EVENT CENTER AND MIXED-USE DEVELOPMENT AT MISSION BAY BLOCKS 29-32

Office of Community Investment and Infrastructure Case No. ER 2014-919-97
San Francisco Planning Department Case No. 2014.1441E
State Clearinghouse No. 2014112045

Draft SEIR Publication Date: June 5, 2015
Draft SEIR Public Hearing Date: June 30, 2015
Draft SEIR Public Comment Period: June 5, 2015 – July 20, 2015

office of
COMMUNITY INVESTMENT
and INFRASTRUCTURE
OCII

Volume 1

Draft Subsequent Environmental Impact Report

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LIST OF ABBREVIATIONS AND ACRONYMS

3-D	three-dimensional
ABAG	Association of Bay Area Governments
AB 26	California Assembly Bill 26
AB 32	California Global Warming Solutions Act (California Assembly Bill 32)
AB 939	California Integrated Waste Management Act of 1989 (California Assembly Bill 939)
AB 900	California Assembly Bill 900
AB 1484	California Assembly Bill 1484
AC Transit	Alameda-Contra Costa Transit District
AEG	Anschutz Entertainment Group
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
agl	above ground level
AQI	Air Quality Index
ATCM	Airborne Toxic Control Measure
AVI	Automatic Vehicle Identification
AWSS	Auxiliary Water Supply System
BAA	Basketball Association of America
BART	San Francisco Bay Area Rapid Transit District
BAAQMD	Bay Area Air Quality Management District
BCDC	San Francisco Bay Conservation and Development Commission
BMPs	best management practices
BOMA	Building Owners and Managers Association International
Btu	British thermal units
CAA	Clean Air Act
CAPCOA	California Air Pollution Officers Association

CARB	California Air Resources Board
CCSF	City and County of San Francisco
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CDSM	Cement Deep Soil Mixing
CEQA	California Environmental Quality Act
CFA	continuous flight auger piles
CFR	Code of Federal Regulations
CHP	California Highway Patrol
CH_4	methane
CMP	Congestion Management Program
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2E	carbon dioxide equivalent
CO-CAT	Coastal and Ocean Working Group of the California Climate Action Team
CPC	Capital Planning Committee
CRHR	California Register of Historical Resources
CSC	California Species of Concern
CSD	combined sewer discharges
CSO	combined sewer overflow
CWA	Federal Clean Water Act
cy	cubic yards
dB	decibel
DEM	digital elevation model
DPH	San Francisco Department of Public Health
DBI	San Francisco Department of Building Inspection
DNL	day-night noise level
DOA	Division of Aeronautics
DPM	diesel particulate matter
DPW	San Francisco Department of Public Works
EIR	Environmental Impact Report

EO	Executive Order
EV	electric vehicle
FAA	Federal Aviation Administration
FAR	floor area ratio
FARR	Final Archaeological Resources Report
FATO	final approach and takeoff area
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FICON	Federal Interagency Committee on Noise
FTA	Federal Transit Administration
FTE	full-time equivalent
GHGs	Greenhouse gases
gpm	gallons per minute
gsf	gross square feet
GSW	Golden State Warriors Arena, LLC
HCM 2000	Highway Capacity Manual 2000
HEPA	High Efficiency Particulate Air Filter
HMBP	hazardous materials business plan
HRA	health risk assessment
HUD	U.S. Department of Housing and Urban Development
I-280	Interstate 280
I-80	Interstate 80
IPCC	Intergovernmental Panel on Climate Change
kWh	kilowatt-hours
L_{eq}	equivalent continuous sound level
L_{max}	maximum noise level
LEED®	Leadership in Energy and Environmental Design
LID	Low Impact Development
LiDAR	Light Detection and Ranging
LRDP	Long Range Development Plan
mgd	million gallons per day
Mission Bay FEIR	Mission Bay Final Environmental Impact Report

Mission Bay FSEIR	Mission Bay Final Subsequent Environmental Impact Report
Mission Bay TMA	Mission Bay Transportation Management Association
MLD	Most Likely Descendant
MMcf	million cubic feet
MMRP	Mitigation Monitoring and Reporting Program
MPO	Metropolitan Planning Organization
MS4	Municipal Separate Storm Sewer System
msl	mean sea level
MTC	Metropolitan Transportation Commission
$MTCO_2E$	metric tons of carbon dioxide equivalent
MTS	Metropolitan Transportation System
Muni	San Francisco Municipal Railway
MW	megawatt
MWh	megawatt-hours
N_2O	nitrous oxide
NAAQS	national ambient air quality standards
NAHC	Native American Heritage Commission
NAVD88	North American Vertical Datum of 1988
NBA	National Basketball Association
NBL	National Basketball League
ng/m^3	nanograms per cubic meter
NIH	National Institutes of Health
NO2	nitrogen dioxide
NOP	Notice of Preparation
North Design for Development	Design for Development for the Mission Bay North Project Area
North Plan	Mission Bay North Redevelopment Plan
North Plan Area	Mission Bay North Redevelopment Plan Area
NPDES	National Pollutant Discharge Elimination System
NWIC	Northwest Information Center
NPDES	National Pollutant Discharge Elimination System
NRC	National Research Council
NRHP	National Register of Historic Places

NSR	New Source Review
O.co Coliseum	Oakland–Alameda County Coliseum
OCII	Office of Community Investment and Infrastructure
OEHHA	California Office of Environmental Health Hazard Assessment
OPA	Owners Participation Agreement
OPR	Governor's Office of Planning and Research
OSHA	Occupation Safety and Health Administration
PCBs	polychlorinated biphenyls
PCOs	Parking Control Officers
PDA	Priority Development Area
PDR	Production, Distribution, and Repair
perc	percloroethylene
PG&E	Pacific Gas and Electric Company
PM	particulate matter
PM10	particulate matter of 10 microns in diameter or less
PM2.5	particulate matter of 2.5 microns in diameter or less
POM	polycyclic organic matter
Port	Port of San Francisco
ppb	parts per billion
ppm	parts per million
pphm	parts per hundred million
PPV	peak particle velocity
RMP	Risk Management Plan
ROG	reactive organic gases
RPP	Residential Permit Parking
RPS	Renewable Porfolio Standard
RRMP	Revised Risk Management Plan
ROSE	San Francisco General Plan Recreation and Open Space Element
RWQCB	Regional Water Quality Control Board
SB 107	California Senate Bill 107
SB 352	California Senate Bill 352
SB 375	California Senate Bill 375

SB 743	California Senate Bill 743
SB 1048	California Senate Bill 1048
SCS	Sustainable Communities Strategy
SAAQS	state ambient air quality standards
Secretary's Standards	Secretary of the Interior's Standards for the Treatment of Historic Properties
SEIR	Subsequent EIR
SEWPCP	Southeast Water Pollution Control Plant
sf	square feet
SFO	San Francisco International Airport
SFCTA	San Francisco County Transportation Authority
SFBAAB	San Francisco Bay Area Air Basin
SFD	San Francisco City Datum
SFGH	San Francisco General Hospital
SFFD	San Francisco Fire Department
SFMTA	San Francisco Municipal Transportation Agency
SFPD	San Francisco Police Department
SFPUC	San Francisco Public Utilities Commission
SFSD	San Francisco Sheriff's Department
SFUSD	San Francisco Unified School District
SHPO	State Historic Preservation Officer
SO2	sulfur dioxide
SoMa	South of Market
South Design for Development	Design for Development for the Mission Bay South Project Area
South Plan	Mission Bay South Redevelopment Plan
South Plan Area	Mission Bay South Redevelopment Plan Area
SSIP	Sewer System Improvement Program
SWMP	Storm Water Management Plan
SWRCB	State Water Resources Control Board
STC	sound transmission class
SVP	Society of Vertebrate Paleontology
SWL	Seawall Lot
SWPPP	Stormwater Pollution Prevention Plan

TACs	toxic air contaminants
TASC	Transportation Advisory Committee
TDM	Transportation Demand Management
TEP	Transit Effectiveness Project
TMA	Transportation Management Association
TMC	Transportation Management Center
TMDL	total maximum daily load
TMP	Transportation Management Plan
TNC	Transportation Network Company
TOG	total organic gases
TPY	tons per year
TSP	Transit Service Plan
TTRP	Travel Time Reduction Proposal
UCPD	University of California Police Department
UCMP	University of California Museum of Paleontology
UCSF	University of California at San Francisco
U.S. 101	U.S. Highway 101
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
UWMP	Urban Water Management Plan
$\mu g/m^3$	micrograms per cubic meter
VdBs	vibration decibels
VDEC	Verified Diesel Emission Control Strategy
VMS	Variable Message Signs
VOC	volatile organic compounds
WAS	Water Availability Study
WETA	Water Emergency Transportation Authority
WHO	World Health Organization
WTA	Waterfront Transportation Assessment

CHAPTER 1
Summary

1.1 Project Description

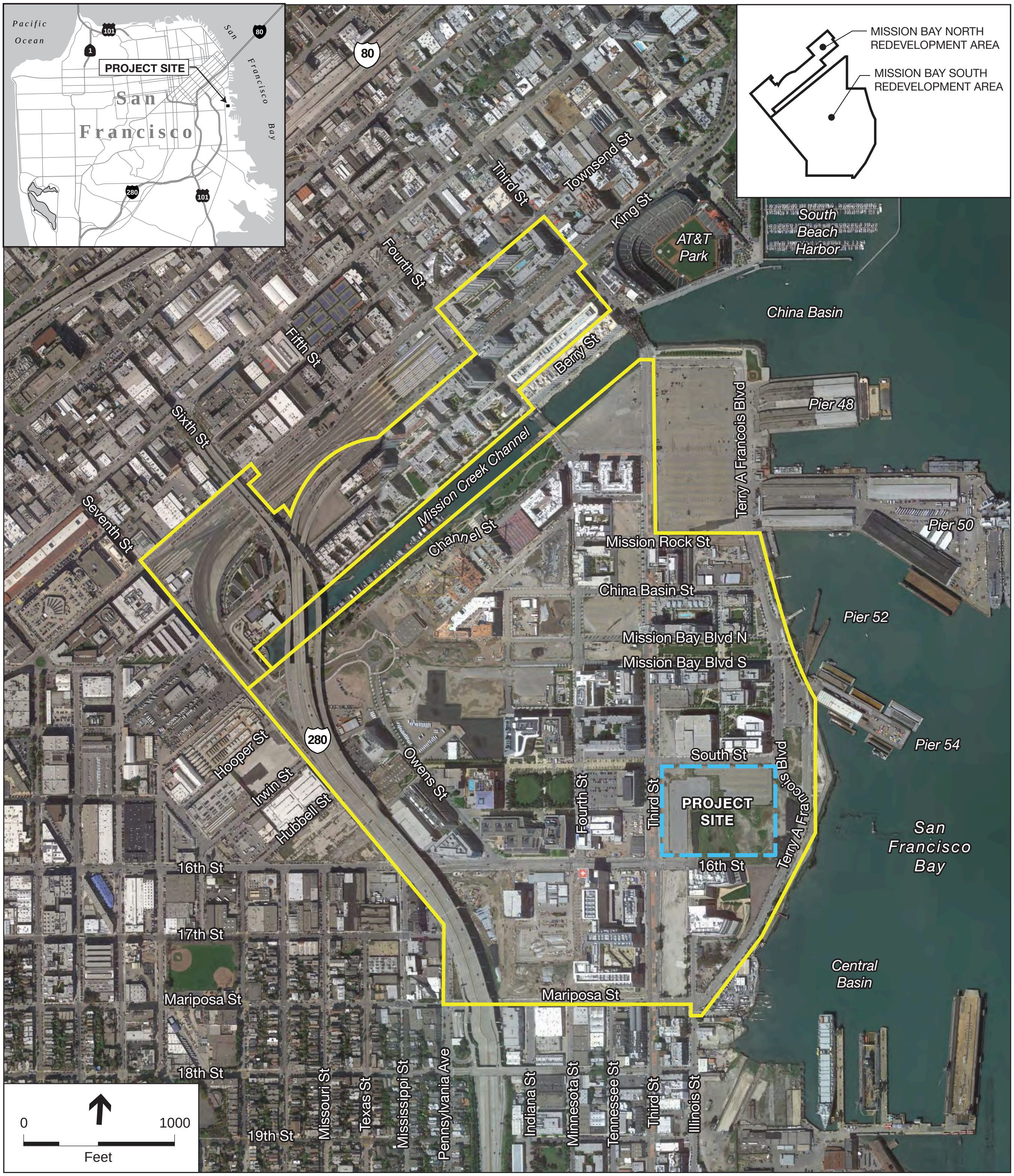
GSW Arena LLC (GSW), an affiliate of Golden State Warriors, LLC, which owns and operates the Golden State Warriors National Basketball Association (NBA) team, proposes to construct a multi-purpose event center and a variety of mixed uses, including office, retail, open space and structured parking on an approximately 11-acre site on Blocks 29-32 within the Mission Bay South Redevelopment Plan Area of San Francisco. See **Figure 1-1** for an aerial photograph of the project site within the Mission Bay South Redevelopment Plan Area. The project site is bounded by South Street on the north, Third Street on the west, 16th Street on the south, and by the future planned realigned Terry A. Francois Boulevard on the east. The proposed event center would host the Golden State Warriors basketball team during the NBA season, and provide a year-round venue for a variety of other uses, including concerts, family shows, other sporting events, cultural events, conferences, and conventions.

1.1.1 Background

The San Francisco Office of Community Investment and Infrastructure (OCII), successor to the San Francisco Redevelopment Agency, is the lead agency responsible for administering the environmental review for private projects in the Mission Bay North and South Redevelopment Plan Area of San Francisco, and has determined that an environmental impact report (EIR) is required for the proposed project in compliance with the requirements of the California Environmental Quality Act (CEQA). This EIR is a public information document for use by governmental agencies and the public to identify and evaluate potential environmental impacts of the proposed project, to recommend mitigation measures to lessen or eliminate significant adverse impacts, and to examine feasible alternatives to the project. The information contained in the EIR must be reviewed and considered by the OCII and by any responsible agencies (as defined in CEQA) prior to a decision to approve, disapprove, or modify the proposed project.

This document is a Subsequent EIR (SEIR), tiered from the certified *Mission Bay Final Subsequent Environmental Impact Report* (Mission Bay FSEIR),[1] which provided programmatic environmental review of the overall Mission Bay Redevelopment Plan (consisting of the Mission Bay North

1 City and County of San Francisco and San Francisco Redevelopment Agency, 1998. *Final Mission Bay Subsequent Environmental Impact Report*. Planning Department File No. 96.771E, San Francisco Redevelopment Agency Case No. ER 919-97, State Clearinghouse No. 97092068. Certified September 17, 1998.



Mission Bay Redevelopment Plan Area Boundary

Project Site Boundary

Note: Please see also Figure 3-2, Existing Roadway Network in Mission Bay, for recent roadway improvements in Mission Bay.

SOURCE: Google Maps, ESA, 2014

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E: Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 1-1
Aerial Photograph of Mission Bay

Redevelopment Plan and Mission Bay South Redevelopment Plan). The Mission Bay FSEIR evaluated the potential environmental effects of the overall development of the approximately 300-acre Mission Bay plan area (see **Figure 1-2** for an illustration of land uses in the Mission Bay Redevelopment Plan). The proposed project at Blocks 29-32 is a subsequent activity allowed under and consistent with the Mission Bay South Redevelopment Plan. This SEIR provides detailed, project-level environmental review of the proposed Event Center and Mixed-Use Development at Blocks 29-32, within the context of the certified Mission Bay FSEIR.

On November 19, 2014, OCII issued a Notice of Preparation (NOP) to notify and inform agencies and interested parties about the proposed project and to initiate the CEQA environmental review process for the project. The NOP included an Initial Study, which described and analyzed environmental resource areas that would not be significantly affected by the proposed project and included mitigation measures to reduce certain impacts to less than significant. This SEIR addresses the remaining environmental resources areas upon which the proposed project could result in significant, physical environmental impacts as well as identifies and analyzes alternatives to the proposed project. The NOP and Initial Study are included in Appendix NOP-IS of this SEIR.

1.1.2 Project Objectives

The Golden State Warriors currently play their home games at Oracle Arena, located at 7000 Coliseum Way in Oakland, California and lease their management offices and practice facility at the Oakland Convention Center at 1011 Broadway in downtown Oakland. The proposed project would consolidate these facilities in one location. Oracle Arena, built in 1966 and remodeled in 1996, is the oldest facility still in use by the NBA.

The project sponsor's objectives for the proposed Event Center and Mixed-Use Development at Blocks 29-32 are to:

- Construct a state-of-the-art multi-purpose event center in San Francisco that meets NBA requirements for sports facilities, can be used year-round for sporting events and entertainment and convention purposes with events ranging in capacity from approximately 3,000-18,500, and expands opportunities for the City’s tourist, hotel and convention business.

- Provide sufficient complementary mixed-use development, including office and retail uses, to create a lively local and regional visitor-serving destination that is active year-round, promotes visitor activity and interest during times when the event center is not in use, provides amenities to visitors of the event center as well as the surrounding neighborhood, and allows for a financially feasible project.

- Develop a project that meets high-quality urban design and high-level sustainability standards.

- Optimize public transit, pedestrian and bicycle access to the site by locating the project within walking distance to local and regional transit hubs, and adjacent to routes that provide safe and convenient access for pedestrians and bicycles.

Mission Bay Redevelopment Plan Area Boundary
Project Site Boundary

0 1000 Feet

Note: Numbers in figure represents Mission Bay Redevelopment Plan block numbers
"X" represents parcels not owned by master developer at the time Mission Bay Redevelopment Plan was adopted
"P" represents open space parcels
"N" represents blocks within Mission Bay North Redevelopment Area

SOURCE: OCII, ESA, 2014

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 1-2
Land Uses in the Mission Bay Redevelopment Plan

- Provide adequate parking and vehicular access that meets NBA and project sponsor's reasonable needs for the event center and serves the needs of project visitors and employees, while encouraging the use of transit, bicycle, and other alternative modes of transportation.

- Provide the City with a world class performing arts venue of sufficient size to attract those events which currently bypass San Francisco due to lack of a world class 3,000-4,000 seat facility.

- Develop a project that promotes environmental sustainability, transportation efficiency, greenhouse gas reduction, stormwater management using green technology, and job creation consistent with the objectives of the California Jobs and Economic Improvement Through Environmental Leadership Act (AB 900),[2] as amended.

1.1.3 Project Characteristics

The proposed project would develop the currently vacant Blocks 29-32 with a multi-purpose event center and a variety of mixed uses, including office, retail, open space and structured parking on the approximately 11-acre site. **Figure 1-3** presents the conceptual project site plan, illustrating primary project features and associated building heights. **Table 1-1** provides a summary overview of the key characteristics of the project facilities.

The proposed roughly circular-shaped event center building would be located in the central-east portion of the site. The event center building would be approximately 135 feet at its roof peak, and would include multiple levels of varying elevations. The event center would be programmed with a capacity of 18,064 seats for basketball games, but could be reconfigured for concerts for a maximum capacity of about 18,500. The performance and seating areas could also be re-configured in a cut-down theater configuration to create a smaller venue space.

Two office and retail buildings would be located on the west side of the project site. These buildings would each be 11 stories (160 feet tall at building rooftop); each office and retail building would consist of a podium ground level plus 5 podium levels (90 feet tall), with a 5-story (70-foot tall) tower (with smaller floorplate than the podium) above. These buildings could serve a variety of office and/or research and development uses, with retail uses on the lower floor(s).

Additional retail uses would front on South Street and Terry A. Francois Boulevard, and a 2-story, 38-foot high "gatehouse" building located mid-point along Third Street would provide retail uses and house elevators/escalators connecting to parking facilities on lower floors. A 3-story, 41-foot high "food hall" would be located at the corner of Terry A. Francois Boulevard and South Street.

Approximately 3.2 acres of open space would be designed within the site, including a proposed Third Street Plaza (elevated at approximately 8 to 12 feet above Third Street) on the west side of the project site between the event center and Third Street, and a proposed ground-level Southeast Plaza in the southeastern corner of the site.

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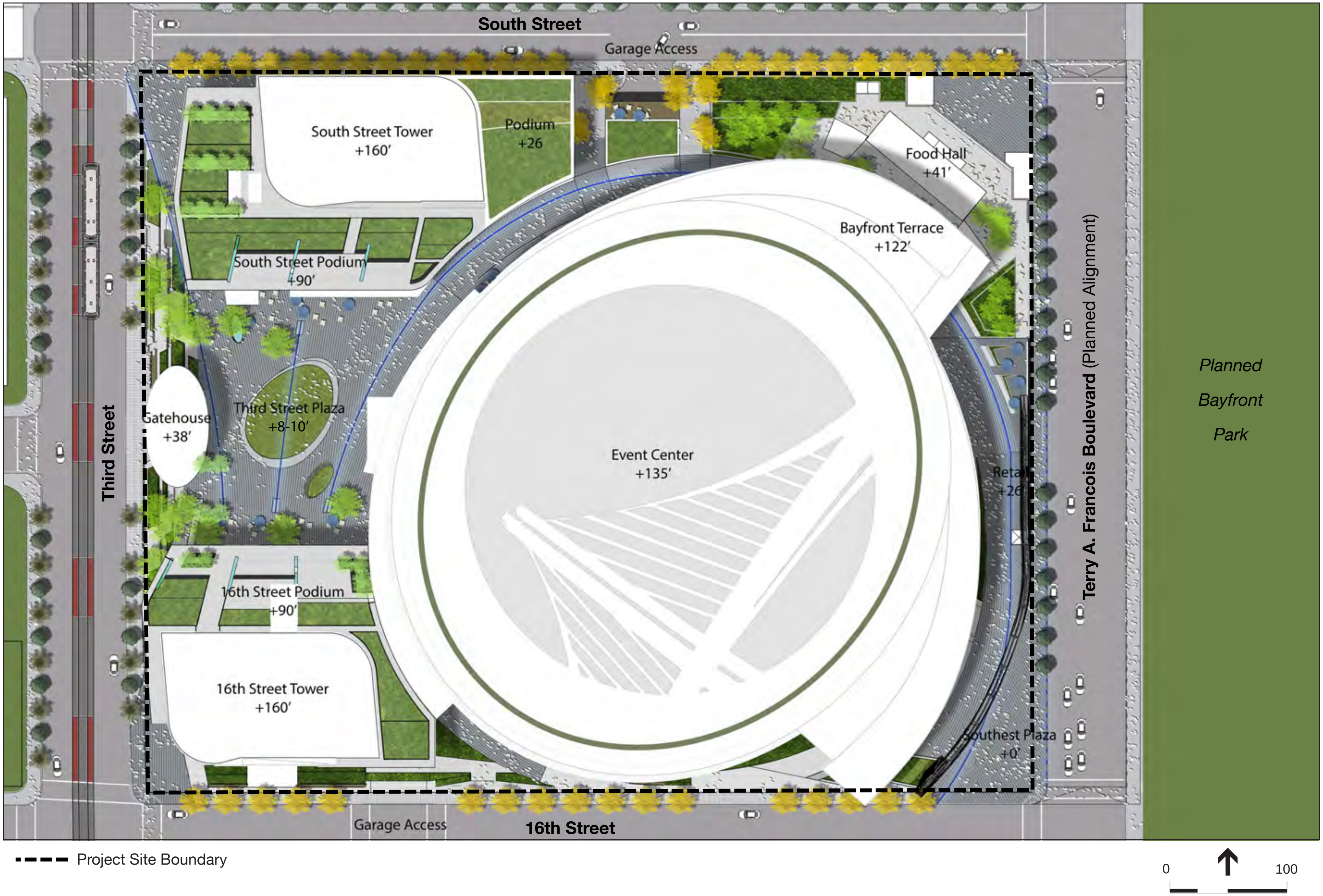
2 AB 900, effective January 1, 2012, provides streamlining benefits under CEQA for privately-financed projects located on an infill site that has been determined to generate thousands of jobs and include state-of-the-art pollution reductions.



SOURCE: Manica Architecture, 2015

Note: All building elevations were estimated per *Mission Bay South Design for Development* guidelines; please see text for additional description.

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Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 1-3
Conceptual Project Site Plan

TABLE 1-1
SUMMARY OF PROPOSED PROJECT FACILITIES AND DESIGN FEATURES

Project Component	Characteristic
Event Center Basketball Seating Capacity	18,064 seats[a]
Size	Total GSF
Event Center[b]	750,000
Golden State Warriors Office Space	25,000
Office Space	580,000
Retail Space[c]	125,000
Parking and Loading	475,000
Total Building Area	**1,955,000 GSF**[d]
Height[e,f]/Levels	
Event Center	135 feet
Office and Retail Buildings	160 feet (11 stories) total [90-foot (6-story) podiums with 70-foot (5-story) towers above]; retail uses within street level and plaza-level floors
Retail-only Buildings	41 feet in market hall building northeast corner of site; 38 feet in gatehouse building along Third Street
Parking/Loading Spaces	Blocks 29-32: 950 parking stalls below-grade or at-grade (concealed by Third Street Plaza) 13 truck docks below-grade Existing off-site at 450 South Street Parking Garage: 132 parking stalls
Vehicular Access	Access point for autos and all trucks on 16th Street at Illinois Street Access point for autos on South Street at Bridgeview Way
Open Space	3.2 acres

NOTES:

GSF = gross square feet.

a Presented maximum seating capacity is for basketball games. However, as discussed in Chapter 3, Project Description, there would other types of events at the event center, including certain concerts and conventions, that would be able to accommodate a maximum attendance of up approximately 18,500 patrons with the addition of floor seats and/or standing room-only spaces (see Table 3-3 in Chapter 3 for more detail).

b The event center would include a variety of supporting uses, including Golden State Warriors practice facility and management offices, bayfront terrace, retail, and other uses. For purposes of estimating areas, the Golden State Warriors management office space square footage is presented separately from square footage of the other event center uses.

c Proposed retail uses are approximately 51,500 GSF sit-down restaurant, 11,000 quick-service restaurant, and 62,500 GSF soft goods retail including food retail.

d The CEQA analyses are based on gross square footage. However, the Mission Bay South Redevelopment Plan permits development based on adjusted gross square footage and leasable square footage. Gross Square Footage and Leasable Square Footage as defined in the Mission Bay South Redevelopment Plan for this project would be less than the gross square footage presented in this environmental document.

e All building heights in this SEIR, unless otherwise noted, are measured from finished grade to top of building, consistent with the South Design for Development guidelines. Please note the project site would continue to be slightly sloped, as under existing conditions. Per the South Design for Development guidelines, building height measurements are taken at the median grade height for each building face, and the total building height is calculated by averaging the height of the individual building faces.

f Heights of proposed office and retail buildings exclude unoccupied top floor level with mechanical equipment. Mechanical equipment and associated enclosure may be up to 20 feet above the rooftop of building.

SOURCE: Manica Architecture, 2014, 2015

Three levels of enclosed on-site parking (two below grade and one at street level) would be located below the office and retail buildings and plaza areas, with a total of 950 vehicle parking spaces. Thirteen truck loading docks located on the lower parking level would serve the event center and office and retail uses. The project would also include 132 off-site parking spaces at the South Street garage, directly north of the project site, across South Street.

The project would be designed to Leadership in Energy and Environmental Design (LEED®) Gold standards and would incorporate a variety of design features to provide energy and water conservation and efficiency, encourage alternative transportation, promote a healthy indoor environment, minimize waste, and maximize recycling opportunities. The project would also implement a number of off-site roadway network and curb regulations, transit network, pedestrian and bicycle network improvements in the project site vicinity, including roadway restriping, intersection signalization, on-street parking, new perimeter sidewalks, bicycle lanes, signage and other improvements.

1.1.4 Proposed Operations

The event center would serve as the new venue for the Golden State Warriors home games, and provide a year-round venue for a variety of other uses, including concerts, family shows, other sporting events, cultural events, conferences and conventions. The event center would be used for up to approximately 225 events per year, with events ranging in capacity from approximately 3,000 patrons up to about 18,500 patrons. All existing Golden State Warriors operations, including management offices and practice facility, would relocate from their existing facilities in Oakland to the new event center. The proposed office and retail facilities on Blocks 29-32 would operate year-round, independent of the event center operations.

As part of the project, the project sponsor prepared and would implement a Transportation Management Plan (TMP). The TMP is a management and operating plan to facilitate multimodal access at the event center during project operation. The TMP includes various management strategies designed to reduce use of single-occupant vehicles and to increase the use of rideshare, transit, bicycle, and walk modes for trips to and from the project site.

1.1.5 Construction

Construction of the proposed project is anticipated to occur over an approximate 26-month period. Construction activities would include, but not be limited to: site demolition, clearing and excavation; temporary dewatering; pile installation and foundation construction; construction of all proposed development, including event center, podium structure, office towers and plazas; installation of associated utilities; interior finishing; and exterior hardscaping and landscaping improvements.

1.2 Environmental Impacts and Mitigation Measures

The Initial Study determined that the following topics were adequately analyzed in the Mission Bay FSEIR such that the proposed project would have no new significant impacts or no substantially more severe impacts previously found significant on these resources: Land Use; Population and Housing; Cultural and Paleontological Resources; Recreation; Air Quality (odors); Utilities and Services Systems (water supply and solid waste); Public Services (schools, parks, and other services); Biological Resources; Geology and Soils; Hydrology and Water Quality (groundwater, drainage, flooding, and inundation); Hazards and Hazardous Materials; Mineral and Energy Resources; and Agricultural and Forest Resources. Discussion and analysis of these impacts can be found in Appendix NOP-IS.

Impacts related to Aesthetics are not analyzed in the Initial Study or this SEIR because under CEQA (Public Resources Code Section 21099), aesthetics impacts of a mixed-use or employment center project on an infill site located within a transit priority area are not to be considered significant impacts.

Chapter 5 of the SEIR presents detailed discussion and analysis of the following resources: Transportation and Circulation; Noise and Vibration; Air Quality; Greenhouse Gas Emissions; Wind and Shadow; Utilities and Service Systems (wastewater and stormwater); Public Services (police and fire services); and Hydrology and Water Quality (wastewater, stormwater, and flood hazards).

Table 1-2 (at the end of this chapter) summarizes all of the impacts of the proposed project, identifies the significance determination of each impact, and presents the full text of the recommended mitigation measures and improvement measures. Mitigation measures are feasible measures that would avoid, lessen, or reduce significant impacts, and would be required to be implemented if the project is approved. Improvement measures would also lessen or reduce impacts, but unlike mitigation measures, implementation of improvement measures is not required under CEQA because they apply only to impacts determined to be less than significant. However, all improvement measures identified in this SEIR would be incorporated into conditions of approval and therefore would also be required to be implemented if the project is approved. The summary table includes all impacts and mitigation measures applicable to the proposed project, with the SEIR sections presented first, followed by the Initial Study sections.

As indicated on Table 1-2, the SEIR determined that the proposed project would result in significant and unavoidable impacts in the areas of transportation and circulation (traffic impacts at multiple intersections and freeway ramps, and transit demand on regional transit providers exceeding capacity); noise (substantial permanent increase in roadway noise and crowd noise affecting sensitive receptors); air quality (construction and operational emissions of ozone precursors exceeding thresholds), wind (substantial increase in wind hazard hours at off-site public areas); and utilities (construction of new or upgraded wastewater facilities, and determination by the San Francisco Public Utilities Commission that it currently has inadequate capacity to serve the project's wastewater demand).

1.3 Alternatives

An alternatives screening process was conducted to identify a reasonable range of alternatives that would avoid or lessen significant impacts of the proposed project, would meet most of the project objectives, and would be feasible. This process resulted in three alternatives selected for detailed analysis: the No Project Alternative, as required by CEQA; the Reduced Intensity Alternative based on its ability to attain the basic project objectives and its potential ability to avoid or substantially lessen transportation- and construction-related significant impacts; and the Off-site Alternative at Piers 30-32 and Seawall Lot 330 based on its ability to attain the basic project objective and its potential ability to avoid or substantially lessen wastewater capacity impacts, operational noise impacts, UCSF hospital helipad safety impacts, construction-related impacts, and water quality and hazardous materials impacts that were identified for the proposed project. In addition, analysis of a project variant requested by the project sponsor resulted in a fourth alternative, the Third Street Plaza Variant, which would lessen off-site wind hazard impacts of the proposed project. Numerous alternatives, including several off-site alternatives, were considered but eliminated from further consideration for one or more of the following reasons: the alternative would be infeasible, the alternative would result in the same or greater significant impacts than the proposed project, and/or the alternative would not meet most of the project objectives.

1.3.1 No Project Alternative

The No Project Alternative assumes that development at Blocks 29-32 could occur in the foreseeable future within the restrictions and controls established in the Mission Bay South Redevelopment Plan and the South Design for Development, as was envisioned in the Mission Bay FSEIR. While there is currently no such development proposal for Blocks 29-32, a hypothetical scenario was developed for the purposes of this SEIR. Under this scenario, the total mixed-use development would be 1,056,000 gross square feet (gsf) of commercial/ industrial uses, and 31,700 gsf of retail uses, with all buildings a maximum of 90 feet high except for a 160-foot high tower on Block 29, on-site above-grade structure parking with 1,050 stalls, and 132 spaces of off-site parking at the South Street garage. There would be no event center.

Impacts of the No Project alternative would be similar to those of the proposed project with respect to most resource areas. This is because most of these impacts would result from the conversion of a vacant parcel to a fully developed City block, regardless of the size of the development. However, unlike the proposed project which would result in significant and unavoidable air quality and noise impacts, the No Project Alternative would result in less-than-significant effects for the comparable impacts, due in large part to the removal of air pollutant emissions and noise from mobile sources associated with the event center. The No Project Alternative would avoid or substantially lessen a number of the project's significant and unavoidable impacts related to traffic, transit, crowd noise, roadway noise, and emissions of criteria air pollutants during construction and operation. However, the No Project Alternative would fail to meet the basic project objective of building an event center that can be used for NBA basketball games.

1.3.2 Reduced Intensity Alternative

The Reduced Intensity Alternative, developed as a hypothetical scenario for the purposes of this SEIR, would be the same as the proposed project with respect to the event center, but the office uses would be reduced from 580,000 to 373,000 gsf, retail uses would be reduced from 125,000 to 75,000 gsf, and on-site, subgrade parking reduced from 950 to 750 stalls. The total development would be reduced from 1,955,000 to 1,673,000 gsf, or a reduction of 282,000 gsf. In addition, the 16th Street tower would be reduced by seven floors, such that the height of the structure at Third and 16th Streets would be 55 feet instead of 160 feet.

Impacts of this alternative would be similar to those of the proposed project with respect to nearly all resource areas. This is because not only would the Reduced Intensity Alternative result in conversion of a vacant parcel to a fully developed City block, but with the inclusion of the event center, the Reduced Intensity Alternative would not avoid or substantially lessen any of the significant and unavoidable impacts identified for the proposed project. However, the reduced scale of the office and retail development would result in reducing the severity of a broad range of significant impacts. The Reduced Intensity Alternative would result in similar but slightly less severe impacts related to traffic, noise, air quality, and wastewater demand, and this alternative would meet all of the basic project objectives.

1.3.3 Off-site Alternative at Piers 30-32 and Seawall Lot 330

This alternative is based on a previous proposal by the same project sponsor, but was withdrawn and replaced by the currently proposed project. The Off-site Alternative at Piers 30-32 and Seawall Lot 330 would have an event center on Piers 30-32 with the same basketball seating capacity as the currently proposed project (18,064 seats), totaling 694,944 gsf (including the GSW offices), plus an event hall covering 25,946 gsf. Also located on Piers 30-32, this off-site alternative would include about 90,000 gsf of retail/restaurant uses, 13,172 gsf for services, about 252,554 gsf for parking and loading, and 1,820 gsf for Red's Java House, for a total building area of about 1,078,436 gsf. The height of the event center would be 128 feet high, with seven arena levels, height of the retail buildings 32 to 58 feet, with 1 to 3 levels, and the parking would be 31 feet high, with 3 levels. Red's Java House would be relocated from its current location in the northwest corner of Piers 30-32 to near the southwest corner. Other proposed facilities on Piers 30-32 would include a water taxi dock, a dolphin berthing structure, and over 7 acres of public open space on Piers 30-32. There would be 500 parking spaces at Piers 30-32. In addition to the development on Piers 30-32, the Off-site Alternative would include development on Seawall Lot 330, located directly across The Embarcadero from Piers 30-32, and consist of 208,844 gsf residential, 178,406 gsf hotel, 29,854 gsf retail, 106,339 gsf parking, and 11,447 gsf shared support areas. The development would include a four-story building with a 13-story residential tower above it (total height 175 feet) and a seven story hotel tower (total height 105 feet. Construction would require 32 months, compared to 26 months for the proposed project.

The Off-site Alternative would avoid or substantially lessen of the impacts of the proposed project related to roadway noise, criteria air pollutant emissions during project operations, wind hazards at off-site public areas, and wastewater utilities. However, this alternative would have substantially more severe impacts than the proposed project related to construction noise and vibration and exposure of sensitive receptors to health risks. Furthermore, this alternative would result in different significant and unavoidable impacts that would not occur under the proposed project in the areas of transportation (traffic impacts at different intersections and a greater number of intersections) and construction noise (impacts on special-status fish and marine mammals). This alternative would meet most of the basic project objectives.

1.3.4 Third Street Plaza Variant as an Alternative

The Third Street Plaza Variant, described below under Section 1.5, is a minor variation on the proposed project in which the gatehouse and elevated plaza along Third Street would be replaced with a plaza. It would meet all of the project objectives and would have all the same impacts as the proposed project, except that it would avoid the significant and unavoidable wind hazard impact that was identified for the proposed project.

1.3.5 Environmentally Superior Alternative

The Reduced Intensity Alternative would be considered the environmentally superior alternative because it would reduce the severity of adverse environmental effects across a broad range of resources and would not result in any new significant impacts that would not occur under the proposed project.

1.4 Areas of Controversy and Issues to Be Resolved

On November 11, 2014, the OCII issued a NOP of a SEIR on the proposed project. Individuals, groups, and agencies that received these notices included owners of properties within 300 feet of the project site and other potentially interested parties, including various regional, state, and local agencies. A scoping meeting was held on December 9, 2014, to solicit comments on the scope of the SEIR. Based on the comments received during the scoping period for the project, controversial issues for the proposed project, as expressed by community members, include the following:

- Site should be reserved for potential future expansion of the UCSF campus;
- Effect of project construction and operations on UCSF helipad operations;
- Why the project is analyzed under a Subsequent Environmental Impact Report;
- Which City ordinances, regulations, and approval requirements are superseded or otherwise different in the Mission Bay area;
- Aesthetic effects of the proposed development, including views through the project site and view easements, light and glare effects from construction, building lighting, and outdoor events;
- The approach to the transportation impact analysis, reasons for the assumptions incorporated (specifically into mode share), times of day and week studied, and cumulative projects considered;

- Impacts on transportation and circulation (including highways, arterial streets, local streets, pinch points, transit stations and service, and emergency response), as well as mitigation measures—specifically a Transportation Management Plan—that would reduce such impacts;
- Provision of sufficient bicycle and pedestrian circulation facilities and impacts to bicyclists and pedestrians;
- Parking supply and demand under both existing conditions and with the project;
- Financing, monitoring, and responsibility for implementation of mitigation measures;
- Noise from construction, outdoor events, crowds, operational traffic and generators;
- Impact from exposure to air pollutants during construction and operation;
- Effects on nearby infrastructure and facilities, including the Mariposa pump station and Bayfront Park;
- Security and crowd management, provision of public restrooms, provision of trash receptacles, littering, vermin, graffiti, and public intoxication;
- Economic effects of the project on the surrounding neighborhood and City; and
- Cumulative impacts of development of the project combined with development of other projects, and development under other plans, in the vicinity.

1.5 Third Street Plaza Variant

The project sponsor has requested that this SEIR include environmental analysis of a variant to the proposed project. The project variant, the Third Street Plaza Variant, is a minor variation of the proposed project at the same project site at Mission Bay Blocks 29-32, with all of the same objectives, background, and development controls, and with one exception, same approvals as the proposed project. The Third Street Plaza Variant is analyzed in this SEIR at an equal level of detail as the proposed project, and therefore the variant analysis satisfies all CEQA requirements, should this variant be selected for approval.

Under the Third Street Plaza Variant, all aspects of the design, uses, construction, and operation proposed project would be identical to that of the proposed project with one exception: the area of the proposed Third Street Plaza would be modified to be consistent with the design standards of the UCSF view easement on the project site. Consequently, the "gatehouse" building, located mid-block along Third Street under the proposed project, would be relocated and the elevated main plaza would be replaced with an at-grade "event space" with no above-grade structural development. The variant would not require approval by UCSF for termination of their view easement that extends east from Third Street onto the project site.

The Third Street Plaza Variant would have all the same environmental impacts as those identified for the proposed project, with the exception of Wind effects. Unlike the proposed project which would have significant and unavoidable wind hazard impacts at off-site public locations, the Third Street Plaza Variant would have less-than-significant wind hazard impacts.

TABLE 1-2
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Transportation and Circulation, SEIR Section 5.2		
Construction		
Impact TR-1: The proposed project would not result in construction-related ground transportation impacts because of their temporary and limited duration.	LS	No mitigation required. **Improvement Measure I-TR-1: Construction Management Plan and Public Updates** ***Construction Coordination*** – To reduce potential conflicts between construction activities and pedestrians, bicyclists, transit and vehicles at the project site, the project sponsor shall require that the contractor prepare a Construction Management Plan for the project construction period. The preparation of a Construction Management Plan could be a requirement included in the construction bid package. Prior to finalizing the Plan, the project sponsor/construction contractor(s) shall meet with DPW, SFMTA, the Fire Department, Muni Operations and other City agencies to coordinate feasible measures to include in the Construction Management Plan to reduce traffic congestion, including temporary transit stop relocations and other measures to reduce potential traffic, bicycle, and transit disruption and pedestrian circulation effects during construction of the proposed project. This review should consider other ongoing construction in the project vicinity, such as construction of the nearby UCSF LRDP projects and construction on Blocks 26 and 27. ***Carpool, Bicycle, Walk and Transit Access for Construction Workers*** – To minimize parking demand and vehicle trips associated with construction workers, the construction contractor could include as part of the Construction Management Plan methods to encourage carpooling, bicycle, walk and transit access to the project site by construction workers (such as providing transit subsidies to construction workers, providing secure bicycle parking spaces, participating in free-to-employee ride matching program from www.511.org, participating in emergency ride home program through the City of San Francisco (www.sferh.org), and providing transit information to construction workers. ***Construction Worker Parking Plan*** – As part of the Construction Management Plan that would be developed by the construction contractor, the location of construction worker parking could be identified as well as the person(s) responsible for monitoring the implementation of the proposed parking plan. The use of on-street parking to accommodate construction worker parking could be discouraged. All construction bid documents could include a requirement for the construction contractor to identify the proposed location of construction worker parking. If on-site, the location, number of parking spaces, and area where vehicles would enter and exit the site could be required. If off-site parking is proposed to accommodate construction workers, the location of the off-site facility, number of parking spaces retained, and description of how workers would travel between off-site facility and project site could be required. ***Project Construction Updates for Adjacent Businesses and Residents*** – To minimize construction impacts on access to nearby institutions and businesses, the project sponsor could provide nearby residences and adjacent businesses with regularly-updated information regarding project construction, including construction activities, peak construction vehicle activities (e.g., concrete pours), travel lane closures, and parking lane and sidewalk closures. A regular email notice could be distributed by the project sponsor that would provide current construction information of interest to neighbors, as well as contact information for specific construction inquiries or concerns.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Transportation and Circulation, SEIR Section 5.2 (cont.)		
Conditions Without a SF Giants Game at AT&T Park (Impacts TR-2 through TR-10)		
Impact TR-2: The proposed project would result in significant traffic impacts at multiple intersections that would operate at LOS E or LOS F under Existing plus Project conditions without a SF Giants game at AT&T Park.	SUM	**Mitigation Measure M-TR-2a: Additional PCOs during Events** As a mitigation measure to manage traffic flows and minimize congestion associated with events at the project site, the proposed project's TMP shall be modified to include four additional PCOs that shall be deployed to intersections where the proposed project would result in significant impacts, as conditions warrant during events. These could include the intersections of King/Fourth, Fifth/Harrison/I-80 westbound off-ramp, Fifth/Bryant/I-80 eastbound on-ramp, Seventh/Mission Bay Drive, and Seventh/Mississippi/16th. The PCO Supervisor shall make the determination where the additional PCOs would be located, based on field conditions during an event. **Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts** The project sponsor shall work with the City to pursue and implement, if feasible, additional strategies to reduce transportation impacts. In addition, the City shall pursue and implement, if feasible, additional strategies that could be implemented by the City or other public agency (e.g., Caltrans). These strategies could include the following: ***Strategies to Reduce Traffic Congestion*** • The City to work with Caltrans to install changeable message signs upstream of key entry points onto the street network, such as on I-280 northbound. • The City to provide coordinated outreach efforts to surrounding neighborhoods to explore the need/desire for new on-street parking management strategies, which could include implementation of time limits and Residential Parking Permit program areas. • The project sponsor to offer for pre-purchase substantially all available on-site parking spaces not otherwise committed to office tenants, retail customers or season ticket holders, and to cooperate with neighboring private garage operators to pre-sell parking spaces, as well as notify patrons in advance that nearby parking resources are limited and travel by non-auto modes is encouraged. • The project sponsor to create a smart phone application, or integrate into an existing smart phone application, transportation information that promotes transit first, allows for pre-purchase of parking and designates suggested paths of travel that best avoid congested areas or residential streets such as Bridgeview north of Mission Bay Boulevard and Fourth Street. • The City and the project sponsor to work to identify off-site parking lot(s) in the vicinity of the event center, if available, where livery and TNC vehicles could stage prior to the end of an event.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Transportation and Circulation, SEIR Section 5.2 (cont.)		
Conditions Without a SF Giants Game at AT&T Park (Impacts TR-2 through TR-10) (cont.)		
Impact TR-2 (cont.)		• The City to include on-street parking spaces within Mission Bay in the expansion and permanent implementation of SF*park*, including installation of sensors, dynamic pricing, and smart phone application providing real-time parking availability and cost. • The City shall work to include the publicly accessible off-street facilities into the permanent implementation of SF*park*, and incorporate data into a smart phone application and permanent dynamic message signs. • If necessary to support achievement of non-auto mode shares for the project, the project sponsor shall cooperate with future City efforts for active interventions to effectively manage and price the parking supply in the project vicinity to reduce travel by automobile, thus improving traffic conditions. • The project sponsor to seek partnerships with car-sharing services. ***Strategy to Enhance Non-auto Modes*** • The project sponsor to provide a promotional incentive (e.g., show Clipper card or bike valet ticket for concession savings, chance to win merchandise or experience, etc.) for public transit use and/or bicycle valet use at the event center. ***Strategies to Enhance Transportation Conditions in Mission Bay and Nearby Neighborhoods*** • The project sponsor to participate as a member of the Mission Bay Ballpark Transportation Coordination Committee (MBBTCC) and to notify at least one month prior to the start of any non-GSW event with at least 12,500 expected attendees. If commercially reasonable circumstances prevent such advance notification, the GSW shall notify the MBBTCC within 72 hours of booking. • The City and the project sponsor to meet to discuss transportation and scheduling logistics following signing any marquee events (national tournaments or championships, political conventions, or tenants interested in additional season runs: NHL, NCAA, etc.). ***Strategies to Increase Transit Access*** • The City to coordinate with regional providers to encourage increased special event service, particularly longer BART and Caltrain trains, and increased ferry and bus service. • The City to work in good faith with the Water Emergency Transportation Agency, the project sponsor, UCSF, and other interested parties to explore the possibility of construction of a ferry landing at the terminus of 16th Street, and provision of ferry service during events.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Transportation and Circulation, SEIR Section 5.2 (cont.)		
Conditions Without a SF Giants Game at AT&T Park (Impacts TR-2 through TR-10) (cont.)		
Impact TR-2 (cont.)		**Mission Bay FSEIR Mitigation Measure E.47: Transportation System Management Plan** Prepare a TSM Plan, which could include the following: *FSEIR Mitigation Measure E.47.a*: Shuttle Bus - Operate shuttle bus service between Mission Bay and regional transit stops in San Francisco (e.g., BART, Caltrain, Ferry Terminal, Transbay Transit Terminal), and specific gathering points in major San Francisco neighborhoods (e.g., Richmond and Mission Districts). *FSEIR Mitigation Measure E.47.b*: Transit Pass Sales - Sell transit passes in neighborhood retail stores and commercial buildings in the Project Area. *FSEIR Mitigation Measure E.47.c*: Employee Transit Subsidies - Provide a system of employee transportation subsidies for major employers. *FSEIR Mitigation Measure E.47.e*: Secure Bicycle Parking - Provide secure bicycle parking area in parking garages of residential buildings, office buildings, and research and development facilities. Provide secure bicycle parking areas by 1) constructing secure bicycle parking at a ratio of 1 bicycle parking space for each 20 automobile parking spaces, and 2) carry out an annual survey program during project development to establish trends in bicycle use and to estimate actual demand for secure bicycle parking and for sidewalk bicycle racks, increasing the number of secure bicycle parking spaces or racks either in new buildings or in existing automobile parking facilities to meet the estimated demand. Provide secure bicycle racks throughout Mission Bay for the use of visitors. *FSEIR Mitigation Measure E.47.f*: Appropriate Street Lighting - Ensure that streets and sidewalks in Mission Bay are sufficiently lit to provide pedestrians and bicyclists with a greater sense of safety, and thereby encourage Mission Bay employees, visitors and residents to walk and bicycle to and from Mission Bay. *FSEIR Mitigation Measure E.47.g*: Transit and Pedestrian and Bicycle Route Information - Provide maps of the local and citywide pedestrian and bicycle routes with transit maps and information on kiosks throughout the Project Area to promote multi-modal travel. *FSEIR Mitigation Measure E.47.h*: Parking Management Strategies - Establish parking management guidelines for the private operators of parking facilities in the Project Area. *FSEIR Mitigation Measure E.47i*: Flexible Work Hours/Telecommuting - Where feasible, offer employees in the Project Area the opportunity to work on flexible schedules and/or telecommute so they could avoid peak hour traffic conditions.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Transportation and Circulation, SEIR Section 5.2 (cont.)		
Conditions Without a SF Giants Game at AT&T Park (Impacts TR-2 through TR-10) (cont.)		
Impact TR-2 (cont.)		*FSEIR Mitigation Measure E.49*: Ferry Service - Make a good faith effort to assist the Port of San Francisco and others in ongoing studies of the feasibility of expanding regional ferry service. Make good faith efforts to assist in implementing feasible study recommendations.
Impact TR-3: The proposed project would result in significant traffic impacts at freeway ramps that would operate at LOS E or LOS F under Existing plus Project conditions without a SF Giants game at AT&T Park.	SUM	**Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts** (see Impact TR-2, above)
Impact TR-4: The proposed project would not result in a substantial increase in transit demand that could not be accommodated by adjacent Muni transit capacity such that significant adverse impacts to Muni transit service would occur under Existing plus Project conditions without a SF Giants game at AT&T Park.	LS	No mitigation required. **Improvement Measure I-TR-4: Operational Study of the Southbound Platform at the T Third UCSF/Mission Bay Station** As an improvement measure to enhance T Third operations at the UCSF/Mission Bay station for pre-event arrivals, the project sponsor shall fund a study of the effects of pedestrian flows on Muni's safety and operations prior to an event as well as the feasibility and efficacy of enlarging the southbound platform by extending it south towards 16th Street. The study shall include an assessment of exiting pedestrian flows from a fully occupied two-car light rail train on the platform and ramp to the crosswalk at South Street across Third Street, also taking into consideration the presence of non-event transit riders waiting to board the train, service frequency, and current traffic signal operations. The study shall be performed by a qualified transportation professional approved by SFMTA.
Impact TR-5: The proposed project would result in a substantial increase in transit demand that could not be accommodated by regional transit capacity such that significant adverse impacts to regional transit service would occur under Existing plus Project conditions without a SF Giants game at AT&T Park.	SUM	**Mitigation Measure M-TR-5a: Additional Caltrain Service** As a mitigation measure to accommodate transit demand to and from the South Bay for weekday and weekend evening events, the project sponsor shall work with the Ballpark/Mission Bay Transportation Coordinating Committee to coordinate with Caltrain to provide additional Caltrain service to and from San Francisco on weekdays and weekends. The need for additional service shall be based on surveys of event center attendees conducted as part of the TMP.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Transportation and Circulation, SEIR Section 5.2 (cont.)		
Conditions Without a SF Giants Game at AT&T Park (Impacts TR-2 through TR-10) (cont.)		
Impact TR-5 (cont.)		**Mitigation Measure M-TR-5b: Additional North Bay Ferry and/or Bus Service** As a mitigation measure to accommodate transit demand to the North Bay following weekday and weekend evening events, the project sponsor shall work with the Ballpark/Mission Bay Transportation Coordinating Committee to coordinate with Golden Gate Transit and WETA to provide additional ferry and/or bus service from San Francisco following weekday and weekend evening events. The need for additional service shall be based on surveys of event center attendees conducted as part of the TMP.
Impact TR-6: The proposed project could result in a substantial overcrowding on public sidewalks, or create potentially hazardous conditions for pedestrians, or otherwise interfere with pedestrian accessibility on the site and adjoining areas under Existing plus Project conditions without a SF Giants game at AT&T Park.	LSM	**Mitigation Measure M-TR-6: Active Management of Pedestrian Flows at the Intersection of Third/South** As a mitigation measure to accommodate pedestrians traveling to and from the event center through the intersection of Third/South, PCOs stationed at this location shall implement strategies to allow pedestrians to cross the street safely. The strategies and level of active management shall be tailored to the event size, and could include extending the green time for pedestrians crossing the street, manually overriding the traffic signal and directing pedestrians to cross, erecting temporary pedestrian crossing barriers, allowing use of the closed Third Street as a pedestrian access route, providing a defined passenger waiting area within the closed Third Street, shielding passengers waiting to board light rail from adjacent pedestrian traffic, and deploying additional PCOs to this intersection.
Impact TR-7: The proposed project would not result in potentially hazardous conditions for bicyclists, or otherwise substantially interfere with bicycle accessibility to the site and adjoining areas under Existing plus Project conditions without a SF Giants game at AT&T Park.	LS	No mitigation required.
Impact TR-8: The proposed project's loading demand would be accommodated within the proposed on-site loading facilities or proposed adjacent on-street commercial loading spaces, and would not create potentially hazardous conditions or significant delays for traffic, transit, bicyclists, or pedestrians under Existing plus Project conditions.	LS	No mitigation required. **Improvement Measure I-TR-8: Truck and Service Vehicle Loading Operations Plan** As an improvement measure to reduce potential conflicts between driveway operations, including loading activities, and pedestrians, bicycles and vehicles on South Street, Terry A. Francois Boulevard, and 16th Street, the project sponsor shall prepare a Loading Operations Plan, and submit the plan for review and approval by the OCII, or its designee, and the SFMTA. As appropriate, the Loading Operations Plan shall be periodically reviewed by the sponsor, the OCII or its designee, and SFMTA and revised if feasible to more appropriately respond to changes in street or circulation conditions.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Transportation and Circulation, SEIR Section 5.2 (cont.)		
Conditions Without a SF Giants Game at AT&T Park (Impacts TR-2 through TR-10) (cont.)		
Impact TR-8 (cont.)		The Loading Operations Plan shall include a set of guideline related to the operation of the on-site and on-street loading facilities, as well as large truck curbside access guidelines; it shall also specify driveway attendant responsibilities to minimize truck queuing and/or substantial conflicts between project-generated loading/unloading activities and pedestrians, bicyclists, transit and autos. Elements of the Loading Operations Plan shall include: • Commercial loading activities within on-street commercial loading spaces on South Street, Terry A. Francois Boulevard, and 16th Street should comply with all posted time limits and all other posted restrictions. • Double parking or any form of illegal parking or truck loading/unloading should not be permitted on any streets adjacent to the project site, and particularly on 16th Street which would include a bicycle lane. Working with the SFMTA Parking Control Officers, building management should ensure that no truck loading/unloading activities occur within the bicycle lanes on 16th Street. • All move-in and move-out activities for commercial office uses should be coordinated by building management, and, in the event that moving trucks cannot be accommodated within the below-grade loading area, building management should obtain a reserved curbside permit from the SFMTA in advance of move-in or move-out activities.
Impact TR-9a: Construction of the proposed project could temporarily obstruct UCSF helipad airspace surfaces.	LSM	**Mitigation Measure M-TR-9a: Crane Safety Plan for Project Construction** Prior to construction, the project construction contractor shall develop a crane safety plan for the project construction cranes that would be implemented during the construction period. The crane safety plan shall identify appropriate measures to reduce, and where possible, avoid, potential conflicts that may be associated with the operation of the construction cranes in the vicinity of the UCSF Benioff Children's Hospital helipad airspace. These safety protocols shall be developed in consultation and coordination with OCII (or its designated representative) and UCSF, and the crane safety plan shall be subject to approval by OCII or its designated representative. The crane safety plan may include, but not limited to the following measures: • Convey project crane activity schedule to UCSF and OCII • If other projects on adjacent properties are under construction concurrent with the proposed project and are using tower cranes, the project sponsor shall participate in joint coordination with those project sponsors and OCII or its designated representative to ensure any potential cumulative construction crane effects on the UCSF helipad would be minimized • use appropriate markings, flags, and/or obstruction lighting on all project construction cranes working in proximity to the helipad's airspace surfaces • light all construction crane structures at night (e.g., towers, arms, and suspension rods) to enhance a pilot's ability to discern the location and height of the cranes

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Transportation and Circulation, SEIR Section 5.2 (cont.)		
Conditions Without a SF Giants Game at AT&T Park (Impacts TR-2 through TR-10) (cont.)		
Impact TR-9a (cont.)		• inform crane operators of the location and elevation of the hospital helipad's Part 77 airspace surfaces and the need to minimize penetrations to the surfaces • use construction methods that minimize the duration of Part 77 airspace surface penetrations that may occur • to the extent possible, rotate crane arms away from the UCSF helipad's Part 77 airspace surfaces at night and when not in use • Issue a Notice to Airmen (NOTAM) to advise pilots in the area of the presence of construction cranes at the project site.
Impact TR-9b: Project construction lighting would not adversely affect UCSF helipad flight operations.	LS	No mitigation required.
Impact TR-9c: Development of the proposed project would not obstruct UCSF helipad airspace surfaces.	LS	No mitigation required.
Impact TR-9d: Certain project specialized exterior lighting could adversely affect UCSF helipad flight operations.	LSM	**Mitigation Measure M-TR-9d: Event Center Exterior Lighting Plan** The project sponsor shall develop an exterior lighting plan that incorporates measures to ensure specialized exterior lighting systems would not have an undue impact on helipad operations. Feasible measures shall be developed in consultation and coordination with SFO staff knowledgeable of the effects of lighting on pilots and safe air navigation, and OCII (or its designated representative), and the exterior lighting plan shall be subject to approval by OCII or its designated representative. Measures may include, but not be limited to the following: • prohibit the use of high-intensity lights that are directed towards the UCSF helipad • prohibit the use of high-intensity outdoor flashing lights or strobe lights in proximity to the hospital helipad's three approaches • prohibit the use of outdoor lasers directed upward, and laser light shows that have not been subject to prior review by OCII in consultation with SFO staff knowledgeable of the effects of lighting on pilots and safe air navigation and, if necessary the FAA • locate primary outdoor lighted displays and television/lighted screens away from the project property line at 16th Street, South Street, or Third Street, where feasible • advance notification and coordination of planned special event lighting with OCII and UCSF representatives • develop exterior specialized lighting guidelines and ensure event organizers are informed of the hospital helipad, its approaches, and safety concerns related to outdoor nuisance lighting

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SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Transportation and Circulation, SEIR Section 5.2 (cont.)		
Conditions Without a SF Giants Game at AT&T Park (Impacts TR-2 through TR-10) (cont.)		
Impact TR-10: The proposed project would not result in significant impacts on emergency vehicle access under Existing plus Project conditions without a SF Giants game at AT&T Park.	LS	No mitigation required. **Improvement Measure I-TR-10a**: **UCSF Emergency Vehicle Access and Garage Signage Plan** As an improvement measure to enhance access for emergency vehicles and other visitors to the UCSF Children's Hospital emergency room and parking facilities at the UCSF Medical Center, the project sponsor shall work with UCSF to develop and implement a UCSF emergency vehicle access and garage signage plan for I-280 and Mariposa, Owens, and 16th Streets to reflect desirable access routes for UCSF and event center access. **Improvement Measure I-TR-10b: Mariposa Street Restriping Study** As an improvement measure to enhance access to the UCSF Medical Center Children's Hospital, the project sponsor shall retain a qualified transportation professional approved by SMTA to conduct a traffic engineering study to evaluate potential changes to the travel lane configuration and related signage on Mariposa Street between the I-280 ramps and Fourth Street. The study, to be conducted in coordination with UCSF and SFMTA, would determine if the eastbound left turn lane into Fourth Street/UCSF passenger loading/unloading and emergency vehicle entrance to the UCSF Children's Hospital could be extended west from its existing length of about 150 feet to provide for additional queuing area.
Conditions With a SF Giants Evening Game at AT&T Park (Impacts TR-11 to TR-17)		
Impact TR-11: The proposed project would result in significant traffic impacts at multiple intersections that would operate at LOS E or LOS F under Existing plus Project conditions with an overlapping SF Giants evening game at AT&T Park.	SUM	**Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts** (see Impact TR-2, above) **Mitigation Measure M-TR-11a: Additional PCOs during Overlapping Events** As a mitigation measure to manage traffic flows and minimize congestion associated with overlapping events, the proposed project's TMP shall be expanded to include additional PCOs that shall be deployed to the following intersections where the proposed project would result in significant traffic impacts, as conditions warrant during events: King/Fifth/I-280 ramps, Fifth/Harrison/I-80 westbound off-ramp, Fifth/Bryant/I-80 eastbound on-ramp, Seventh/Mission Bay Drive, Fourth/16th, and Seventh/Mississippi/16th. The PCO Supervisor shall make the determination where the additional PCOs would be located, based on field conditions during an event. This measure shall be implemented in coordination with Mitigation Measure M-TR-2a: Additional PCOs during Events. **Mitigation Measure M-TR-11b: Participation in the Ballpark/Mission Bay Transportation Coordinating Committee** As a mitigation measure to optimize effectiveness of the transportation management strategies for day-to-day operations and events in the Mission Bay area, at AT&T Park, UCSF Mission Bay campus, and the proposed project, the project sponsor shall actively participate as a member of the Ballpark/Mission Bay Transportation Coordinating Committee in order to evaluate and

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Transportation and Circulation, SEIR Section 5.2 (cont.)		
Conditions With a SF Giants Evening Game at AT&T Park (Impacts TR-11 to TR-17) (cont.)		
Impact TR-11 (cont.)		plan for operations of all three facilities (i.e., AT&T Park, UCSF Mission Bay Campus, and the proposed event center). This committee would, among other roles, serve as a single point for coordination of transportation management strategies. The Transportation Coordinating Committee shall consult on changes to and expansion of transit services, and for developing and implementing strategies within their purview that address transportation issues and conflicts as they arise. In addition, the committee shall serve as a liaison for operation of the facilities, monitoring conditions, and addressing community issues related to events and the project sponsor shall make good faith efforts to notify the committee regarding events. **Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events** The project sponsor shall work with the City to pursue and implement, if feasible, additional strategies to reduce transportation impacts associated with overlapping events at AT&T Park and the proposed event center. These strategies could include the following: • The project sponsor shall exercise commercially reasonable efforts to avoid scheduling non-Golden State Warriors events of 12,500 or more event center attendees that start within 60 minutes of the start (respectively) of events at AT&T Park. • When overlapping non-Golden State Warriors events of 12,500 or more event center attendees and evening SF Giants games cannot be avoided through commercially reasonable efforts, the project sponsor shall negotiate with the event promoter as feasible to stagger start times such that the event headliner starts no earlier than 8:30 p.m. • The City shall identify one or more off-site parking lot(s) on Port of San Francisco or other lands to the south of the event center to provide approximately 250 additional parking spaces for all events and up to approximately 750 additional parking spaces for use during dual events of 12,500 or more event center attendees (for a total of approximately 1,000 additional off-site parking spaces). The project sponsor shall: (1) acquire sufficient rights for the use of such parking lot(s) through lease, purchase, or other means as necessary; (2) pay its fare-share contribution towards any improvements required for the use of such parking lot(s), including but not limited to grading, paving, striping, fencing, lighting, drainage, stormwater pollution prevention measures, curb cuts, and ramps; and (3) provide free shuttles to the event center from such off-site parking lot(s) that are more than ¼-mile from the event center on a maximum 10-minute headway before and after events.
Impact TR-12: The proposed project would result in significant traffic impacts at freeway ramps that would operate at LOS E or LOS F under Existing plus Project conditions with an overlapping SF Giants evening game at AT&T Park.	SUM	**Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts** (see Impact TR-2, above) **Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events** (see Impact TR-11, above)

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Transportation and Circulation, SEIR Section 5.2 (cont.)		
Conditions With a SF Giants Evening Game at AT&T Park (Impacts TR-11 to TR-17) (cont.)		
Impact TR-13: The proposed project could result in a substantial increase in transit demand that could not be accommodated by adjacent Muni transit capacity such that significant adverse impacts to Muni transit service would occur under Existing plus Project conditions with an overlapping SF Giants evening game at AT&T Park.	LSM	**Mitigation Measure M-TR-13: Additional Muni Transit Service during Overlapping Events** As a mitigation measure to accommodate Muni transit demand to and from the project site and AT&T Park on the T Third light rail line during overlapping evening events, the project sponsor shall work with the Ballpark/Mission Bay Transportation Coordinating Committee to coordinate with the SFMTA to provide additional Muni light rail service and/or shuttle buses between key Market Street locations and the project. Examples of the additional service include Muni bus shuttles between Union Square and/or Montgomery BART/Muni station and the project site. The need for additional Muni service shall be based on characteristics of the overlapping events (e.g., projected attendance levels, and anticipated start and end times).
Impact TR-14: The proposed project would result in a substantial increase in transit demand that could not be accommodated by regional transit such that significant adverse impacts to regional transit service would occur under Existing plus Project conditions with an overlapping SF Giants evening game at AT&T Park.	SUM	**Mitigation Measure M-TR-5a: Additional Caltrain Service during Events** (see Impact TR-5, above) **Mitigation Measure M-TR-5b: Additional North Bay Bus and Ferry Service during Events** (see Impact TR-5, above) **Mitigation Measure M-TR-14: Additional BART Service to the East Bay during Overlapping Events** As a mitigation measure to accommodate transit demand to the East Bay following weekday and weekend evening events, the project sponsor shall work with the Ballpark/Mission Bay Transportation Coordinating Committee to coordinate with BART to provide additional service from San Francisco following weekday and weekend evening events. The additional East Bay BART service could be provided by operating longer trains. The need for additional BART service shall be based on characteristics of the overlapping events (e.g., event type, projected attendance levels, and anticipated start and end times).
Impact TR-15: The proposed project could result in a substantial overcrowding on public sidewalks, or create potentially hazardous conditions for pedestrians, or otherwise interfere with pedestrian accessibility on the site and adjoining areas under Existing plus Project conditions with an overlapping SF Giants evening game at AT&T Park.	LSM	**Mitigation Measure M-TR-6: Active Management of Pedestrian Flows at the Intersection of Third/South** (See Impact TR-6, above)

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Transportation and Circulation, SEIR Section 5.2 (cont.)		
Conditions With a SF Giants Evening Game at AT&T Park (Impacts TR-11 to TR-17) (cont.)		
Impact TR-16: The proposed project would not result in potentially hazardous conditions for bicyclists, or otherwise substantially interfere with bicycle accessibility to the site and adjoining areas under Existing plus Project conditions with an overlapping SF Giants evening game at AT&T Park.	LS	No mitigation required.
Impact TR-17: The proposed project would not result in significant impacts on emergency vehicle access under Existing plus Project conditions with an overlapping SF Giants evening game at AT&T Park.	LS	No mitigation required. **Improvement Measure I-TR-10a: UCSF Emergency Vehicle Access and Garage Signage Plan** (see Impact TR-10, above) **Improvement Measure I-TR-10b: Mariposa Street Restriping** (see Impact TR-10, above)
Conditions Without Implementation of the Muni Special Events Transit Service Plan		
Impact TR-18: Without implementation of the Muni Special Event Transit Service Plan, the proposed project would result in additional significant traffic impacts at intersections that would operate at LOS E or LOS F under Existing plus Project conditions.	SUM	**Mitigation Measure M-TR-2a: Additional PCOs during Events** (see Impact TR-2, above) **Mitigation Measure M-TR-2b: Additional Measures to Reduce Transportation Impacts** (see Impact TR-2, above) **Mitigation Measure M-TR-18: Auto Mode Share Performance Standard and Monitoring** *Performance Standards and Strategies for Achieving Them* The project sponsor shall be responsible for implementing TDM measures intended to reach an auto mode share performance standard for different types of events. Specifically, the project sponsor shall work to achieve the following performance standards: 1. For weekday events that have 12,500 or more attendees, the project shall not exceed an arrival auto mode share of 53 percent. 2. For weekend events that have 12,500 or more attendees, the project shall not exceed an arrival auto mode share of 59 percent.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Transportation and Circulation, SEIR Section 5.2 (cont.)		
Conditions without Implementation of the Muni Special Event Transit Service Plan (cont.)		
Impact TR-18 (cont.)		The performance standards shall be achieved by the middle of the Golden State Warriors' third season at the event center, and for every Golden State Warriors season thereafter. The project sponsor may implement any combination of TDM strategies, including those identified in the proposed project's TMP, to achieve the above performance standards. Potential strategies include, but are not limited to: • Providing shuttle bus service between major transportation hubs such as Transbay Transit Terminal, BART stations, Caltrain stations and the event center. • Providing bus shuttles between park & ride lots, remote parking facilities, or other facilities or locations within San Francisco, and the event center. • Facilitating charter bus packages through the event sales department to encourage large groups to travel to and from the event center on charter buses. • Reducing the project parking demand through a variety of mechanisms, including pricing. • Offering high occupancy vehicle parking at more convenient locations than parking for the general public and/or at reduced rates. • Undertaking media campaigns, including in social media, that promote walking and/or bicycling to the event center. • Conducting cross-marketing strategies with event center businesses (e.g., 10 percent off merchandise/food if patrons arrive by transit and/or bike or on foot). • Carrying out public education campaigns. • Offering special event ferry service to the closest ferry station to the project site (similar to the existing service provided between AT&T Park and Alameda and Marin Counties by Golden Gate Transit, Alameda/Oakland and Vallejo ferry service). • Providing incentive for arrivals by bike. • Providing transit fare incentives to event ticket holders.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Transportation and Circulation, SEIR Section 5.2 (cont.)		
Conditions without Implementation of the Muni Special Event Transit Service Plan (cont.)		
Impact TR-18 (cont.)		***Monitoring and Reporting*** The project sponsor shall retain a qualified transportation professional[1] to conduct travel surveys, as outlined below, and to document the results in a *Transportation Demand Management Report*. Prior to beginning the travel survey, the transportation professional shall develop the data collection methodology in consultation with and approved by OCII (or its designated representative such as the Environmental Review Officer (ERO)) and in consultation with SFMTA. It is anticipated that data collection would occur at least during four days for two different types of events, for a total of eight days. Specifically, data collection shall be conducted during at least two weekday and two weekend NBA basketball games with 12,500 or more attendees, and two weekday and two weekend non-basketball events with attendance of 12,500 or more attendees. The schedule of the travel surveys shall be as follows: • Comprehensive travel surveys of basketball game attendees shall be conducted between December and April of every season. • Comprehensive travel surveys of non-basketball event attendees (conventions events, concerts, family shows, etc.) could be collected any time during the year. The following data of event attendees shall be collected as part of the travel surveys: • Origin/destination of the trip (city, zip code, home/work/other) • Mode of travel to/from event center – If by transit, list mode and name of transit operator (AC Transit, BART, Caltrain, Muni, etc.) – If by rail, name of station trip started and ended – If by auto, number of people in the vehicle – If by auto, parking location and approximate walking time to event center – If by auto, ask if following trips would continue as auto, or if anticipate a mode shift. – If by bicycle or walking, name the origin of the trip. If a transfer from regional transit, name the origin and operator. – If by bike share, name the origin (i.e., the pick up location) of the trip. Note if trip is a "last mile" connection from regional transit, and include the origin and operator.

[1] The Transportation Demand Management Report shall be performed by a qualified transportation professional from the Planning Department's *Transportation Consultant Pool.*

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Transportation and Circulation, SEIR Section 5.2 (cont.)		
Conditions without Implementation of the Muni Special Event Transit Service Plan (cont.)		
Impact TR-18 (cont.)		• Arrival and departure times at the event center The travel survey shall employ whatever methodology necessary, as approved by the OCII (or the ERO) in consultation with SFMTA, to collect the above described data including but not limited to: manual or automatic (e.g., video or tubes) traffic volume counts, intercept surveys, smart phone application-based surveys, and on-line surveys. The *Transportation Demand Management Report(s)* shall be submitted to OCII, or its designee, for review within 30 days of completion of the data collection. If the City finds that the project exceeds the stated mode share performance standard, the project sponsor shall revise the proposed project's Transportation Management Plan (TMP) to incorporate a set of measures that would lower the auto mode share. For basketball events, the TMP shall be revised by no later than August 15th of the calendar year to ensure adequate lead time to implement TDM measures prior to the start of the following basketball season. For non-basketball events, the proposed project's TMP shall be revised within 90 days of submittal of the *Transportation Demand Management Report* to incorporate a set of measure that would lower the auto mode share. If the project does not meet the stated performance standard, the project sponsor shall implement TDM measures and collect data on a semi-annual basis (i.e., twice during a calendar year) to assess their effectiveness for basketball games and other events. The implementation of TDM measures shall be intensified until the auto mode split performance standard is achieved. Upon achievement of the performance standard, the project sponsor may resume travel survey data collection for basketball and non-basketball events on an annual basis. If the sponsor demonstrates three consecutive years of meeting the auto mode share performance standard, the comprehensive data collection effort may occur every two years. The data collection plan described above may be modified by OCII (or the ERO) in coordination with SFMTA if field observations and/or other circumstances require data collection at different times and/or for different events than specified above. The modification of the data collection plan, however, shall not change the performance standards set forth in this mitigation measure.
Impact TR-19: Without implementation of the Muni Special Event Transit Service Plan, the proposed project would result in additional significant traffic impacts at freeway ramps that would operate at LOS E or LOS F under Existing plus Project conditions.	SUM	**Mitigation Measure M-TR-2b: Additional Measures to Reduce Transportation Impacts** (see Impact TR-2, above) **Mitigation Measure M-TR-18: Auto Mode Share Performance Standard and Monitoring** (see Impact TR-18, above)

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Transportation and Circulation, SEIR Section 5.2 (cont.)		
Conditions without Implementation of the Muni Special Event Transit Service Plan (cont.)		
Impact TR-20: Without implementation of the Muni Special Event Transit Service Plan, the proposed project would result in a substantial increase in transit demand that could not be accommodated by adjacent Muni transit capacity such that significant adverse impacts to Muni transit service would occur under Existing plus Project conditions.	SUM	**Mitigation Measure M-TR-18: Auto Mode Share Performance Standard and Monitoring** (see Impact TR-18, above)
Impact TR-21: Without implementation of the Muni Special Event Transit Service Plan, the proposed project would result in a substantial increase in transit demand that could not be accommodated by regional transit capacity such that significant adverse impacts to regional transit service would occur under Existing plus Project conditions.	SUM	**Mitigation Measure M-TR-5a: Additional Caltrain Service** (see Impact TR-5, above) **Mitigation Measure M-TR-5b: Additional North Bay Ferry and Bus Service** (see Impact TR-5, above)
Impact TR-22: Without implementation of the Muni Special Event Transit Service Plan, the proposed project could result in a substantial overcrowding on public sidewalks, nor create potentially hazardous conditions for pedestrians, or otherwise interfere with pedestrian accessibility on the site and adjoining areas under Existing plus Project conditions.	LSM	**Mitigation Measure M-TR-22: Provide Safe Pedestrian Access to Adjacent Transit and Parking Facilities and Monitoring** During events with 3,000 or more attendees, the project sponsor shall be responsible for providing trained personnel (e.g., off-duty SFPD staff) to control pedestrian, bicycle and vehicular flows to and from the event center at the intersections immediately adjacent to the project site and to ensure that Muni platforms serving the site are not over capacity. The trained personnel shall be provided during pre- and post-event periods. The project sponsor shall ensure that conflicts between various modes are reduced to the maximum extent possible through adequate staffing of trained personnel as well as other measures, as appropriate. Other pedestrian management measures that could be implemented include but are not limited to: installation of barricades, proper signage and announcements to disperse patrons to other streets around the project site, such as to Terry A. Francois Boulevard, and cross-marketing incentives such as 20 percent discount at the restaurant and retail establishments to extend the peak departure period. Through the implementation of various strategies, the project sponsor shall ensure that pedestrian conflicts with other modes are minimized by separating vehicles, bicycles, transit and pedestrian flows to the greatest extent possible, including ensuring that various modes are adequately instructed about when it is their turn to proceed. The project sponsor shall also ensure that Muni platforms are not overcrowded by staging event attendees on the adjacent sidewalks until there is sufficient space on the Muni platforms, which are proposed to be expanded as part of the project.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Transportation and Circulation, SEIR Section 5.2 (cont.)		
Conditions without Implementation of the Muni Special Event Transit Service Plan (cont.)		
Impact TR-22 (cont.)		At the intersection of Third/South, the trained personnel shall implement strategies to allow pedestrians to cross the street safely. The strategies could include manually overriding the traffic signal and directing pedestrians to cross, erecting temporary pedestrian crossing barriers, allowing use of the closed Third Street as a pedestrian access route, providing a defined passenger waiting area within the closed Third Street, and shielding passengers waiting to board light rail from adjacent pedestrian traffic. ***Monitoring and Reporting*** The project sponsor shall retain a qualified transportation professional[2] to conduct field observations of pedestrian hazards and safety conditions along Third Street adjacent to the project site, as outlined below, and to document the results in a *Pedestrian Access Report*. City staff shall verify the field data collection results. Prior to beginning field observations, the transportation professional shall develop the data collection methodology in consultation with and approved by OCII (or its designated representative such as the ERO) in coordination with SFMTA. The data collection methodology shall be reviewed and revised annually, if appropriate. Field observations shall be conducted during the following event types and attendance levels: • at least two weekday NBA basketball games with 12,500 or more attendees; • at least two weekend NBA basketball games with 12,500 or more attendees; • at least two weekday non-basketball game events with 12,500 or more attendees; • at least two weekend non-basketball game events with 12,500 or more attendees; • at least two weekday non-basketball game events with 3,000 to 9,000 attendees; and, • at least two weekend non-basketball game events with 3,000 to 9,000 attendees; and • at least two weekday convention events of 9,000 or more attendees. The pedestrian hazard and safety conditions field observations shall occur on an annual basis. The *Pedestrian Access Report* shall be submitted to SFMTA, OCII and Planning Department for review within 30 days of completion of the data collection. If the City finds that the project does not meet the performance standard outlined below, the Transportation Management Plan (TMP) shall be revised to incorporate techniques to minimize conflicts between pedestrians and other modes. The TMP shall be revised within 90 days of submittal of the *Pedestrian Access Report*. When the project is not meeting the stated performance standard, the project sponsor shall collect data on a semi-annual basis (i.e., twice during a calendar year) to assess the effectiveness of various measures incorporated into the revised TMP. The implementation of various measures shall be intensified until pedestrian access to and from the site occurs in a safe manner, as determined by OCII (or the ERO).

[2] The Transportation Demand Management Report shall be performed by a qualified transportation professional from the San Francisco Planning Department's *Transportation Consultant Pool*. Available online at *http://www.sf-planning.org/index.aspx?page=1886*. Accessed May 28, 2015.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Transportation and Circulation, SEIR Section 5.2 (cont.)		
Conditions without Implementation of the Muni Special Event Transit Service Plan (cont.)		
Impact TR-22 (cont.)		The performance standard for safe pedestrian operations consists of the following: substantial numbers of pedestrians are not spilling onto the Muni right-of-way area, are not illegally crossing Third Street midblock, are not overcrowding the Muni platforms, and are not crossing intersections against the signal. Upon achievement of the performance standard, the project sponsor may resume field observations for basketball, non-basketball and convention events on an annual basis. If the sponsor demonstrates three consecutive years of meeting the performance standard, the comprehensive data collection effort may occur every two years. Further, in reviewing the *Pedestrian Access Report*, OCII (or the ERO) may adjust the size of the events for which this measure is applicable. For example, if small scale events (e.g., those with 5,000 attendees) do not result in crosswalk and/or Muni platform overcrowding or other similar pedestrian safety conditions, OCII (or the ERO) may revise this mitigation measure to apply to events of 5,001 or more attendees.
Impact TR-23: Without implementation of the Muni Special Event Transit Service Plan, the proposed project would not result in potentially hazardous conditions for bicyclists, or otherwise substantially interfere with bicycle accessibility to the site and adjoining areas under Existing plus Project conditions.	LS	No mitigation required.
Impact TR-24: Without implementation of the Muni Special Event Transit Service Plan, the proposed project would not result in significant impacts on loading under Existing plus Project conditions.	LS	No mitigation required. **Improvement Measure I-TR-8: Truck and Service Vehicle Loading Operations Plan** (see Impact TR-8, above)
Impact TR-25: Without implementation of the Muni Special Event Transit Service Plan, the proposed project would not result in significant impacts on emergency vehicle access under Existing plus Project conditions.	LS	No mitigation required. **Improvement Measure I-TR-10a: UCSF Emergency Vehicle Access and Garage Signage Plan** (see Impact TR-10, above) **Improvement Measure I-TR-10b: Mariposa Street Restriping** (see Impact TR-10, above)

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SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Transportation and Circulation, SEIR Section 5.2 (cont.)		
Cumulative Impacts		
Impact C-TR-1: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative construction-related ground transportation impacts.	LS	No mitigation required.
Impact C-TR-2: The project, in combination with other past, present, and reasonably foreseeable future projects, would result in significant cumulative traffic impacts at multiple intersections in the project vicinity under 2040 Cumulative conditions.	SUM	**Mitigation Measure M-TR-2a: Additional PCOs during Events** (see Impact TR-2, above) **Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts** (see Impact TR-2, above) **Mitigation Measure M-TR-11a: Additional PCOs During Overlapping Events** (see Impact TR-11, above) **Mitigation Measure M-TR-11b: Participation in Ballpark/Mission Bay Transportation Coordinating Committee** (see Impact TR-11, above) **Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events** (see Impact TR-11, above)
Impact C-TR-3: The project, in combination with other past, present, and reasonably foreseeable future projects, would result in significant cumulative traffic impacts at multiple freeway ramps in the project vicinity under 2040 Cumulative conditions.	SUM	**Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts** (see Impact TR-2, above) **Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events** (see Impact TR-11, above)
Impact C-TR-4: The project, in combination with other past, present, and reasonably foreseeable future projects, could have significant transit impacts on Muni service under 2040 Cumulative conditions, and could contribute to significant cumulative transit impacts at Muni screenlines.	LSM	**Mitigation Measure M-TR-13: Additional Muni Transit Service During Overlapping Events** (see Impact TR-13, above)

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IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Transportation and Circulation, SEIR Section 5.2 (cont.)		
Cumulative Impacts (cont.)		
Impact C-TR-5: The project, in combination with other past, present, and reasonably foreseeable future projects, would have significant transit impacts on regional transit under 2040 Cumulative conditions.	SUM	**Mitigation Measure M-TR-5a: Additional Caltrain Service** (see Impact TR-5, above) **Mitigation Measure M-TR-5b: Additional North Bay Ferry and Bus Service** (see Impact TR-5, above) **Mitigation Measure M-TR-14: Additional BART Service to the East Bay During Overlapping Events** (see Impact TR-14, above)
Impact C-TR-6: The project, in combination with other past, present, and reasonably foreseeable future projects, could result in significant adverse cumulative pedestrian impacts.	LSM	**Mitigation Measure M-TR-6: Active Management of Pedestrian Flows at the Intersection of Third/South** (see Impact TR-6, above)
Impact C-TR-7: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative bicycle impacts.	LS	No mitigation required.
Impact C-TR-8: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative loading impacts.	LS	No mitigation required. **Improvement Measure I-TR-8: Truck and Service Vehicle Operations Plan** (see Impact TR-8, above)
Impact C-TR-9: The project, in combination with other past, present, and reasonably foreseeable future projects, could result in significant adverse cumulative impacts to the UCSF helipad.	LSM	**Mitigation Measure M-TR-9a: Crane Safety Plan for Project Construction** (see Impact TR-9)
Impact C-TR-10: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative emergency vehicle access impacts.	LS	No mitigation required. **Improvement Measure I-TR-10a: UCSF Emergency Vehicle Access and Garage Signage Plan** (see Impact TR-10, above) **Improvement Measure I-TR-10b: Mariposa Street Restriping** (see Impact TR-10, above)

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Noise, SEIR Section 5.3		
Impact NO-1: Construction of the proposed project would not cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project	LS	No mitigation required. **Improvement Measure I-NO-1: Mission Bay Good Neighbor Construction Noise Policy** The project sponsor shall comply with the Mission Bay Good Neighbor Policy and limit all extreme noise-generating construction activities to 8:00 a.m. to 5:00 p.m., Monday through Friday. No pile driving or other extreme noise generating activity is permitted on Saturdays, Sundays, and holidays.
Impact NO-2: Construction of the proposed project would not expose people to or generate noise levels in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies.	LS	No mitigation required.
Impact NO-3: Construction of the proposed project would not expose people and structures to or generate excessive groundborne vibration levels.	LS	No mitigation required. **Improvement Measure I-NO-3: Neighbor Notification of Vibration-Inducing Construction Activities** At least one week prior to the start of rapid impact compaction activities, the project sponsor shall notify owners and occupants within 500 feet of the project site of the dates, hours, and expected duration of such activities.
Impact NO-4: Operation of the proposed project could result in exposure of persons to or generation of noise levels in excess of standards established in the *San Francisco General Plan* or San Francisco Noise Ordinance.	LSM	**Mitigation Measure M-NO-4a: Noise Control Plan for Outdoor Amplified Sound** The project sponsor shall develop and implement a Noise Control Plan for operations at the proposed entertainment venues to reduce the potential for noise impacts from public address and/or amplified music. This Noise Control Plan shall contain the following elements: • The project sponsor shall comply with noise controls and restrictions in applicable entertainment permit requirements for outdoor concerts. • Speaker systems shall be directed away from the nearest sensitive receptors to the degree feasible. • Outdoor speaker systems shall be operated consistent with the restrictions of Section 2909 of the San Francisco Police Code, and conform to a performance standard of 8 dBA and dBC over existing ambient L90 noise levels at the nearest residential use.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Noise, SEIR Section 5.3 (cont.)		
Impact NO-4 (cont.)		**Mitigation Measure M-NO-4b: Noise Control Plan for Place of Entertainment Permit** As part of the Place of Entertainment Permit process, the project sponsor shall develop and implement a Noise Control Plan for operations at the proposed entertainment venue to reduce the potential for noise impacts from interior event noise. This Noise Control Plan shall, at a minimum, contain the following elements: • The project sponsor shall comply with noise controls and restrictions in applicable entertainment permit requirements. • The establishment shall provide adequate ventilation within the structures such that doors and/or windows are not left open for such purposes resulting in noise emission from the premises. • There shall be no noise audible outside the establishment during the daytime or nighttime hours that violates the San Francisco Municipal Code Section 49 or 2900 et. seq. Further, absolutely no sound from the establishment shall be audible inside any surrounding residences or businesses that violates San Francisco Police Code section 2900. • Permit holder shall take all reasonable measures to insure the sidewalks adjacent to the premises are not blocked or unnecessarily affected by patrons or employees due to the operations of the premises and shall provide security whenever patrons gather outdoors. • Permit holder shall provide a cell phone number to all interested neighbors that will be answered at all times by a manager or other responsible person who has the authority to adjust volume and respond to other complaints whenever entertainment is provided.
Impact NO-5: Operation of the proposed project would cause a substantial permanent increase in ambient noise levels in the project vicinity.	SUM	**Mitigation Measure M-TR-2c: Additional Strategies to Reduce Transportation Impacts** (see Section 5.2, Transportation and Circulation, Impact TR-2) **Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events** (see Section 5.2, Transportation and Circulation, Impact TR-2)
Impact C-NO-1: Construction activities of the proposed project combined with cumulative construction noise in the project area could cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity during construction.	LSM	**Mitigation Measure M-C-NO-1: Construction Noise Control Measures** Contractors shall employ site-specific noise attenuation measures during construction to reduce the generation of construction noise. These measures shall be included in a Noise Control Plan that shall be submitted for review and approval by the OCII or its designated representative to ensure that construction noise is reduced to the degree feasible. Measures specified in the Noise Control Plan and implemented during project construction shall include, at a minimum, the following noise control strategies: • Equipment and trucks used for construction shall use the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds).

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Noise, SEIR Section 5.3 (cont.)		
Impact C-NO-1 (cont.)		• Construction equipment with lower noise emission ratings shall be used whenever possible, particularly for air compressors. • Sound-control devices no less effective than those provided by the manufacturer shall be provided on all construction equipment. • Impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10 dBA. External jackets on the tools themselves shall be used where feasible; this could achieve a reduction of 5 dBA. Quieter procedures, such as use of drills rather than impact tools, shall be used where feasible. • Stationary noise sources such as material stockpiles and vehicle staging areas shall be located as far from adjacent receptors as possible. • Enclosures and mufflers for stationary equipment shall be provided, impact tools shall be shrouded or shielded, and barriers shall be installed around particularly noisy activities at the construction sites so that the line of sight between the construction activities and nearby sensitive receptor locations is blocked to the extent feasible. • Unnecessary idling of internal combustion engines shall be prohibited. • Construction-related vehicles and equipment shall be required to use designated truck routes to travel to and from the project sites as determined with consultation with the SFMTA as part of the permit process prior to construction (see **Improvement Measure I-TR-1**: **Construction Management Plan and Public Updates)**. • The project sponsor shall designate a point of contact to respond to noise complaints. The point of contact must have the authority to modify construction noise-generating activities to ensure compliance with the measures above and with the San Francisco Noise Ordinance.
Impact C-NO-2: Operation of the proposed project when considered with other cumulative development would cause a substantial permanent increase in ambient noise levels in the project vicinity.	SUM	**Mitigation Measure M-TR-2c: Additional Strategies to Reduce Transportation Impacts** (see Section 5.2, Transportation and Circulation, Impact TR-2) **Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events** (see Section 5.2, Transportation and Circulation, Impact TR-2)
Impact C-NO-3: Occupants of the proposed project would not be substantially affected by noise from future operations of the helipad at the adjacent UCSF Hospital.	LS	No mitigation required.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Air Quality, SEIR Section 5.4		
Impact AQ-1: Construction of the proposed project would generate fugitive dust and criteria air pollutants, which would violate an air quality standard, contribute substantially to an existing or projected air quality violation, or result in a cumulatively considerable net increase in criteria air pollutants.	SUM	**Mitigation Measure M-AQ-1: Construction Emissions Minimization** A. *Construction Emissions Minimization Plan.* Prior to issuance of a construction permit, the project sponsor shall submit a Construction Emissions Minimization Plan (Plan) to the OCII or its designated representative for review and approval by an Air Quality Specialist. The Plan shall detail project compliance with the following requirements: 1. All off-road equipment greater than 25 horsepower (hp) and operating for more than 20 total hours over the entire duration of construction activities shall meet the following requirements: a) Where access to alternative sources of power are available, portable diesel engines shall be prohibited. Where portable diesel engines are required because alternative sources of power are not available, the diesel engine shall meet the equipment compliance step-down schedule in **Table M-AQ-1-1**. (see Table M-AQ-1-1 below) b) All off-road equipment shall have engines that meet either U.S. Environmental Protection Agency (USEPA) or California Air Resources Board (CARB) Tier 4 off-road emission standards. If engines that comply with Tier 4 off-road emission standards are not commercially available, then the project sponsor shall provide the next cleanest piece of off-road equipment as provided by the step down schedules in Table M-AQ-1-1.

TABLE M-AQ-1-1
OFF-ROAD EQUIPMENT COMPLIANCE STEP-DOWN SCHEDULE

Compliance Alternative	Engine Emission Standard	Emissions Control
1	Tier 4 Interim	ARB NOx VDECS (40%)[3]
2	Tier 3	ARB NOx VDECS (40%)
3	Tier 2	ARB NOx VDECS (40%)

How to use the table: If the requirements of (A)(1)(b) cannot be met, then the project sponsor would need to meet Compliance Alternative 1. Should the project sponsor not be able to supply off-road equipment meeting Compliance Alternative 1, then Compliance Alternative 2 would need to be met. Should the project sponsor not be able to supply off-road equipment meeting Compliance Alternative 2, then Compliance Alternative 3 would need to be met.

3 http://www.arb.ca.gov/diesel/verdev/vt/cvt.htm

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Air Quality, SEIR Section 5.4 (cont.)		
Impact AQ-1 (cont.)		i. For purposes of this mitigation measure, "commercially available" shall mean the availability of Tier 4 equipment taking into consideration factors such as: (i) critical path timing of construction; (ii) geographic proximity to the Project site of equipment; and (iii) geographic proximity of access to off haul deposit sites. ii. The project sponsor shall maintain records concerning its efforts to comply with this requirement. 2. The project sponsor shall require the idling time for off-road and on-road equipment be limited to no more than two minutes, except as provided in exceptions to the applicable state regulations regarding idling for off-road and on-road equipment. Legible and visible signs shall be posted in multiple languages (English, Spanish, and Chinese) in designated queuing areas and at the construction site to remind operators of the two minute idling limit. 3. The project sponsor shall require that construction operators properly maintain and tune equipment in accordance with manufacturer specifications. 4. The Plan shall include estimates of the construction timeline by phase with a description of each piece of off-road equipment required for every construction phase. Off-road equipment descriptions and information may include, but are not limited to: equipment type, equipment manufacturer, equipment identification number, engine model year, engine certification (Tier rating), horsepower, engine serial number, and expected fuel usage and hours of operation. For VDECS installed: technology type, serial number, make, model, manufacturer, ARB verification number level, and installation date and hour meter reading on installation date. For off-road equipment using alternative fuels, reporting shall indicate the type of alternative fuel being used. The plan shall also include estimates of ROG and NOx emissions. 5. The project sponsor shall keep the Plan available for public review on site during working hours. The project sponsor shall post at the perimeter of the project site a legible and visible sign summarizing the requirements of the Plan. The sign shall also state that the public may ask to inspect the Plan at any time during working hours, and shall explain how to request inspection of the Plan. Signs shall be posted on all sides of the construction site that face a public right of way. The project sponsor shall provide copies of Plan to members of the public as requested. B. *Reporting*. Quarterly reports shall be submitted to the OCII or its designated representative indicating the construction phase and off-road equipment information used during each phase including the information required in A(4). In addition, for off-road equipment using alternative fuels, reporting shall include the actual amount of alternative fuel used. Within six months of the completion of construction activities, the project sponsor shall submit to the OCII or its designated representative a final report summarizing construction activities. The final report shall indicate the start and end dates and duration of each construction phase. For each phase, the report shall include detailed information required in A(4). In addition, for off-road equipment using alternative fuels, reporting shall include the actual amount of alternative fuel used.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Air Quality, SEIR Section 5.4 (cont.)		
Impact AQ-1 (cont.)		C. *Certification Statement and On-site Requirements.* Prior to the commencement of construction activities, the project sponsor must certify (1) compliance with the Plan, and (2) all applicable requirements of the Plan have been incorporated into contract specifications.
Impact AQ-2: During project operations, the proposed project would result in emissions of criteria air pollutants at levels that would violate an air quality standard, contribute to an existing or projected air quality violation, or result in a cumulatively considerable net increase in criteria air pollutants.	SUM	**Mitigation Measure M-AQ-2a: Reduce Operational Emissions** The project sponsor shall implement the following measures as feasible: • Provision of outlets for electrically powered landscape equipment • **Mitigation Measure M-TR-2c: Additional Strategies to Reduce Transportation Impacts** (see Section 5.2, Transportation and Circulation, Impact TR-2) • **Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events** (see Section 5.2, Transportation and Circulation, Impact TR-11) **Mitigation Measure M-AQ-2b: Emission Offsets** Upon completion of construction, and prior to issuance of certificate of occupancy, the project sponsor shall pay a mitigation offset fee to the Bay Area Air Quality Management District's (BAAQMD) Strategic Incentives Division in an amount not to exceed $18,030 per weighted ton of ozone precursors plus a 5 percent administrative fee to fund one or more emissions reduction projects within the San Francisco Bay Area Air Basin (SFBAAB). This fee is intended to fund emissions reduction projects to achieve reductions of 17.0 tons per year of ozone precursors. Documentation of payment shall be provided to OCII or its designated representative. The project sponsor shall calculate the amount of emissions offset required from construction based on the reporting requirements of Mitigation Measure M-AQ-1 and the degree of compliance with off-road equipment types that were determined to be commercially available. If the calculated construction emissions of ozone precursors requires offsets in excess of 17.0 tons per year, then the applicant shall provide the additional offset amount commensurate with the calculated ozone precursor emissions exceeding 17.0 tons per year. Acceptance of this fee by the BAAQMD shall serve as an acknowledgment and commitment by the BAAQMD to: (1) implement an emissions reduction project(s) within one year of receipt of the mitigation fee to achieve the emission reduction objectives specified above; and (2) provide documentation to OCII or its designated representative and to the project sponsor describing the project(s) funded by the mitigation fee, including the amount of emissions of ROG and NOx

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Air Quality, SEIR Section 5.4 (cont.)		
Impact AQ-2 (cont.)		reduced (tons per year) within the SFBAAB from the emissions reduction project(s). If there is any remaining unspent portion of the mitigation offset fee following implementation of the emission reduction project(s), the project sponsor shall be entitled to a refund in that amount from the BAAQMD. To qualify under this mitigation measure, the specific emissions retrofit project must result in emission reductions within the SFBAAB that would not otherwise be achieved through compliance with existing regulatory requirements.
Impact AQ-3: Construction and operation of the proposed project would generate toxic air contaminants, including diesel particulate matter, and could expose sensitive receptors to substantial air pollutant concentrations.	LSM	**Mitigation Measure M-AQ-1: Construction Emissions Minimization** (see Impact AQ-1, above)
Impact AQ-4: The proposed project could conflict with, or obstruct implementation of, the *2010 Clean Air Plan*.	LSM	**Mitigation Measure M-AQ-1: Construction Emissions Minimization** (see Impact AQ-1, above) **Mitigation Measure M-AQ-2a: Reduce Operational Emissions** (see Impact AQ-2, above) **Mitigation Measure M-AQ-2b: Emissions Offsets** (see Impact AQ-2, above)
Cumulative Impacts		
Impact C-AQ-1: The project, in combination with other past, present, and reasonably foreseeable future projects, would contribute to cumulative regional air quality impacts.	SUM	**Mitigation Measure M-AQ-1: Construction Emissions Minimization** (see Impact AQ-1) **Mitigation Measure M-AQ-2a: Reduce Operational Emissions** (see Impact AQ-2) **Mitigation Measure M-AQ-2b: Emission Offsets** (see Impacts AQ-1 and AQ-2)
Impact C-AQ-2: The project, in combination with other past, present, and reasonably foreseeable future projects, could generate toxic air contaminants, including diesel particulate matter, and could expose sensitive receptors to substantial air pollutant concentrations.	LSM	**Mitigation Measure M-AQ-1: Construction Emissions Minimization** (see Impact AQ-1)

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Greenhouse Gas Emissions, SEIR Section 5.5		
Impact C-GG-1: The proposed project would generate greenhouse gas emissions, but not at levels that would result in a significant impact on the environment or conflict with any policy, plan, or regulation adopted for the purpose of reducing greenhouse gas emissions.	LS	No mitigation required. **Improvement Measure I-C-GG-1: Purchase Voluntary Carbon Credits** ***Construction Emissions*:** No later than six (6) months after the issuance of a Temporary Certificate of Occupancy for the project, the project sponsor shall provide to the Office of Community Investment and Infrastructure (OCII), a calculation of the net additional emissions resulting from the construction of the project, to be calculated in accordance with the methodology agreed upon by the California Air Resources Board (CARB) in connection with the AB 900 certification of the project. The project sponsor shall provide courtesy copies of the calculations to CARB and the Governor's office promptly following transmittal of the calculations to OCII. The project sponsor shall enter into one or more contracts to purchase voluntary carbon credits from a qualified greenhouse gas emissions broker in an amount sufficient to offset the construction emissions. The project sponsor shall provide courtesy copies of any such contracts to the ARB and the Governor's office promptly following the execution of such contracts. ***Operational Emissions*:** No later than six (6) months after project stabilization, to be defined as the date following project completion when the project is 90 percent leased and occupied (and with respect to the arena component, 90 percent of the available booking dates are utilized), the project sponsor shall submit to OCII a projection of operational emissions arising from the project, based on data accumulated to that date and reasonable projections of operational emissions for the useful life of the project (30 years), to be calculated in accordance with the methodology agreed upon by CARB in connection with the AB 900 certification of the project. The project sponsor shall provide courtesy copies of the calculations to CARB and the Governor's office promptly following transmittal of the calculations to OCII. The project sponsor shall enter into one or more contracts to purchase voluntary carbon credits from a qualified greenhouse gas emissions broker in an amount sufficient to offset the operational emissions, on a net present value basis in light of the fact that the project sponsor is proposing to acquire such credits in advance of any creation of the emissions subject to the offset. The project sponsor shall provide courtesy copies of any such contracts to CARB and the Governor's office promptly following the execution of such contracts.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Wind and Shadow, SEIR Section 5.6		
Wind		
Impact WS-1: The project would alter wind in a manner that would substantially affect off-site public areas.	SUM	**Mitigation Measure M-WS-1: Develop and Implement Design Measures to Reduce Project Off-site Wind Hazards** The project sponsor shall develop and implement design measures to reduce the identified project off-site wind hazards to the extent feasible. This may include on-site project design modifications or additions, additional on-site landscaping; and the implementation of potential additional off-site streetscape landscaping or other off-site wind-reducing features. Potential on- and/or off-site project site wind-reduction design measures developed by the sponsor would be coordinated with, and subject to review and approval, by OCII.
Impact C-WS-1: The project, in combination with cumulative development, would not alter wind in a manner that would substantially affect off-site public areas.	LS	No mitigation required.
Shadow		
Impact C-WS-2: The project, in combination with cumulative development, would create new shadow but not in a manner that would substantially affect the use of publicly accessible open space or outdoor recreational facilities or other public areas within the Mission Bay South plan area.	LS	No mitigation required.
Impact C-WS-3: The project, in combination with cumulative development, would create new shadow but not in a manner that would substantially affect the use of publicly accessible open space or outdoor recreational facilities or other public areas outside the Mission Bay South plan area.	LS	No mitigation required.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Utilities and Service Systems, Initial Study Section E11 and SEIR Section 5.7		
Impact UT-1: The City's water service provider would have sufficient water supply available to serve the project from existing entitlements and resources, and would not require new or expanded water supply resources or entitlements.	LS	No mitigation required.
Impact UT-2: The proposed project would not require or result in the construction of new water treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.	LS	No mitigation required.
Impact UT-3: The proposed project would be served by landfills with sufficient permitted capacity to accommodate the project's solid waste disposal needs.	LS	No mitigation required.
Impact UT-4: The proposed project would comply with federal, state, and local statutes and regulations related to solid waste.	LS	No mitigation required.
Impact UT-5: The proposed project in itself would not require or result in the construction of new wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.	LS	No mitigation required.
Impact C-UT-1: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative utilities and service systems impacts (water supply and solid waste).	LS	No mitigation required.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Utilities and Service Systems, Initial Study Section E11 and SEIR Section 5.7 (cont.)		
Impact C-UT-2: The proposed project, in combination with past, present, and foreseeable future development in the Mission Bay South area, would require or result in the construction of new wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.	SU	No feasible mitigation available that could be implemented by the project sponsor.
Impact C-UT-3: The proposed project, in combination with past, present, and foreseeable future development in the Mission Bay South area, would not require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.	LS	No mitigation required.
Impact C-UT-4: The project, in combination with past, present, and foreseeable future development in the Mission Bay South area, would result in a determination by the SFPUC that it has inadequate capacity to serve the project's projected wastewater demand in addition to its existing commitments.	SUM	**Mitigation Measure M-C-UT-4: Fair Share Contribution for Mariposa Pump Station Upgrades** The project sponsor shall pay its fair share for improvements to the Mariposa Pump Station and associated wastewater facilities required to provide adequate sewer capacity within the project area and serve the project as determined by the SFPUC. The contribution shall be in proportion to the wastewater flows from the proposed project relative to the total design capacity of the upgraded pump station(s). The project sponsor shall not be responsible for any share of costs to address pre-existing pump station deficiencies.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Public Services, Initial Study Section E12 and SEIR Section 5.8		
Impact PS-1: The proposed project would not result in substantial adverse physical impacts associated with the provision of or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for schools or other services.	LS	No mitigation required.
Impact PS-2: Construction of the proposed project would not result in substantial adverse physical impacts associated with the provision of or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection, emergency medical services, or law enforcement.	LS	No mitigation required.
Impact PS-3: Operation of the proposed project would not result in substantial adverse physical impacts associated with the provision of or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection or emergency medical services.	LS	No mitigation required.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Public Services, Initial Study Section E12 and SEIR Section 5.8 (cont.)		
Impact PS-4: Operation of the proposed project would not result in substantial adverse physical impacts associated with the provision of or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for law enforcement services.	LS	No mitigation required.
Impact C-PS-1: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative impacts on schools or other services.	LS	No mitigation required.
Impact C-PS-2: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative impacts on fire protection, emergency medical, and law enforcement services.	LS	No mitigation required.
Hydrology and Water Quality, Initial Study Section E15 and SEIR Section 5.9		
Impacts HY-1: The project would not violate water quality standards or otherwise substantially degrade water quality with respect to construction activities, including construction dewatering.	LS	No mitigation required.
Impact HY-1a: The project would not violate water quality standards or otherwise substantially degrade water quality with respect to construction-related dewatering.	LS	No mitigation required.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Hydrology and Water Quality, Initial Study Section E15 and SEIR Section 5.9		
Impact HY-2: The project would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level.	LS	No mitigation required.
Impact HY-3: The project would not alter the existing drainage pattern of the area in a manner that would result in substantial erosion, siltation, or flooding on- or off-site, and the project would not substantially increase the rate or amount of surface runoff that would result in flooding on- or off-site.	LS	No mitigation required.
Impact HY-4: The project would not expose people, housing, or structures, to substantial risk of loss due to existing flooding risks and would not redirect or impede flood flows.	LS	No mitigation required.
Impact HY-5: The project would not expose people or structures to a significant risk of loss, injury or death involving inundation by seiche or tsunami.	LS	No mitigation required.
Impact HY-6: Operation of the proposed project could exceed the wastewater treatment requirements of the NPDES permit for the SEWPCP, violate water quality standards or waste discharge requirements, otherwise substantially degrade water quality as a result of changes in wastewater and stormwater discharges to	LSM	**Mitigation Measure M-HY-6. Wastewater Sampling Ports** ***Mission Bay FSEIR Mitigation Measures K.2.*** Participate in the City's existing Water Pollution Prevention Program. Facilitate implementation of the City's Water Pollution Prevention Program by providing and installing wastewater sampling ports in any building anticipated to have a potentially significant discharge of pollutants to the sanitary sewer, as determined by the Water Pollution Prevention Program of the San Francisco Public Utilities Commission's Bureau of Environmental Regulation and Management, and in locations as determined by the Water Pollution Prevention Program.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Hydrology and Water Quality, Initial Study Section E15 and SEIR Section 5.9 (cont.)		
the Bay, or exceed the capacity of the separate stormwater system constructed in Mission Bay, or provide a substantial source of polluted runoff. Operation of the proposed project would not contribute to a substantial increase in combined sewer discharges.		
Impact HY-7: Operation of the proposed project would not expose people or structures to a significant risk of loss, injury, or death involving flooding.	LS	No mitigation required.
Impact C-HY-1: The project, in combination with past, present, and reasonably foreseeable future projects in the site vicinity, would not result in a considerable contribution to cumulative impacts on hydrology and water quality with respect to construction activities, dewatering, groundwater supplies, drainage pattern, flooding, seiche or tsunami.	LS	No mitigation required.
Impact C-HY-2: The proposed project, in combination with past, present, and reasonably foreseeable future projects in the site vicinity, would not exceed the wastewater treatment requirements of the NPDES permit for the SEWPCP; violate water quality standards or waste discharge requirements, or otherwise substantially degrade water quality as a result of changes in wastewater and stormwater discharges to the Bay; or exceed the capacity of the separate stormwater system constructed in	LS	No mitigation required.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Hydrology and Water Quality, Initial Study Section E15 and SEIR Section 5.9 (cont.)		
Mission Bay, or provide a substantial source of polluted runoff. Cumulative wet weather flows would not contribute to an increase in combined sewer discharges.		
Impact C-HY-3: The proposed project, in combination with past, present, and reasonably foreseeable future projects in the site vicinity, would not result in a significant impact related to exposing people or structures to a significant risk of loss, injury, or death involving flooding.	LS	No mitigation required.
Land Use, Initial Study Section E1		
Impact LU-1: The proposed project would not physically divide an established community.	LS	No mitigation required.
Impact LU-2: The proposed project would not conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project, adopted for the purpose of avoiding or mitigating an environmental effect.	LS	No mitigation required.
Impact LU-3: The proposed project would not have a substantial impact upon the existing character of the vicinity.	LS	No mitigation required.
Impact C-LU-1: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative land use impacts.	LS	No mitigation required.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Aesthetics, Initial Study Section E2		
Aesthetic impact analysis not applicable to the proposed project based on CEQA Public Resources Code Section 21099.		
Population and Housing, Initial Study Section E3		
Impact PH-1: Construction of the proposed project would not induce substantial growth in the area, either directly (for example, by constructing new homes or businesses)) or indirectly (for example, through extension of roads or other infrastructure).	LS	No mitigation required.
Impact PH-2: Construction of the proposed project not displace existing housing units or create substantial demand for additional housing.	LS	No mitigation required.
Impact PH-3: Construction of the proposed project would not displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.	LS	No mitigation required.
Impact PH-4: Operation of the proposed project would not induce substantial population growth in the area, either directly (for example, by constructing new homes or businesses) or indirectly (for example, through extension of roads or other infrastructure).	LS	No mitigation required.
Impact PH-5: Operation of the proposed project would not displace existing housing units or create demand for additional housing.	LS	No mitigation required.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Population and Housing, Initial Study Section E3 (cont.)		
Impact PH-6: Operation of the proposed project would not displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.	NI	No mitigation required.
Impact C-PH-1: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative impacts on population and housing.	LS	No mitigation required.
Cultural and Paleontological Resources, Initial Study Section E4		
Impact CP-1: The project would not cause a substantial adverse change in the significance of a historical resource as defined in §15064.5, including those resources listed in Article 10 or Article 11 of the San Francisco Planning Code.	LS	No mitigation required.
Impact CP-2: The project could cause a substantial adverse change in the significance of an archeological resource pursuant to §15064.5.	LSM	**Mitigation Measure M-CP-2a: Archaeological Testing, Monitoring and/or Data Recovery Program** Based on a reasonable presumption that archaeological resources may be present within the project site, the following measures shall be undertaken to avoid any potentially significant adverse effect from the proposed project on buried or submerged historical resources. The project sponsor shall retain the services of an archaeological consultant approved by OCII or its designated representative such as those from the rotational Department Qualified Archaeological Consultants List (QACL) maintained by the Planning Department archaeologist. The project sponsor shall contact the Department archaeologist to obtain the names and contact information for the next three archaeological consultants on the QACL. The archaeological consultant shall undertake an archaeological testing program as specified herein. In addition, the consultant shall be available to **conduct an archaeological monitoring and/or data recovery program if** required pursuant to this measure. The archaeological consultant's work shall be conducted in accordance with this measure at the direction of OCII or its designated representative. All plans and reports prepared by the consultant as specified herein shall be submitted first and directly to OCII or its designated representative for review and comment, and shall be considered draft reports subject to revision until final approval by OCII or its designated representative. Archaeological monitoring and/or data recovery programs required by this measure could suspend construction of the project for

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Cultural and Paleontological Resources, Initial Study Section E4 (cont.)		
Impact CP-2 (cont.)		up to a maximum of four weeks. At the direction of the OCII or its designated representative, the suspension of construction can be extended beyond four weeks only if such a suspension is the only feasible means to reduce to a less than significant level potential effects on a significant archaeological resource as defined in CEQA Guidelines Sect. 15064.5 (a)(c). ***Consultation with Descendant Communities*:** On discovery of an archaeological site4 associated with descendant Native Americans, the Overseas Chinese, or other descendant group an appropriate representative5 of the descendant group and OCII or its designated representative shall be contacted. The representative of the descendant group shall be given the opportunity to monitor archaeological field investigations of the site and to consult with OCII or its designated representative regarding appropriate archaeological treatment of the site, of recovered data from the site, and, if applicable, any interpretative treatment of the associated archeological site. A copy of the Final Archaeological Resources Report shall be provided to the representative of the descendant group. ***Archaeological Testing Program.*** The archaeological consultant shall prepare and submit to OCII or its designated representative for review and approval an archaeological testing plan (ATP). The archaeological testing program shall be conducted in accordance with the approved ATP. The ATP shall identify the property types of the expected archaeological resource(s) that potentially could be adversely affected by the proposed project, the testing method to be used, and the locations recommended for testing. The purpose of the archaeological testing program will be to determine to the extent possible the presence or absence of archaeological resources and to identify and to evaluate whether any archaeological resource encountered on the site constitutes an historical resource under CEQA. At the completion of the archaeological testing program, the archaeological consultant shall submit a written report of the findings to OCII or its designated representative. If based on the archaeological testing program the archaeological consultant finds that significant archaeological resources may be present, OCII or its designated representative in consultation with the archaeological consultant shall determine if additional measures are warranted. Additional measures that may be undertaken include additional archaeological testing, archaeological monitoring, and/or an archaeological data recovery program. No archaeological data recovery shall be undertaken without the prior approval of OCII or its designated representative. If OCII or its designated representative determines that a significant archaeological resource is present and that the resource could be adversely affected by the proposed project, at the discretion of the project sponsor either: A. The proposed project shall be re-designed so as to avoid any adverse effect on the significant archaeological resource; or

4 By the term "archaeological site" is intended here to minimally include any archaeological deposit, feature, burial, or evidence of burial.

5 An "appropriate representative" of the descendant group is here defined to mean, in the case of Native Americans, any individual listed in the current Native American Contact List for the City and County of San Francisco maintained by the California Native American Heritage Commission and in the case of the Overseas Chinese, the Chinese Historical Society of America. An appropriate representative of other descendant groups should be determined in consultation with the Department archaeologist.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Cultural and Paleontological Resources, Initial Study Section E4 (cont.)		
Impact CP-2 (cont.)		B. A data recovery program shall be implemented, unless OCII or its designated representative determines that the archaeological resource is of greater interpretive than research significance and that interpretive use of the resource is feasible. ***Archaeological Monitoring Program.*** If OCII or its designated representative in consultation with the archaeological consultant determines that an archaeological monitoring program shall be implemented the archaeological monitoring program shall minimally include the following provisions: • The archaeological consultant, project sponsor, and OCII or its designated representative shall meet and consult on the scope of the AMP reasonably prior to any project-related soils disturbing activities commencing. OCII or its designated representative in consultation with the archaeological consultant shall determine what project activities shall be archaeologically monitored. In most cases, any soils- disturbing activities, such as demolition, foundation removal, excavation, grading, utilities installation, foundation work, driving of piles (foundation, shoring, etc.), site remediation, etc., shall require archaeological monitoring because of the risk these activities pose to potential archaeological resources and to their depositional context; • The archeological consultant shall advise all project contractors to be on the alert for evidence of the presence of the expected resource(s), of how to identify the evidence of the expected resource(s), and of the appropriate protocol in the event of apparent discovery of an archaeological resource; • The archaeological monitor(s) shall be present on the project site according to a schedule agreed upon by the archaeological consultant and OCII or its designated representative until OCII or its designated representative has, in consultation with project archaeological consultant, determined that project construction activities could have no effects on significant archaeological deposits; • The archaeological monitor shall record and be authorized to collect soil samples and artifactual/ecofactual material as warranted for analysis; • If an intact archaeological deposit is encountered, all soils-disturbing activities in the vicinity of the deposit shall cease. The archaeological monitor shall be empowered to temporarily redirect demolition/excavation/pile driving/ construction activities and equipment until the deposit is evaluated. If in the case of pile driving activity (foundation, shoring, etc.), the archaeological monitor has cause to believe that the pile driving activity may affect an archaeological resource, the pile driving activity shall be terminated until an appropriate evaluation of the resource has been made in consultation with OCII or its designated representative. The archaeological consultant shall immediately notify the OCII or its designated representative of the encountered archaeological deposit. The archaeological consultant shall make a reasonable effort to assess the identity, integrity, and significance of the encountered archaeological deposit, and present the findings of this assessment to OCII or its designated representative.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Cultural and Paleontological Resources, Initial Study Section E4 (cont.)		
Impact CP-2 (cont.)		Whether or not significant archaeological resources are encountered, the archaeological consultant shall submit a written report of the findings of the monitoring program to the OCII or its designated representative. ***Archaeological Data Recovery Program.*** The archaeological data recovery program shall be conducted in accord with an archaeological data recovery plan (ADRP). The archaeological consultant, project sponsor, and OCII or its designated representative shall meet and consult on the scope of the ADRP prior to preparation of a draft ADRP. The archaeological consultant shall submit a draft ADRP to OCII or its designated representative. The ADRP shall identify how the proposed data recovery program will preserve the significant information the archaeological resource is expected to contain. That is, the ADRP will identify what scientific/historical research questions are applicable to the expected resource, what data classes the resource is expected to possess, and how the expected data classes would address the applicable research questions. Data recovery, in general, should be limited to the portions of the historical property that could be adversely affected by the proposed project. Destructive data recovery methods shall not be applied to portions of the archaeological resources if nondestructive methods are practical. The scope of the ADRP shall include the following elements: • *Field Methods and Procedures*. Descriptions of proposed field strategies, procedures, and operations. • *Cataloguing and Laboratory Analysis*. Description of selected cataloguing system and artifact analysis procedures. • *Discard and Deaccession Policy*. Description of and rationale for field and post-field discard and deaccession policies. • *Interpretive Program*. Consideration of an on-site/off-site public interpretive program during the course of the archaeological data recovery program. • *Security Measures*. Recommended security measures to protect the archaeological resource from vandalism, looting, and non-intentionally damaging activities. • *Final Report*. Description of proposed report format and distribution of results. • *Curation*. Description of the procedures and recommendations for the curation of any recovered data having potential research value, identification of appropriate curation facilities, and a summary of the accession policies of the curation facilities. ***Human Remains and Associated or Unassociated Funerary Objects.*** The treatment of human remains and of associated or unassociated funerary objects discovered during any soils disturbing activity shall comply with applicable State and Federal laws. This shall include immediate notification of the Coroner of the City and County of San Francisco and in the event of the Coroner's determination that the human remains are Native American remains, notification of the California State Native

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Cultural and Paleontological Resources, Initial Study Section E4 (cont.)		
Impact CP-2 (cont.)		American Heritage Commission (NAHC) who shall appoint a Most Likely Descendant (MLD) (Pub. Res. Code Sec. 5097.98). The archaeological consultant, project sponsor, OCII or its designated representative, and MLD shall make all reasonable efforts to develop an agreement for the treatment of, with appropriate dignity, human remains and associated or unassociated funerary objects (CEQA Guidelines. Sec. 15064.5(d)). The agreement should take into consideration the appropriate excavation, removal, recordation, analysis, custodianship, curation, and final disposition of the human remains and associated or unassociated funerary objects. ***Final Archaeological Resources Report.*** The archeological consultant shall submit a Draft Final Archaeological Resources Report (FARR) to OCII or its designated representative that evaluates the historical significance of any discovered archaeological resource and describes the archaeological and historical research methods employed in the archaeological testing/monitoring/data recovery program(s) undertaken. Information that may put at risk any archaeological resource shall be provided in a separate removable insert within the final report. Once approved by OCII or its designated representative, copies of the FARR shall be distributed as follows: California Archaeological Site Survey Northwest Information Center (NWIC) shall receive one (1) copy and OCII or its designated representative shall receive a copy of the transmittal of the FARR to the NWIC. As requested by OCII, the Environmental Planning division of the Planning Department shall receive one bound, one unbound and one unlocked, searchable PDF copy on CD of the FARR along with copies of any formal site recordation forms (CA DPR 523 series) and/or documentation for nomination to the National Register of Historic Places/California Register of Historical Resources. In instances of high public interest in or the high interpretive value of the resource, OCII or its designated representative may require a different final report content, format, and distribution than that presented above. **Mitigation Measure M-CP-2b: Accidental Discovery of Archaeological Resources** The following mitigation measure is required to avoid any potential adverse effect from the proposed project on accidentally discovered buried or submerged historical resources as defined in *CEQA Guidelines* Section 15064.5(a)(c). The project sponsor shall distribute the Planning Department archaeological resource "ALERT" sheet to the project prime contractor; to any project subcontractor (including demolition, excavation, grading, foundation, pile driving, etc. firms); or utilities firm involved in soils disturbing activities within the project site. Prior to any soils disturbing activities being undertaken each contractor is responsible for ensuring that the "ALERT" sheet is circulated to all field personnel, including machine operators, field crew, pile drivers, supervisory personnel, etc. The project sponsor shall provide OCII officer or its designated representative with a signed affidavit from the responsible parties (prime contractor, subcontractor(s), and utilities firm) confirming that all field personnel have received copies of the Alert Sheet.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Cultural and Paleontological Resources, Initial Study Section E4 (cont.)		
Impact CP-2 (cont.)		Should any indication of an archaeological resource be encountered during any soils disturbing activity of the project, the project Head Foreman and/or project sponsor shall immediately notify OCII officer or its designated representative and shall immediately suspend any soils disturbing activities in the vicinity of the discovery until OCII officer or its designated representative has determined what additional measures should be undertaken. If OCII officer or its designated representative determines that an archaeological resource may be present within the project site, the project sponsor shall retain the services of an archaeological consultant from the pool of qualified archaeological consultants maintained by the Planning Department archaeologist. The archaeological consultant shall advise OCII officer or its designated representative as to whether the discovery is an archaeological resource, retains sufficient integrity, and is of potential scientific/historical/cultural significance. If an archaeological resource is present, the archaeological consultant shall identify and evaluate the archaeological resource. The archaeological consultant shall make a recommendation as to what action, if any, is warranted. Based on this information, OCII officer or its designated representative may require, if warranted, specific additional measures to be implemented by the project sponsor. Measures might include: preservation in situ of the archaeological resource; an archaeological monitoring program; or an archaeological testing program. If an archaeological monitoring program or archaeological testing program is required, it shall be consistent with the Environmental Planning (EP) division guidelines for such programs. OCII officer or its designated representative may also require that the project sponsor immediately implement a site security program if the archaeological resource is at risk from vandalism, looting, or other damaging actions. The project archaeological consultant shall submit a Final Archaeological Resources Report (FARR) to OCII officer or its designated representative that evaluates the historical significance of any discovered archaeological resource and describing the archaeological and historical research methods employed in the archaeological monitoring/data recovery program(s) undertaken. Information that may put at risk any archaeological resource shall be provided in a separate removable insert within the final report. Copies of the Draft FARR shall be sent to OCII officer or its designated representative for review and approval. Once approved by OCII officer or its designated representative, copies of the FARR shall be distributed as follows: California Archaeological Site Survey Northwest Information Center (NWIC) shall receive one (1) copy and OCII officer or its designated representative shall receive a copy of the transmittal of the FARR to the NWIC. OCII and the Environmental Planning division of the Planning Department shall each receive one bound copy, one unbound copy and one unlocked, searchable PDF copy on CD three copies of the FARR along with copies of any formal site recordation forms (CA DPR 523 series) and/or documentation for nomination to the National Register of Historic Places/California Register of Historical Resources. In instances of high public interest or interpretive value, OCII officer or its designated representative may require a different final report content, format, and distribution than that presented above.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Cultural and Paleontological Resources, Initial Study Section E4 (cont.)		
Impact CP-3: The project would not directly or indirectly destroy a unique paleontological resource or site or unique geological feature.	LS	No mitigation required.
Impact CP-4: The proposed project would not disturb any human remains, including those interred outside of formal cemeteries.	LS	No mitigation required.
Impact C-CP-1: The proposed project, in combination with other past, present and foreseeable future projects, could result in significant impacts to cultural resources.	LSM	**Mitigation Measure M-CP-2a: Archaeological Testing, Monitoring and/or Data Recovery Program** (see Impact CP-2 above) **Mitigation Measure M-CP-2b: Accidental Discovery of Archaeological Resources** (see Impact CP-2 above)
Recreation, Initial Study Section E10		
Impact RE-1: The proposed project would not increase the use of parks and recreational facilities such that substantial physical deterioration of the facilities could occur or otherwise result in physical degradation of existing recreational resources.	LS	No mitigation required.
Impact RE-2: The proposed project would not require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment.	LS	No mitigation required.
Impact C-RE-1: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative recreation impacts.	LS	No mitigation required.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Biological Resources, Initial Study Section E13		
Impact BI-1: The proposed project would not have a substantial adverse effect, either directly or through habitat modification, on any special status species.	LS	No mitigation required.
Impact BI-2: The proposed project would not have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations.	NI	No mitigation required.
Impact BI-3: The proposed project would not have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act or navigable waters as defined in Section 10 of the Rivers and Harbors Act through direct removal, filling, hydrological interruption, or other means.	LS	No mitigation required.
Impact BI-4: The proposed project could interfere substantially with the movement of native resident or migratory wildlife species resident or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.	LSM	**Mitigation Measure M-BI-4a: Preconstruction Surveys for Nesting Birds** To the extent practicable, vegetation removal and grading of the site in advance of new site construction shall be performed between September 1 and January 31 in order to avoid breeding and nesting season for birds. If these activities cannot be performed during this period, a preconstruction survey of onsite vegetation for nesting birds shall be conducted by a qualified biologist. In coordination with the OCII or its designated representative, pre-construction surveys of onsite vegetation shall be performed during bird breeding season (February 1 – August 31) no more than 14 days prior to vegetation removal, grading, or initiation of construction in order to locate any active passerine nests within 250 feet of the project site and any active raptor nests within 500 feet of the project site. Surveys shall be performed in accessible areas within 500 feet of the project site and include suitable habitat within line of sight as access is available. If active nests are found on either the project site or within the 500-foot survey buffer surrounding the project site, no-work buffer zones shall be established around the nests. Buffer distances will consider physical and visual barriers between the active nest and project activities, existing noise sources and disturbance, as well as sensitivity of the bird species to disturbance. Modification of standard buffer distances, 250 feet for active passerine nests and 500 feet for active raptor nests, will

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SUM = Significant and Unavoidable Impact with Mitigation (significant or potentially significant unavoidable impact, even with feasible mitigation)
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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Biological Resources, Initial Study Section E13		
Impact BI-4 (cont.)		be determined by a qualified biologist in consultation with the California Department of Fish and Wildlife (CDFW). No vegetation removal or ground-disturbing activities including grading or new construction shall occur within a buffer zone until young have fledged or the nest is otherwise abandoned as determined by the qualified biologist. If construction work during the nesting season stops for 14 days or more and then resumes, then nesting bird surveys shall be repeated, to ensure that no new birds have begun nesting in the area **Mitigation Measure M-BI-4b: Bird Safe Building Practices** The project sponsor shall design and implement the project consistent with the San Francisco *Standards for Bird-Safe Buildings* and Planning Code Section 139, as approved by OCII. OCII shall consult with the Planning Department and the Zoning Administrator concerning project consistency with Planning Code Section 139.
Impact C-BI-1: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative impacts on biological resources.	LS	No mitigation required.
Geology and Soils, Initial Study Section E14		
Impact GE-1: The proposed project would not expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, seismic groundshaking, seismically-induced ground failure, or landslides.	LS	No mitigation required.
Impact GE-2: The project would not result in substantial erosion or loss of top soil.	LS	No mitigation required.
Impact GE-3: The project would not be located on a geologic unit or soil that is unstable, or that could become unstable as a result of the project.	LS	No mitigation required.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Geology and Soils, Initial Study Section E14 (cont.)		
Impact GE-4: The project would not create substantial risks to life or property as a result of location on expansive soils or other problematic soils**.**	LS	No mitigation required.
Impact GE-5: The project would not substantially change the topography or any unique geologic or physical feature of the project site**.**	LS	No mitigation required.
Impact C-GE-1: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative impacts related to geologic hazards.	LS	No mitigation required.
Hazards and Hazardous Materials, Initial Study Section E16		
Impact HZ-1: The project could create a significant hazard through routine transport, use, or disposal of hazardous materials or result in a substantial risk of upset involving the release of hazardous materials.	LSM	**Mitigation Measure M-HZ-1a: Guidelines for Handling Biohazardous Materials** ***Mission Bay FSEIR Mitigation Measure I.1***. Require businesses that handle biohazardous materials and do not receive federal funding to certify that they follow the guidelines published by the National Research Council and the United States Department of Health and Human Services Public Health Service, National Institutes of Health, and Centers for Disease Control, as set forth in Biosafety in Microbiological and Biomedical Laboratories, Guidelines for Research Involving Recombinant DNA Molecules (NIH Guidelines), and Guide for the Care and Use of Laboratory Animals, or their successors, as applicable. ***Mission Bay FSEIR Mitigation Measure I.2.*** Require businesses handling biohazardous materials to certify that they use high efficiency particulate air (HEPA) filters or substantially equivalent devices on all exhaust from Biosafety Level 3 laboratories unless they demonstrate that exhaust from their Biosafety Level 3 laboratories would not pose substantial health or safety hazards to the public or the environment. Require such businesses to certify that they inspect or monitor the filters regularly to ensure proper functioning. ***Mission Bay FSEIR Mitigation Measure I.3.*** Require businesses handling biohazardous materials to certify that they do not handle or use biohazardous materials requiring Biosafety Level 4 containment (i.e., dangerous or exotic materials that pose high risks of life-threatening diseases or aerosol-transmitted infections, or unknown risks of transmission) in the Project Area.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Hazards and Hazardous Materials, Initial Study Section E16 (cont.)		
Impact HZ-1 (cont.)		**Mitigation Measure M-HZ-1b: Geologic Investigation and Dust Mitigation Plan for Naturally Occurring Asbestos** The project sponsor shall conduct a geologic investigation in accordance with the guidelines of the California Geologic Survey to determine the naturally occurring asbestos content of fill materials to be excavated at the project site. If the investigation determines that the naturally occurring asbestos content of the fill materials is 0.25 percent or greater, the project sponsor or its construction contractor shall submit the appropriate notification forms and prepare an asbestos dust mitigation plan in accordance with the Asbestos ATCM. The plan shall specify measures that will be taken to ensure that no visible dust crosses the property boundary during construction. The plan must specify the following measures: • Prevent and control visible track-out from the property • Ensure adequate wetting or covering of active storage piles • Control disturbed surface areas and storage piles that would remain inactive for 7 days Control traffic on on-site unpaved roads, parking lots, and staging areas, including a maximum vehicle speed of 15 miles per hour • Control earthmoving activities • Control offsite transport of dust emissions that contain naturally-occurring asbestos-containing materials • Stabilize disturbed areas following construction The asbestos dust mitigation plan shall be submitted to and approved by the Bay Area Air Quality Management District (BAAQMD) prior to the beginning of construction, and the site operator must ensure the implementation of all specified dust mitigation measures throughout the construction project. In addition, if required by the BAAQMD, the project sponsor or a qualified third party consultant shall conduct air monitoring for offsite migration of asbestos dust during construction activities and shall modify the dust mitigation plan on the basis of the air monitoring results if necessary.
Impact HZ-2: The project would be located on a site identified on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5. Excavation could also require the handling of potentially contaminated soil and groundwater, potentially exposing workers and the public to hazardous materials, or resulting in a release into the environment during construction.	LSM	**Mitigation Measure M-HZ-2: RMP Provisions for Child Care Facilities** ***Mission Bay FSEIR Mitigation Measure J.2***. Carry out a site-specific risk evaluation for each site in a non-residential area proposed to be used for a public school or child care facility; submit to RWQCB for review and approval. If cancer risks exceed 1 x 10^{-5} and/or noncancer risk exceeds a Hazard Index of 1, carry out remediation designed to reduce risks to meet these standards or select another site that is shown to meet these standards.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Hazards and Hazardous Materials, Initial Study Section E16 (cont.)		
Impact HZ-3: The project would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan or expose people or structures to a significant risk of loss, injury or death involving fires.	LS	No mitigation required.
Impact C-HZ-1: The project, in combination with past, present, and reasonably foreseeable future projects in the site vicinity, would not result in a considerable contribution to cumulative impacts related to hazardous materials.	LS	No mitigation required.
Minerals and Energy Resources, Initial Study Section E17		
Impact ME-1: The project would not result in the use of large amounts of fuel, water, or energy, or use these in a wasteful manner.	LS	No mitigation required.
Impact C-ME-1: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative impacts on energy resources.	LS	No mitigation required.
Agriculture and Forest Resources, Initial Study Section E18		
Agricultural and forest resources are not applicable to the proposed project.	NI	No mitigation required.

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TABLE 1-2 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure or Improvement Measure
Third Street Plaza Variant, SEIR Chapter 8		
Wind		
All impacts, significance determinations, mitigation measures, and improvement measures the same as listed above for the proposed project, except for Impact WS-1 and Impact C-WS-1, which are replaced with the impacts shown below.		
Impact V-WS-1: The variant would not alter wind in a manner that would substantially affect off-site public areas.	LS	No mitigation required.
Impact V-C-WS-1: The variant, in combination with cumulative development, would not alter wind in a manner that would substantially affect off-site public areas.	LS	No mitigation required.

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CHAPTER 2
Introduction

2.1 Purpose of This SEIR

This Subsequent Environmental Impact Report (SEIR) provides environmental review and analysis of the proposed multi-purpose event center and mixed-use development on Blocks 29-32 in the Mission Bay South Redevelopment Plan Area of San Francisco (proposed project). This chapter provides background information and an explanation of how this SEIR satisfies the requirements of the California Environmental Quality Act (CEQA), the governing legislation for this report. Details of the proposed project, including the project's location, objectives, and characteristics that form the basis of the SEIR environmental analysis, are presented in Chapter 3, Project Description.

The San Francisco Office of Community Investment and Infrastructure (OCII), as lead agency responsible for administering the environmental review for private projects in the Mission Bay North and South Redevelopment Plan Area of San Francisco, has determined that under CEQA, an environmental impact report (EIR) is required for the proposed project. CEQA requires the preparation of an EIR when a proposed project could result in significant, adverse effects on the physical environment. This SEIR has been prepared in compliance with CEQA (California Public Resources Code, Sections 21000 *et seq.*) and the *CEQA Guidelines*. It is an informational document for use by governmental agencies and the public to aid in the planning and decision-making process by disclosing the physical environmental effects of the project and identifying possible ways of reducing or avoiding its potentially significant impacts.

CEQA requires that before a decision can be made to approve a project that would pose potential adverse physical effects, an EIR must be prepared that fully describes the environmental effects of the project. The EIR is a public information document which identifies and evaluates potential environmental impacts of a project, recommends mitigation measures to lessen or eliminate significant adverse impacts, and examines feasible alternatives to the project. The information contained in the EIR must be reviewed and considered by the OCII and by any responsible agencies (as defined in CEQA) prior to a decision to approve, disapprove, or modify the proposed project.

The state *CEQA Guidelines* (California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000 *et seq.*) help define the role and content of an EIR as follows:

- **Informational Document.** An EIR is an informational document that will inform public agency decision-makers and the public of the significant environmental effect(s) of a project, identify possible ways to minimize the significant effects, and describe reasonable alternatives to the project. The public agency shall consider the information in the EIR along with other information that may be presented to the agency (Section 15121[a]).

- **Standards for Adequacy of an EIR.** An EIR should be prepared with a sufficient degree of analysis to provide decision-makers with information that enables them to make an informed decision that takes account of environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among the experts. The courts have looked not for perfection but for adequacy, completeness, and a good faith effort at full disclosure (Section 15151).

The *CEQA Guidelines*, Section 15382, define a significant effect on the environment as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project…." Therefore, in identifying the significant impacts of the project, this SEIR describes the potential for the project to result in substantial physical effects within the area affected by the project and identifies mitigation measures that would avoid, reduce, or otherwise alleviate those effects. See Chapter 5, Section 5.1, Impact Overview, for further description of the approach to analyzing environmental impacts and identifying mitigation measures presented in this SEIR.

OCII, as the CEQA lead agency, has entered into an agreement with the San Francisco Planning Department's Environmental Planning Division to assist in the preparation of the SEIR for this project.

2.2 CEQA Environmental Review

The CEQA Guidelines Section 15160 provides for variations in EIRs so that environmental documentation can be tailored to different situations and intended uses, and these variations are not exclusive. As described below, this SEIR relies on several variations of EIRs, including a *project* EIR, a *program* EIR, a *redevelopment plan* EIR, a *subsequent* EIR, and a *focused* EIR.

This SEIR is a *project* EIR that examines the environmental impacts of a specific development project, consistent with CEQA Guidelines Section 15161. This project EIR is tiered from a previously certified *program* EIR in accordance with the CEQA Guidelines Section 15168(c), which provides for environmental review of subsequent activities under the same program. The proposed project — the event center and mixed use development at Mission Bay Blocks 29-32 — is a subsequent activity under the Mission Bay South Redevelopment Plan. Environmental review of the Mission Bay South Redevelopment Plan was completed in the program EIR, *Mission Bay Final Subsequent Environmental Impact Report* (Mission Bay FSEIR),[1] certified in

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[1] City and County of San Francisco and San Francisco Redevelopment Agency, 1998. *Final Mission Bay Subsequent Environmental Impact Report*. Planning Department File No. 96.771E, San Francisco Redevelopment Agency Case No. ER 919-97, State Clearinghouse No. 97092068. Certified September 17, 1998.

September 1998. The Mission Bay FSEIR is a *program* EIR under CEQA Guidelines Section 15168 and a *redevelopment plan* EIR under CEQA Guidelines Section 15180. The Mission Bay FSEIR analyzed the environmental impacts associated with the development program proposed for the entire Mission Bay Redevelopment Plan Area, including the program under the Mission Bay South Redevelopment Plan, which includes development in Blocks 29-32. Thus, under CEQA, the proposed project at Blocks 29-32 is considered a subsequent activity under the Mission Bay South Redevelopment program, and this SEIR evaluates the environmental effects of the proposed project relative to the program-level impact analysis in the certified Mission Bay FSEIR.

This SEIR is a *subsequent* EIR to the Mission Bay FSEIR pursuant to CEQA Guidelines Section 15162, which states that a subsequent EIR is required if the lead agency determines that the proposed project could result in any of the following conditions:

- Substantial changes are proposed in the project that will require major revisions of the previous EIR,
- Substantial changes have occurred with respect to the circumstances under which the project is undertaken, or
- New information of substantial importance, which was not known and could not have been known at the time of certification of the previous EIR, shows that the project could have one or more significant effects not discussed in the previous EIR, significant effects previously examined will be substantially more severe than shown in the previous EIR, mitigation measures or alternatives previously found not to be feasible would in fact be feasible and would substantially reduce one or more significant effects, or mitigation measures or alternatives that are considerably different from those analyzed in the previous EIR would substantially reduce one or more significant effects.

OCII has determined that one or more of these conditions have been met for the proposed project, and that a *subsequent* EIR is therefore warranted, including the fact that the proposed project would result in new significant impacts and substantially more severe significant impacts than previously identified in the Mission Bay FSEIR.

Furthermore, this SEIR is a *focused* EIR, in accordance with CEQA Guidelines Sections 15063(b)(1)(C) and 15168(d)(1). An Initial Study on the proposed project was published on November 19, 2014 (see Appendix NOP of this SEIR), and it identifies which of the project's effects were adequately examined in the Mission Bay FSEIR and which topics warrant more detailed environmental analysis. Thus, this SEIR concentrates the environmental analysis on those topics identified in the Initial Study with the potential to have either new significant effects or substantially more severe significant impacts than were previously identified in the Mission Bay FSEIR under the currently proposed project at Blocks 29-32. The remaining environmental topics, as documented in the Initial Study, were determined to have no new or more severe significant environmental effects than what was previously identified in the Mission Bay FSEIR, and these topics are not analyzed in this SEIR.

2.3 Mission Bay Final Subsequent EIR

2.3.1 Mission Bay Redevelopment Plan Environmental Review

On August 23, 1990, the San Francisco Board of Supervisors certified the *Mission Bay Final Environmental Impact Report* (the "1990 FEIR").[2] The 1990 FEIR assessed the development program that was ultimately adopted as the *Mission Bay Plan, an Area Plan of the San Francisco General Plan*. This development program was never implemented. In 1996–1997, the former San Francisco Redevelopment Agency, with Catellus Development Corporation as project sponsor, proposed a new project for the Mission Bay area, consisting of two separate redevelopment plans (*Mission Bay North Redevelopment Plan* and *Mission Bay South Redevelopment Plan*, "North Plan" and "South Plan" or, collectively, the "Plans") in two redevelopment project areas separated by the China Basin Channel (also known as Mission Creek).

On September 17, 1998, the San Francisco Planning Commission and the Redevelopment Agency Commission certified the *Mission Bay Final Subsequent Environmental Impact Report* (Mission Bay FSEIR). The Mission Bay FSEIR analyzed reasonably foreseeable development under the Plans. It incorporated by reference information from the original 1990 FEIR that continued to be accurate and relevant for analysis of the Plans. Thus, the 1990 FEIR and the Mission Bay FSEIR together constitute the environmental documentation for the Plans. The 1990 FEIR and Mission Bay FSEIR are program EIRs under CEQA Guidelines 15168 and redevelopment plan EIRs under CEQA Guidelines Section 15180.

The former Redevelopment Agency Commission adopted the North and South Plans on September 17, 1998, along with the Mission Bay North Owner Participation Agreement (as subsequently amended, the "North OPA") and Mission Bay South Owner Participation Agreement (as subsequently amended, the "South OPA"), which are agreements between the former Redevelopment Agency, now OCII as successor to the Redevelopment Agency, and the Mission Bay Master Developer (originally Catellus Development Corporation and now FOCIL-MB, LLC, the successor to Catellus Development Corporation).[3]

The North and South OPAs incorporated into the Plan the mitigation measures identified in the Mission Bay FSEIR and adopted by the former Redevelopment Agency Commission at the time of Plan approval.[4] As authorized by the Plans, the former Redevelopment Agency Commission simultaneously adopted design guidelines and standards governing development, contained in companion documents, the Design for Development for the Mission Bay North Project Area (the "North Design for Development") and the Design for Development for the Mission Bay South Project Area (the "South Design for Development"), respectively.[5] The San Francisco Board of Supervisors adopted the North Plan on October 26, 1998, and the South Plan on November 2, 1998.[6]

2 Planning Department Case No. 86.505E.
3 Resolution No. 191-98, and No. 188-98, respectively.
4 North and South OPAs, Attachment L.
5 Resolution No. 191-98 and Resolution No. 186-98, respectively.
6 Ordinance No. 327098 North and South OPAs, Attachment L and Ordinance No. 335-98, respectively.

The South OPA has been amended four times, the first amendment dated February 17, 2004, the second dated November 1, 2005, the third dated May 21, 2013, and the fourth dated June 4, 2013.

The Redevelopment Agency has prepared nine addenda to the Mission Bay FSEIR (completed between 2000 and 2013) for specific developments within Mission Bay that required additional environmental review of specific issues beyond those that were covered in the Mission Bay FSEIR. These addenda are as follows:

- The first addendum, dated March 21, 2000, analyzed the ballpark parking lots.
- The second addendum, dated June 20, 2001, addressed Infrastructure Plan revisions related to the 7th Street bike lanes and relocation of a storm drain outfall.
- The third addendum, dated February 10, 2004, addressed revisions to the South Design for Development with respect to the maximum allowable number of towers, tower separation, and required setbacks.
- The fourth addendum, dated March 9, 2004, addressed revisions to the South Design for Development with respect to the permitted maximum number of parking spaces for biotechnical and similar research facilities, and specified certain changes to the North OPA to reflect a reduction in permitted commercial development and associated parking.
- The fifth addendum, dated October 4, 2005, addressed revisions to the University of California San Francisco (UCSF) Long Range Development Plan and the Final Environmental Impact Report for the Long Range Development Plan.
- The sixth addendum, dated September 10, 2008, addressed revisions of the UCSF Medical Center at Mission Bay.
- The seventh addendum, dated January 7, 2010, analyzed the development of a Public Safety Building on Mission Bay Block 8 to accommodate the headquarters of the San Francisco Police Department, a local Police Station, and new San Francisco Fire Department station, and adaptive reuse of historic Fire Station 30, along with parking for these uses.
- The eighth addendum, dated May 15, 2013, analyzed amendments to the South Plan and South OPA to allow a mix of hotel, residential, and retail use on Block 1.
- The ninth addendum, dated May 30, 2013, addressed development on Block 7E for a facility housing extended stay bedrooms and associated facilities to support families of patients receiving medical treatment primarily at UCSF's medical facilities.

In all of these cases, an addendum was sufficient to satisfy CEQA environmental review requirements. The proposed event center and mixed use development at Blocks 29-32 is the first development project under the adopted Plans in which conditions triggering a Subsequent or Supplemental EIR are met. This SEIR is the first project-level environmental impact report tiering from the Mission Bay FSEIR.

2.3.2 Successor Agency/Oversight Board Jurisdiction

The former San Francisco Redevelopment Agency, along with all 400 redevelopment agencies in California, was dissolved on February 1, 2012, by order of the California Supreme Court in a decision issued on December 29, 2011 (*California Redevelopment Association et al. v. Ana Matosantos*). On June 27, 2012, the California Legislature passed and the Governor signed Assembly Bill (AB) 1484, a bill making technical and substantive changes to AB 26, which was the original bill that resulted in the dissolution of all redevelopment agencies. (Together, AB 26 and AB 1484 are referred to as "Dissolution Law," which is codified at California Health and Safety Code Sections 34161 – 34191.5). In response to the Dissolution Law, the San Francisco Office of Community Investment and Infrastructure (OCII) became the Successor Agency to the Redevelopment Agency of the City and County of San Francisco. Pursuant to state and local legislation, OCII is governed by two bodies, the Oversight Board of the Successor Agency and the Commission on Community Investment and Infrastructure.

On January 24, 2012, the Board of Supervisors of the City and County of San Francisco adopted Resolution No. 11-12 in response to the Supreme Court's December 29, 2011 decision upholding AB 26. On September 25, 2012, the Board of Supervisors adopted Ordinance No. 215-12 in response to the Governor's approval of AB 1484. Together, these two local laws ("Successor Agency Legislation") create the governing structure of the OCII. Pursuant to the Successor Agency Legislation, the Commission on Community Investment and Infrastructure exercises certain land use, development and design approval authority for the Mission Bay North and Mission Bay South Plan areas (and other major approved development projects), and the Oversight Board exercises certain fiscal oversight and other duties required under the Dissolution Law (see Chapter 3 for a discussion on project approvals). As the public agency responsible for carrying out or approving a project under the Successor Agency Legislation, OCII is the designated lead agency under CEQA for this SEIR.

2.3.3 Summary of the Mission Bay FSEIR

As described above, this SEIR is a *subsequent* EIR to the Mission Bay FSEIR certified in 1998, as supplemented by the nine addenda issued from 2000 to 2013. The Mission Bay FSEIR evaluated the potential environmental effects of the development of the Mission Bay plan area, approximately 303 acres in size and located near the eastern shoreline of San Francisco, generally south of Townsend Street, east of Seventh Street and Interstate 280, and north of Mariposa Street and straddling China Basin Channel. As discussed above, the Mission Bay FSEIR analyzed the combined North and South Plans (the Plans).

In general, the combined Plans defined as the project description and analyzed in the Mission Bay FSEIR consisted of the following: 1.5 million gross square feet of retail space; 43-acre new site for the University of California San Francisco (UCSF) containing 2.65 million gross square feet of instruction, research and support space, and a space to be donated for a public school; a mix of 5.56 million gross square feet of research and development, light manufacturing, and office space surrounding the UCSF site to the west, south, and east; a 500-room hotel between Third and

Fourth Streets south of China Basin Channel; police and fire stations; off-street parking accessory to most uses; about 47 acres of open space, including 8 acres within the UCSF site; and approximately 6,090 residential units (located on the north and south sides of China Basin Channel). The project site at Blocks 29-32 was identified as proposed commercial industrial/retail uses under the South Plan. The Plans included expansion and/or improvement of infrastructure in the Plan area, including a revised transportation network, new east-west streets, extension of Owens Street north and east to connect to Third Street, realignment and extension of Fourth Street south to Mariposa; expansion of the high- and low-pressure water systems; expansion of the combined sewer system and creation of a separate stormwater-only system for the central part of Mission Bay South; realignment of railroad tracks accessing Pier 80; improvement of rail crossings; and a pedestrian bridge across China Basin Channel. As described below, the Mission Bay North Plan and Mission Bay South Plan ultimately adopted reflected a mix of land uses covered by a combination of variants analyzed in the Mission Bay FSEIR. As a result, the adopted Plans vary from the original project description described in this paragraph.

The Mission Bay FSEIR analyzed the environmental impacts associated with implementation of the Plans and identified a suite of mitigation measures for avoiding or reducing significant environmental impacts. A topic-by-topic summary of impacts and mitigation measures presented in the Mission Bay FSEIR is included under each respective environmental topic in this SEIR and associated Initial Study. (Appendix MIT of this SEIR lists all of the mitigation measures from the FSEIR and indicates those applicable to the proposed project.)

In addition to analyzing the impacts of the proposed Plans, the Mission Bay FSEIR analyzed six variants and one combination of various components of the variants and the Plans. The variants were slight modifications to the Plans that were under consideration by the project sponsor and typically modified one limited area or aspect of the Plans. The variants analyzed in the FSEIR consisted of the following: Terry A. Francois Boulevard Variant; Esprit Commercial Industrial/Retail Variant; No Berry Street Crossing Variant; Modified No Berry Street Crossing Variant; Mission Bay North Retail Variant; and Castle Metals Block Commercial Industrial/Retail Variant. It also covered a combination of variants to the Plans (described below).

As required under CEQA, the Mission Bay FSEIR identified and analyzed alternatives that would reduce or avoid identified significant impacts of the Plans and meet most of the Plans objectives. The three alternatives analyzed included: No Project Alternative; Redevelopment North of Channel/Expected Growth South of Channel Alternative; and Residential/Open Space Alternative. The FSEIR determined that all of the alternatives would result in the same significant unavoidable adverse impacts identified for the Plans (i.e., traffic, vehicular air pollution emissions, potential combined toxic air contaminants, cumulative hazardous waste generation and disposal, and cumulative water quality), but the severity of the impacts would be somewhat lessened although not to a less-than-significant level. The Residential/Open Space Alternative was identified as the environmentally superior alternative in the Mission Bay FSEIR.

Following certification of the Mission Bay FSEIR and as part of the approval process for the Mission Bay Plans, CEQA Findings were adopted by the City and County of San Francisco.[7] The CEQA Findings describes the land use program that was ultimately adopted by the former Redevelopment Agency Commission. The adopted Mission Bay Plan was developed from a combination of the proposed Plans as described in the Mission Bay FSEIR plus a combination of plan variants. Specifically, the adopted Mission Bay Redevelopment Plan was based on the plan description in the Mission Bay FSEIR, plus Variant 1 (Terry A. Francois Boulevard Variant/Expanded Bayshore Open Space Proposal), Variant 2 (Esprit Commercial Industrial/Retail Variant), Variant 3A (Modified No Berry Street Crossing Variant), and Variant 5 (Castle Metals Block Commercial Industrial/Retail Variant). The adopted plan was described in the Mission Bay FSEIR Chapter III, Project Description, and Section VII.G, Combination of Variants Currently under Consideration by the Project Sponsors. The Mission Bay FSEIR concluded that the environmental effects of the combination of plan variants would be similar to those of the proposed plan, and consequently, would not result in any new or substantially more severe significant effects identified in the Mission Bay FSEIR for the proposed plan.

2.4 CEQA Process

Consistent with CEQA Guidelines Sections 15080 to 15097, the CEQA process has multiple phases, many of which require notification to and comments from the public. The main steps in this process are described below.

2.4.1 Previous Project Proposal for an Event Center and Mixed-Use Development at Piers 30-32 and Seawall Lot 330

On December 5, 2012, the San Francisco Planning Department issued a Notice of Preparation (NOP) of an EIR on an event center and mixed-use development on Piers 30-32 and Seawall Lot 330 (Case No. 2012.0178E) as proposed by GSW Arena LLC, the same project sponsor as for the currently proposed project in Mission Bay. The San Francisco Planning Department held a public scoping meeting on Tuesday, January 15, 2013 at the Delancy Street Foundation at 600 The Embarcadero, San Francisco on this project, and numerous comments were received. However, a Draft EIR was never issued on this project, and the project sponsor has withdrawn its application for the project on Piers 30-32 and Seawall Lot 330. The currently proposed project at Mission Bay Block 29-32 replaces this previous proposal. See Chapter 7, Alternatives, for further description of this previous proposal.

2.4.2 Notice of Preparation and Public Scoping

On November 19, 2014, the OCII sent a NOP to governmental agencies, organizations, and persons interested in the proposed project to initiate the 30-day public scoping period for this SEIR, which ended on December 19, 2014 (see Appendix NOP-IS). The NOP notified and

7 City and County of San Francisco, Board of Supervisors Resolution No. 854-98, October 30, 1998.

informed agencies and interested parties about the proposed project and the OCII's decision to prepare an SEIR; it included a request for agencies and the public to comment on environmental issues that should be addressed in the SEIR. The NOP is included as Appendix NOP-IS of this SEIR. The OCII held a public scoping meeting on Tuesday, December 9, 2014 at the Mission Creek Senior Community, 225 Berry Street, San Francisco to receive oral comments on the scope of the SEIR. The comments received in response to the NOP during the public scoping period, both written and oral, are available for review at the San Francisco Planning Department as part of Case File No. 2014.1441E. The OCII has considered all comments made by the public and agencies in preparing the Draft SEIR for the proposed project. See Section 2.5 below for a summary of the scoping comments received since publication of the NOP.

2.4.3 Draft SEIR Public Review

This Draft SEIR is being circulated to governmental agencies and to interested organizations and individuals that may wish to review and comment on the document. *CEQA Guidelines* Sections 15086(c) and 15096(d) call for responsible agencies or other public agencies to provide comment on those project activities within an agency's area of expertise or project activities that are required to be carried out or approved by the agency, and the agency should support those comments with either oral or written documentation. Publication of the Draft SEIR marks the beginning of a 45-day public review period, during which time the OCII and San Francisco Planning Department will accept comments on the Draft SEIR. The public review period for the Draft SEIR on the Event Center and Mixed-use Development at Mission Bay Blocks 29-32 is from June 5, 2015 through July 20, 2015.

Copies of the Draft SEIR are available for public review at the following locations: (1) Office of Community Investment and Infrastructure, One South Van Ness Avenue, San Francisco, California; (2) San Francisco Planning Department, 1660 Mission Street, 1st Floor, Planning Information Counter, San Francisco, California; (3) San Francisco Main Library, 100 Larkin Street, San Francisco, California and (4) Mission Bay Library, 960 Fourth Street, San Francisco, California. The Draft SEIR is also available on the OCII's website at http://www.sfocii.org/index.aspx?page=61 or the Planning Department's website at http://www.sf-planning.org/sfceqadocs.

All documents referenced in this Draft SEIR are available for review at the San Francisco Planning Department, 1650 Mission Street, Suite 400, San Francisco, CA 94103 as part of case file number 2014.1441E; the documents can also be accessed at the following website: http://gsweventcenter.com/. The distribution list for the Draft SEIR is also available for review at this location.

Written comments on the Draft SEIR should be sent by mail to: Tiffany Bohee, OCII Executive Director, c/o Brett Bollinger, San Francisco Planning Department, 1650 Mission Street, Suite 400, San Francisco, CA 94103; or by email to: warriors@sfgov.org.

During the 45-day public review period for the Draft SEIR, the OCII will conduct a public hearing to receive oral comments on the Draft SEIR. The public hearing is scheduled to be held before the OCII Commission on June 30,2015 at City Hall, Room 416, 1 Dr. Carlton B. Goodlett Place, San Francisco, California beginning at 1 p.m. or later.

2.4.4 Responses to Comments Document and Final SEIR

Following the close of the public review period on the Draft SEIR, the OCII will prepare a Responses to Comments document. Written and oral comments received on the Draft SEIR will be addressed in the Responses to Comments document, which will be released for public review and circulated to all persons, organizations, and agencies submitting comments on the Draft SEIR. The Responses to Comments document together with the Draft SEIR constitute the Final SEIR. The OCII Commission will hold a public hearing to consider the adequacy of the Final SEIR in complying with the requirements of CEQA. If the OCII Commission finds that the Final SEIR complies with CEQA requirements, it will certify the Final SEIR.

The OCII must consider the certified Final SEIR before making a decision to approve, disapprove, or modify the project. CEQA requires the adoption of findings prior to approval of a project for which a certified EIR identifies significant environmental effects (*CEQA Guidelines*, Sections 15091 and 15092). If the SEIR identifies significant adverse impacts that cannot be mitigated to less-than-significant levels, the findings must include a statement of overriding considerations for those impacts (*CEQA Guidelines*, Section 15093[b]). See Chapter 5, Section 5.1 for a description of impact significance determinations.

2.5 Public Participation

The *CEQA Guidelines* encourage public participation in the planning and environmental review processes. As part of the CEQA process, OCII provides formal opportunities for the public to present comments and concerns regarding the planning and environmental review process as follows: (1) during the public scoping period after publication of the NOP and before publication of the Draft SEIR, (2) during the Draft SEIR public review period after publication of the Draft SEIR, and (3) at a public hearing before the OCII Commission after publication of the Final SEIR when the Commission is considering certification of the Final SEIR. Written public comments may be submitted to the OCII directly, or on their behalf through the San Francisco Planning Department during the specified public review and comment periods, and both written and oral comments may be presented at public hearings held specifically for the proposed project. This CEQA public participation process is separate from any public participation or citizen advisory meetings conducted by the project sponsor or other Mission Bay activities.

2.6 Summary of Scoping Comments

Summaries of relevant comments received during the public scoping period are presented in **Tables 2-1** and **2-2**. Table 2-1 includes comments that are addressed within each chapter or section of the SEIR, as indicated in the first column of the table. Table 2-2 includes comments that are addressed in the Initial Study (see Appendix NOP-IS).

TABLE 2-1
SUMMARY OF SCOPING COMMENTS ADDRESSED IN THE SEIR

SEIR Section	Comment
Chapter 3, Project Description	The Project Description should include explanation and/or descriptions of: • Retail Gatehouse: Present additional design and programmatic information about the Gatehouse site element including the location of doors, vertical circulation elements, public restrooms (if any), solid vs. void elements, lighting and signage, as it will be located within the UCSF view easement. • Parking: Describe parking in sufficient detail including comprehensive discussion regarding parking operations during events. Identify how many on-site parking spaces would be available to event patrons vs. to the users of the office and retail space. • Outdoor Events: Include information on daily/annual event dates and time schedule for outdoor events; decibel limits and monitoring; exterior lighting locations and light levels, audio/visual design including any exterior monitors/LED panels, and other environmental elements with potential to impact occupants of the UCSF campus, including sensitive receptors in nearby campus housing, medical facilities or operations. • Exterior Lighting Plan: Discuss the project's exterior site and building lighting plan, including illuminated exterior signage (i.e., LED) billboards, event panels and other light producing elements. • Project Approvals: More explanation concerning the approvals sought should be provided in the SEIR. Clarify what specific amendments would be sought to the Mission Bay South Design for Development, and what modifications to Mission Bay South Signage Master Plan and Mission Bay South Streetscape Plan would be needed. Regarding modifications to the Mission Bay South Design for Development, the proposed project would seek: (1) a height increase for the event center to be located on Blocks 30 and 32, (2) a second 160-foot-tall tower on the site where only one 160-foot tower is allowed; (3) exceptions to the bulk limits and tower separation for many of the structures on the site; (4) exceptions to the required view corridor in the center of the project site, east of Campus Way; and (5) exceptions to parking and loading requirements. • Project Approvals: The SEIR should state that approval is needed from the University of California to release the Warriors from a view easement located along the Campus Way axis, extending 100 feet into the site from Third Street, to enable the Warriors to develop within this view easement. • Project Approvals: Explain the "Governor's approval of project sponsor's Assembly Bill 900 (AB 900) application," its purpose, practical application, its benefit to the project, and any consequences for member of the public, including UCSF.
Chapter 4, Plans and Policies	• Identify City Ordinances that are superseded. SEIR should identify all planning ordinances since 1998 with which the project will not comply and explain the consequences of non-compliance so that the deficiencies in the project are clear.
Section 5.1, Impact Overview	The SEIR should include an analysis of: • Approach: Explain in detail the basis for this proposed approach, and to ensure the project SEIR fully discloses and analyzes all new or more severe significant environmental effects than those analyzed in the previous environmental documentation. • Cumulative: In Initial Study, the following plans were not discussed: Western SOMA Community Plan, Central Corridor Plan, Hunters Point Redevelopment Plan. Need to be incorporated in order to make sure the plan works not just for the people who will be coming into and out of the arena, but the people that surround the arena. • Cumulative: Consider all residential and commercial projects in Environmental Planning's pipeline and planned to be in construction during time of the Warriors project. Daggett Place will have over 400 units, and proposed residential housing at the Corovan site and at 1601 Mariposa; in total over a 1,000 residential units.

TABLE 2-1 (Continued)
SUMMARY OF SCOPING COMMENTS ADDRESSED IN THE SEIR

SEIR Section	Comment
Section 5.2, Transportation and Circulation	The SEIR/ Traffic Impact Study should include: • Vicinity, regional, and site plan and site circulation maps. • Project related trip generation, distribution, and assignment, with assumptions supported with appropriate documentation. • Average daily traffic, a.m. and p.m. peak hour volumes, and LOS on all roadway where impacts may occur for existing, existing plus project, cumulative, and cumulative plus project. • Cumulative analysis should consider all existing plus future traffic generating developments. • Identify project contribution to area traffic and degradation to existing/cumulative LOS. • Include turning traffic per study intersection for all scenarios both during game and commute traffic periods. • Event center should assume year round operation at full seat capacity during both game and commute traffic periods. • Schematic illustration of traffic conditions including project site and area roadways, trip distribution percentages and volumes as well as intersection geometrics for all scenarios. • Evaluation of project consistency with the General Plans Circulation Element and Congestion Management Agency's Congestion Management Plan (CMP).
	The Transportation Management Plan (TMP) component of the Project Description should address the following: • TMP should be required as a condition of approval. • TMP should include discussion about traffic management, traffic routing, use of PCOs, location of parking facilities, and parking operations management. • Parking, traffic and transit assumptions used to develop TMP analyses. • Specific measures to reduce traffic, planned traffic management of pre- and post-events, traffic routing, lane closures, use of Parking Control Officers (PCOs) and other measures to ensure project traffic and transit impacts will not affect operations at critical facilities, including UCSF. • Identify when operational measures are triggered. • Include locations and quantities of parking spaces needed to serve GSW project. • Don't assume use of UCSF's parking facilities by the GSW project since there is no agreement. UCSF facilities should not be listed in TMP unless an agreement with UCSF is reached. • TMP does not presently consider traffic flow of event patrons parked at locations other than the event center. The TMP should consider how traffic will be managed at other parking locations. • TMP/SEIR should consider how traffic will be managed to facilitate traffic, transit, pedestrian and bicycle flow for adjacent and nearby uses that are not destined for the event center, including UCSF patients, visitors, employees and residents and other nearby residents and visitors to nearby uses. • UCSF encourages smart parking management (e.g., patrons likely to arrive from north receive parking spaces to north of project site; patrons likely to arrive from south receive parking spaces to south of project site). • TMP should identify mechanisms for monitoring traffic impacts to surrounding streets and impacts to UCSF campus, including impacts to private vehicles, transit, emergency vehicles, UCSF shuttles, pedestrians and bicyclists.

TABLE 2-1 (Continued)
SUMMARY OF SCOPING COMMENTS ADDRESSED IN THE SEIR

SEIR Section	Comment
Section 5.2, Transportation and Circulation (cont.)	• Any modifications to the TMP should require a public process for stakeholders, including UCSF, to comment. • Measures contained in the TMP that are relied upon as mitigation for the project's impacts must be binding and enforceable. • Any road closures to vehicle or pedestrian traffic must have provisions to allow residents of the Madrone and Radiance communities (on Mission Bay Boulevard North) to get in and out of the general area. • The easement area between the Madrone building and Radiance building, into which Bridgeview [Way] runs must have traffic management control in place to close off vehicle and pedestrian traffic except to residents of these two communities. • Bridgeview [Way] north of the arena must be closed off to all foot traffic and enforced to avoid late night noise problems. • PCOs supporting the Giants games are ineffective on Third Street currently, so hearing that PCO are a big part of the solution to the traffic issues on Third Street is not encouraging. PCOs need to be qualified and aggressively control vehicle and foot traffic with ability to change lights when necessary. • Need more details on new shuttles from Van Ness, Ferry Building and 16th Street (how big and will they be of a sufficient number/size to make a difference?). Who is paying for the shuttles, MUNI, tax payers, Warriors fans, or Warriors? • Mission Bay Master Plan has no provision for resident parking stickers. Residents living on Mission Bay Boulevard North need an exception on resident parking stickers. • Warriors plan does not address the needs of the people living in the area to get in and out; people living in the area will be trapped, as they are when the Giants have a ball game.
	The SEIR should use the Transportation Management Plan (TMP) and analyze: • SEIR should include parking, traffic and transit assumptions used to develop TMP and SEIR analyses. • SEIR should include the traffic, parking and transit assumptions used to develop the TMP and SEIR analyses, and include specifics about measures to reduce traffic, planned traffic management of pre- and post-events, traffic routing, lane closures, use of Parking Control Officers (PCOs) and other measures to ensure project traffic and transit impacts will not affect operations at critical facilities, including UCSF. • TMP and SEIR should identify when operational measures are triggered. • SEIR should analyze whether measures in the TMP would be effective in reducing vehicle trips, managing traffic and circulation impacts, whether modifications to the TMP should be made, or whether the project should be modified to eliminate or minimize significant impacts. • SEIR should analyze the effect of any TMP-proposed lane closures on vehicle, transit, pedestrian, and bicycle circulation. • SEIR should evaluate effectives of the TMP; identify what significance standard applies in evaluating the effectiveness of the TMP and in determining whether mitigation measures are needed.
	The SEIR analysis should include: • Construction Impacts on State Highway System: Include impacts from construction traffic on state highway system. • Construction Effects on Transportation: Removal of 350,000 cubic yards of soil from the site will add approximately 10,000 – 20,000 heavy truck trips to the neighboring streets, depending on the capacity of the dump trucks used for hauling. The traffic and safety impacts of these trips should be analyzed in SEIR.

TABLE 2-1 (Continued)
SUMMARY OF SCOPING COMMENTS ADDRESSED IN THE SEIR

SEIR Section	Comment
Section 5.2 Transportation and Circulation (cont.)	The SEIR analysis should include: • Construction Assumptions: Construction-related assumptions should be based on conservative assumptions that disclose impacts, including for road closures, staging, construction employee parking, etc. on surrounding streets. • Cumulative Construction: Construction associated with electrification of Caltrain and construction of new commercial space will impact traffic well past the targeted Warriors opening date. • Identify what Transportation Demand Management (TDM) measures are proposed to reduce vehicular travel in the area. • TDM measures should be required as mitigation measures and as conditions of approval. • Secondary impacts to pedestrian and bicyclists from any traffic impact mitigation measures should be analyzed. • Parking, Traffic and Transit Assumptions: Include parking, traffic and transit assumptions used to develop traffic analyses. • Project Traffic at Off-site Parking Locations: TMP does not consider traffic flow of event patrons parked at locations other than at the event center. SEIR should consider how traffic will be managed at other parking locations. • Non-Project Traffic/Transit/Pedestrian/Bicycle Flow: Consider how traffic will be managed to facilitate traffic, transit, pedestrian and bicycle flow for adjacent and nearby uses that are not destined for the event center, including UCSF patients, visitors, employees and residents and other nearby residents and visitors to nearby uses. • Transportation/Circulation Impacts to FibroGen [409 and 499 Illinois Street]: Disclose transportation and circulation impacts to FibroGen, given the primary GSW access for cars and trucks is via 16th Street, as is FibroGen's main artery for access to its own parking garage. • Project Impacts to Public Transit: Disclose impacts to public transit, given currently constrained nature, and consider any existing and future system constraints. • Avoid 16th Street. UCSF encourages east/westbound event traffic to be routed to the south of the UCSF Mission Bay campus site to the extent possible – i.e., onto Mariposa Street, rather than onto 16th Street which bisects the UCSF Mission Bay campus site and which will have a reduced vehicular capacity given the planned public transit-only lanes on 16th Street in the future. Avoid 16th Street during the 5 p.m. to 7 p.m. peak period when UCSF employees are leaving the site and an employee shift change occurs at the hospitals. • Off-Peak Period Traffic: Given the atypical characteristics of the proposed project, whereby a large number of vehicles is expected to arrive/leave the area in a relatively short amount of time, and the greatest amount of traffic generated by the Event Center is likely to occur outside of the 4 p.m. to 6 p.m. period, clearly identify the peak periods and what significance standard is appropriate to apply in this situation to determine the significance of traffic impacts. • Cumulative Impacts at MB South Intersections UCSF's recently certified 2014 LRDP FEIR identified potentially significant and unavoidable cumulative traffic impacts at several key intersections in the Mission Bay South Area that could result from events at the Warriors' Event Center. These impacts should be further analyzed in the SEIR.
	The SEIR cumulative analysis of UCSF/Mission Rock Project/AT&T events/Warriors project should include: • Identify the basis for assumptions regarding the frequency and times of day of dual events (i.e., events at Warriors' Event Center concurrent with events at AT&T Park). • Disclose cumulative impacts of use of UCSF hospital or other facilities when either or both Giants/Warriors games or other events occur at the same time.

TABLE 2-1 (Continued)
SUMMARY OF SCOPING COMMENTS ADDRESSED IN THE SEIR

SEIR Section	Comment
Section 5.2, Transportation and Circulation (cont.)	• Consider traffic volume increases associated with the Mission Rock project and future closure of Terry François Boulevard (when it is reconfigured when Mission Rock project is completed. • There will be increase in GSW project traffic on Mission Bay Blvd North with future closure of Terry François Boulevard when it is reconfigured when the Mission Rock project is completed.
	The SEIR analysis should include: • Taxi/Valet Exiting Plan. Provide comprehensive pedestrian exiting plan illustrating how taxi and valet parking along Terry François Blvd. will be accessed and announced. The elevator cores near the corners of South St. and Terry François Blvd. are not easily visible from the sidewalk. Unclear access to and from taxi and valet parking areas may result in patrons finding other locations to find taxis which may cause pedestrian flows through UCSF campus. • Quantitative Pedestrian Flow/Circulation Modeling: Conduct quantitative pedestrian flow/circulation modeling to validate the required size and location of pedestrian routes approaching and within the site to ensure that pedestrians will not spill over sidewalks into roadways and/or the UCSF campus, impacting campus operations, vehicular access or otherwise. • Pedestrian Barrier on 3rd Street. Request a pedestrian barrier along 3rd street within the central median be studied to mitigate pedestrian jay-walking across 3rd street onto the UCSF Mission Bay campus site. • Bicycle Facilities: Evaluate whether the event center will provide adequate bicycle facilities to promote access by bike, including wayfinding signage, valet service, bikeshare, and promotion of the Bay Trail for arena access. • Bicycle Parking Requirements: Current Planning Code for arena calls for bicycle parking spaces for 5% of venue capacity, of which 75% must be attended. If bicycle mode share assumptions are changed to 5-6%, which is plausible, there will be insufficient parking available under the terms of the 1998 FSEIR. The GSW design at Mission Bay should comply with current code by providing parking comparable to the earlier Piers 30-32 design. • Bicycle Parking and Pedestrian Improvements: Project should be encouraged to mitigate any transportation impacts through bicycle and pedestrian improvements and infrastructure, including new crosswalks, wider sidewalks, special signals, bike lanes or paths with color treatment or protection, signal synchronization and priority for users other than motorists, and on-site bicycle parking commensurate with expected bicycle mode share. SEIR should study project variants that consider a robust bicycle transportation plan in line with the City's own mode share goals. • Central Subway and Caltrain Electrification: SEIR will assume completion of the Central Subway and Caltrain electrification by the time the Warriors' proposed project is completed in 2018. This may be a faulty assumption, as the Central Subway is not scheduled for completion until 2019, and Caltrain Electrification is not scheduled to be completed until late 2020 at the earliest. Therefore, the potential impacts of the proposed project before these improvements are in place needs to be analyzed. • Travel Demand Assumptions: For the estimates of travel demand of Warriors games, data from Oracle Arena should not be used exclusively. Oracle Arena is located a distance from major employment centers, is accessed via a congested freeway, and has limited on-site pre-game dining options. Conversely, the proposed project is located adjacent to downtown San Francisco and will be providing thousands of square feet of new restaurant space. As such, it is likely that game patrons traveling to the project will arrive several hours prior to events and thus will overlap with the evening peak commute hours. Additional data from similar urban arenas (such as Staples Center in Los Angeles) should be reviewed.

TABLE 2-1 (Continued)
SUMMARY OF SCOPING COMMENTS ADDRESSED IN THE SEIR

SEIR Section	Comment
Section 5.2, Transportation and Circulation (cont.)	The SEIR analysis should include: • Travel Demand Assumptions: Given the proliferation of Uber and other so-called "ride-sharing" services, these modes of travel need to be accounted for in the trip generation and the site planning. • Mode Share: GSW indicate mode share will be 35% transit, 55% auto, 2% bike, 4% walk and 4% taxi/shuttle/etc., derived from Giants and Kings, however, Kings arena is located well outside downtown, and Giants ballpark seats more than twice and operates at different times in different seasons. Provide evidence for assumptions. Consider split data from SFMTA 2011 mode share survey for Zone 1 (5% bike mode share). • Mode Share: When Giants came, they said it was going to be a commuter-only park, with no parking - we all know what happened. So, recommend setting a lower goal on parking load (e.g., reduce from 55% to 25%) because you are going to go over it no matter what you do. • Bicycle Mode Share: The TMP assumes a 2% bicycle mode share for the GSW 2018 opening, despite Mission Bay's 5% bicycle mode share and City goals for 8% bicycle mode share by 2018 and 20% by 2020. SEIR should resolve the TDM mode share assumptions with existing data for the City and neighborhood and the City's goals for growing bicycle mode share by 2020. • Bicycle Mode Share: To account for more accurate mode share, rely on the Waterfront Transportation Assessment (WTA). WTA Phase 2 (SOMA/Mission Bay/Central Waterfront Transportation Needs and Solutions Analysis) should be used to determine real transportation impacts across all modes to achieve more realistic bicycle mode share. WTA estimates a 30% increase in total trips in Mission Bay, 20% of which are predicted to be by bike. • Caltrain Station: Recognize importance of Caltrain Station at 22nd Street. Trip from this station to the arena is roughly as long as trip from Montgomery BART to Giants ballpark. • Traffic Analysis to Account for UCSF Peak Evening Shifts. The analysis should consider the number of UCSF employees leaving/arriving from the UCSF campus, especially the employee shift change at the UCSF hospitals which would be coincident with Event Center patron arrivals for peak (evening) events. • Traffic Pinch Points in Mission Bay: Mission Bay has limited street capacity, with certain pinch points at the I-280 on/off ramps, the 16th Street / 7th Street intersection at the Caltrain crossing, and the Fourth Street and Third Street bridges. Interventions at these pinch points are critical to facilitating traffic flow in and out of Mission Bay. • Traffic Pinch Points: I-280/Mariposa interchange already challenging; addition of traffic from UCSF, and an additional traffic light between I-280 and 3rd Street will make this additionally difficult. • Impacts on I-80/I-280: Concerned about impacts on I-80 and I-280 on-ramp and off-ramp locations; suggest updated counts at on- and off-ramp locations, including special event data counts. • Project Impact on Emergency Vehicle Access/Response: Evaluate the extent to which patients in private vehicles and public transit to the UCSF Mission Bay campus site may be delayed or otherwise encounter difficulties reaching the hospital or emergency room due to Event Center traffic congestion on roadways, or queues on the I-280 off-ramp to Mariposa Street. Evaluate the extent to which emergency vehicles may be delayed reaching the hospital emergency room. Mitigation measures and/or improvement measures should be identified. • Project Impact on Emergency Vehicle Access/Response: The SEIR should evaluate the potential impacts on emergency response in the area, particularly given the project's proposal to close a portion of Third Street to through traffic after events, and given vehicular queues and traffic congestion that are likely to occur both before and after events. Even with parking control officers to direct traffic, UCSF is concerned that traffic

TABLE 2-1 (Continued)
SUMMARY OF SCOPING COMMENTS ADDRESSED IN THE SEIR

SEIR Section	Comment
Section 5.2, Transportation and Circulation (cont.)	The SEIR analysis should include: congestion may inhibit the movement of emergency vehicles needing to access the UCSF Children's Hospital emergency room, due to vehicular queues on streets as well as queues on the I-280 off-ramp to Mariposa Street. In addition, patients who need to each the hospital or emergency room may be in private vehicles, which would not have the benefit of sirens/lights to facilitate their movement through congested traffic. For these reasons, the potential for delay to hospital/emergency room access needs to be considered, as access must be unimpeded 24/7. • Event Center Light Impact on Operation of UCSF Helipad: Outdoor animated lighting, strobe lighting, or Hollywood-style search lights during special events, should be discussed and impacts on adjacent land uses analyzed, including potential impacts on operations of the new helipad located atop the Medical Center at Mission Bay. • Construction Effects on UCSF Helicopter Use. Analyze the potential for construction cranes to interfere with air medical access to the UCSF hospital helipad. Construction cranes for the proposed Warriors' project would be in or in close proximity to the UCSF helicopter flight paths as the UCSF hospital and helipad will be operational in February 2015. • Ferry Terminal: Addition of a new ferry terminal to support the event center worth considering; would relieve vehicular traffic and crowded MUNI system. • UCSF Parking Facilities: Do not assume use of UCSF's parking facilities by the GSW project since there is no agreement. • Parking Demand: Identify the parking demand resulting from the proposed project, particularly during events, and whether parking demand would be met by on- and off-site parking facilities. • On-Site Parking Supply: Lack of on-site parking will create the circulation of several thousand private vehicles with no place to park. • On-Site Parking Management/Use: Use smart parking management (patrons likely to arrive from north receive parking spaces to north of project site; patrons likely to arrive from south receive parking spaces to south of project site). • On-Site Parking Management/Use: Identify how many on-site parking spaces would be available to event patrons vs. to the users of the office and retail space. • Parking Supply/Demand Assessment: CEQA does not foreclose a detailed parking supply/demand study for planning and informational purposes, as well as analysis of queuing for parking spaces. EIR should include a parking supply/demand assessment and disclose any parking shortfalls, review area-wide parking conditions, the effects of vehicles circling looking for parking, and queues at all designed event parking facilities.
	The SEIR mitigation measures should include: • Project's fair share contribution, financing, scheduling, implementation responsibilities and lead agency monitoring should be fully disclosed for all proposed mitigation measures. • Required roadway improvements should be completed prior to issuance of Certificate of Occupancy. • Consider mitigation measures to reduce project impacts on I-80 and I-280. • Describe any pedestrian and bicycle mitigation measures and safety countermeasures needed to maintain and improve access to transit facilities and reducing vehicle trips and traffic impacts on State Highways. • Contraflow Lane Mitigation: Should traffic congestion warrant, the analysis should consider contraflow lanes as mitigation or improvement measures. One possibility is the coning of westbound Mariposa Street to temporarily enable three lanes westbound, rather than two lanes, to facilitate traffic flow onto I-280. This should be considered along with possible interventions on the I-280 onramp to facilitate traffic flow.

TABLE 2-1 (Continued)
SUMMARY OF SCOPING COMMENTS ADDRESSED IN THE SEIR

SEIR Section	Comment
Section 5.3, Noise	The SEIR should include an analysis of: • General: The SEIR should identify noise mitigation measures to reduce potentially significant noise impacts, including impacts on sensitive receptors at UCSF's residential and medical facilities. • Outdoor Event Noise: Analyze impacts from amplified sound equipment to be used for outdoor events in the main plaza nearby facilities. The SEIR should include information on outdoor events, including decibel limits and monitoring, audio/visual design with potential to impact occupants of the UCSF campus, including sensitive receptors in nearby campus housing, medical facilities or operations. Include mitigation measures designed to prevent any potentially significant noise impacts. • Event Center Noise: Analyze the potential for noise leakage from the Event Center structure, particularly during concerts, and associated impacts on adjoining land uses. • Operational Traffic and Emergency Generator Noise Effects on FibroGen: FibroGen should be treated as sensitive noise receptor; SEIR should disclose noise impacts from traffic and circulation from GSW patrons, employees and deliveries; and diesel generators (in event of power outage). • Construction Noise and Vibration Effects on FibroGen: FibroGen operations, sensitive instrumentation, laboratories, and chemicals are highly sensitive to noise and vibration. Project should be conditioned so that pile driving is prohibited and driller augers are instead required; and SEIR should analyze noise and vibration impacts of drilled augers. • Cumulative Construction Noise: UCSF's recently certified 2014 LRDP FEIR identified a potentially significant and unavoidable cumulative noise impact from concurrent UCSF/Warriors' construction projects. This should be further analyzed in the Draft EIR.
Section 5.4, Air Quality	The SEIR should include an analysis of: • Air Pollutant Exposure: Neighborhoods adjacent to freeways (as indicated in BAAQMD and SFDPH maps), through which project traffic will travel, will experience exacerbated levels of particulate matter and other pollutants, worsening an already dangerous health situation. City will be reducing capacity further on many streets; lines of congestion will stretch further; dispersing particulates through residential and work areas. This must be studied, quantified, and an abatement plan discussed. • Construction Air Quality Effects on FibroGen: FibroGen has had to significantly increase the frequency with which it changes its air filters, and has experienced significant amounts of dust and dirt on its windows and walls throughout the UCSF hospital construction. GSW project to be even more impactful to FibroGen. SEIR should conservatively analyze construction air quality impacts. • Operational Air Quality Effects on FibroGen: Analyze traffic-related air quality effects on FibroGen. • Cumulative Construction Air Quality Effects: UCSF's recently certified 2014 LRDP FEIR identified potentially significant and unavoidable cumulative air quality impacts from concurrent construction projects and concurrent operations of the UCSF Mission Bay campus site and the Warriors' Event Center. These impacts should be further analyzed in the Draft EIR.
Section 5.6, Wind and Shadow	The SEIR should include an analysis of: • Wind and shadow impacts on UCSF facilities should be analyzed, particularly in areas heavily used by pedestrians, such as Gene Friend Way near Third, and the 16th/4th Streets campus gateway. • Proposed height increase exceptions, if granted, would have impacts on wind and shadows.

TABLE 2-1 (Continued)
SUMMARY OF SCOPING COMMENTS ADDRESSED IN THE SEIR

SEIR Section	Comment
Section 5.7, Utilities and Service Systems	The SEIR should include an analysis of: • Impact on Mariposa Pump Station: The UCSF 2014 LRDP FEIR identified an issue with the Mariposa Pump Station that has yet to be resolved with the San Francisco Public Utilities Commission staff (see UCSF 2015 LRDP EIR, pp. 7-98 through 7-100 and pg. 10-15). The proposed Warriors' project may contribute to a cumulative impact and this should be analyzed in the SEIR. • Operational Impacts to Other Utilities: Analyze operational impacts to public infrastructure within streets right-of-way. • Construction Impacts to Other Utilities: Analyze construction impacts to public infrastructure within streets right-of-way.
Section 5.8, Public Services	The EIR should include an analysis of: • Security/Crowd Management/Quality of Life Issues: The SEIR should discuss the project's plan for crowd management, nighttime hours of operation, and provisions for sufficient on-site and off-site security and maintenance personnel, public restrooms and trash receptacles. • Security/Crowd Management/Quality of Life Issues: The SEIR should discuss project impacts to law enforcement service ratios/response times; assess fan violence, proliferation of alcohol-related uses, riots; and solid waste management. • Public Intoxication: Consideration must be given to control unorderly behavior, such as intoxication and public urination (e.g., Giants fans using China Basin Channel (also known as Mission Creek) for restroom. • Litter: Consideration must be given to the handling of event related materials that can be littered around the area (not just adjacent streets) • Graffiti: Project may result in increases in graffiti/damage in area buildings. • Evacuation Plan for Emergency Response. SEIR should discuss evacuation plan for emergency response, including law enforcement, and make that plan an enforceable mitigation measure. • Construction Effects on Public Services. Evaluate construction effects on law enforcement, fire, emergency services and solid waste (displacement of vermin, handling of construction materials).
Section 5.9, Hydrology and Water Quality	The SEIR should include an analysis of: • Project Trash Impact to Stormwater Quality: The SEIR should identify mitigation, such as additional trash receptacles and post-event trash pick-up radius exterior to the Warriors property line sufficient to avoid impacts on the water quality of the storm drain system.
Chapter 7, Alternatives	The SEIR should include an analysis of: • Modified Site Plan: Evaluate alternatives that incorporate potential design changes that may be necessary to address significant traffic and circulation impacts (e.g., a reconfigured site plan that provides additional vehicular access s on Third Street and Terry A. François Blvd; additional modifications to freeway access; and modifications to existing public transportation to alleviate traffic concerns).

TABLE 2-2
SUMMARY OF SCOPING COMMENTS ADDRESSED IN THE INITIAL STUDY

Initial Study Section	Comment
Section E.1, Land Use	The EIR should include an analysis of: • Potential land use impacts should be included in the Draft SEIR, as the proposed Event Center would require a secondary use finding, multiple amendments to the applicable Design for Development and other variances. • Given GSW project's significant scope and sensitivity of FibroGen use and operations, combined with other uses in the vicinity that have been constructed, disclose any potential land use incompatibilities with surrounding land uses.
Section E.2, Aesthetics	The EIR should include an analysis of: • Increased Height/Massing Visual Impact: The numerous modifications proposed to the Mission Bay South Design for Development standards which would increase the height limit, the number of allowed towers on the site, increase building bulk beyond current limits, and eliminate a view corridor, warrants the analysis of aesthetic and view corridor impacts resulting from the proposed project, at least for the purpose of providing information to the public and decision makers. • Exterior Lighting Impacts: Given the proximity of the proposed entertainment venue to sensitive receptors (i.e., UCSF hospital and residents), information about nighttime lighting at the Event Center, including the potential for outdoor animated lighting, strobe lighting, or Hollywood-style search lights during special events, should be discussed and impacts on adjacent land uses analyzed, including potential impacts on operations of the new helipad located atop the Medical Center at Mission Bay. • Plaza and Retail Visual Impact: Visual impact of the Third Street Plaza and associated retail space being elevated above Third Street, 16th Street and South Street, rather than at street level where activation of the street is encouraged, and the expanse of blank parking garage walls fronting those streets. • Retail Gatehouse Visual Impact: Retail Gatehouse is located in UCSF view easement and will have a visual impact. • Construction Nighttime Lighting Effects: Construction-period nighttime lighting and impacts on adjacent land uses should be analyzed, and mitigation measures imposed as appropriate.
Section E.3, Population and Housing	The EIR should include an analysis of: • Construction Employment Data: Construction job data presented in Initial Study probably dates back from the end of 2013; construction has gone up greatly over the last year; need to make sure outdated data is not used.
Section E.4, Cultural and Paleontological Resources	The EIR should include an analysis of: • Mitigation for Cultural Resources: Contact appropriate regional archaeological Information Center. If archaeological inventory survey is required, prepare report detailing the findings and recommendations of the records search and field survey. Contact NAHC for a Sacred Lands File Check, and a list of appropriate Native American contacts for consultation concerning the project site and to assist in mitigation measures. Include in mitigation plan provisions for identification and evaluation of accidentally discovered archaeological resources, per CEQA Section 16064.5(f). Include in mitigation plan provisions for disposition of recovered cultural items that are not burial associated, which are addressed in PRC 5097.98, in consultation with culturally affiliated Native Americans. Include provisions for discovery of Native American human remains in mitigation plan (see Health and Safety Code 7050.5, PRC 5097.98, and CEQA Guidelines 15064.5(e)).
Section E.10, Recreation	The EIR should include an analysis of: • Project Increase in Use of Bayfront Park. Initial Study indicated there would not be any substantial increase in the use of existing parks and recreational facilities and would not lead to physical deterioration of existing recreational resources. However, plan for Bayfront Park never contemplated having 20,000 additional people coming into the neighborhood to use these parks.

TABLE 2-2 (Continued)
SUMMARY OF SCOPING COMMENTS ADDRESSED IN THE INITIAL STUDY

Initial Study Section	Comment
Section E.11, Utilities and Service Systems (Solid Waste only)	The EIR should include an analysis of: • Solid Waste. There is a significant increase in solid waste handling as a result of the Giants; the burden of cleanup ends up on Mission Bay and not the City's general fund. Analysis of Warriors project should reflect the increase burden on Mission Bay community from increased solid waste.
Section E.15, Hydrology and Water Quality	The EIR should include an analysis of: • Groundwater: Site is too wet; will not be able to successfully build underground parking.
Section E.16, Hazards and Hazardous Materials	The EIR should include an analysis of: • Cumulative Construction-Related Hazardous Materials Impacts: Concerned about hazardous waste releases from all the cumulative construction that will be going on in the project area (within a 3 to 4 block radius) at the same time as the Warriors project.

2.7 Assembly Bill 900

The Jobs and Economic Improvement through Environmental Leadership Act (Assembly Bill 900 or AB 900)[8], signed by the Governor in September 2011 and effective on January 1, 2012, provides streamlining benefits under CEQA for "environmental leadership development projects (leadership projects)." One of the categories that meets the definition of a leadership project is a project that is residential, retail, commercial, sports, cultural, entertainment, or recreational in nature; upon completion, will qualify for LEED silver certification; will achieve at least 10 percent greater transportation efficiency than comparable projects; and for projects within a metropolitan planning organization's jurisdiction for which a sustainable communities strategy or alternative planning strategy is in effect, the project is consistent with the general use designation, density, building intensity and applicable policies specified for the project area in either the sustainable communities strategy or an alternative planning strategy.[9]

The Governor may certify a leadership project for streamlining if all the following conditions are met: (1) the project would result in a minimum investment of $100 million dollars in California upon completion of construction; (2) the project would create high-wage, highly skilled jobs that pay prevailing wages and living wages and provide construction jobs and permanent jobs for Californians, and help reduce unemployment; (3) the project would not result in any net additional emission of greenhouse gases, including greenhouse gas emissions (GHGs) from employee transportation, as determined by the State Air Resources Board; (4) the project applicant has entered into a binding and enforceable agreement that all mitigation measures required pursuant to the law to certify the project under this chapter shall be conditions of

8 California Public Resources Code 21178 et. seq.
9 The Governor's Office of Planning and Research, California Jobs, *Governor's Guidelines for Streamlining Judicial Review Under the California Environmental Quality Act*, available online at http://opr.ca.gov/s_californiajobs.php, accessed January 6, 2015 and California Public Resources Code Section 21180(b).

approval of the project, and those conditions will be fully enforceable by the lead agency or another agency designated by the lead agency, and in the case of environmental mitigation measures, the applicant agrees, as an ongoing obligation, that those measures will be monitored and enforced by the lead agency for the life of the obligation; (5) the project applicant agrees to pay the costs of the Court of Appeal in hearing and deciding any case, including payment of the costs for the appointment of a special master if deemed appropriate by the court, in a form and manner specified by the Judicial Council; and (6) the project applicant agrees to pay the costs of preparing the administrative record for the project concurrent with review and consideration of the project pursuant to this division, in a form and manner specified by the lead agency for the project.

The project sponsor (GSW Arena LLC, an affiliate of the Golden State Warriors LLC) applied to the governor of California for certification of the proposed project as a leadership project under AB 900, and the application was subject to public review from March 2, 2015 through April 1, 2015. On March 21, the California Air Resources Board issued Executive Order G-15-022 determining that the proposed project would not result in any net additional GHGs for purposes of certification under AB 900. On April 30, 2015, Governor Jerry Brown certified the proposed project as an eligible project under AB 900, and the Governor's Office of Planning and Research forwarded the Governor's determination to the Joint Legislative Budget Committee. On May 22, 2015, the State Legislative Analyst's Office indicated that the project aligns with the intent of AB 900, and recommended to the Joint Legislative Budget Committee that they concur with the Governor's determination. On May 27, 2015, the Joint Legislative Budget Committee concurred with the Governor's determination that the project is an eligible project under AB 900.

Pursuant to Public Resources Code Section 21187, within 10 days of the Governor certifying the proposed project as an environmental leadership development project, the OCII issued a public notice on May 7, 2015 stating that the applicant has elected to proceed under Chapter 6.5 (commencing with Section 21178) of the Public Resources Code, which provides, among other things, that any judicial action challenging the certification of the EIR or the approval of the project described in the EIR is subject to the procedures set forth in Sections 21185 to 21186, inclusive, of the Public Resources Code. The OCII issued a second public notice on June 3, 2015 stating the aforementioned information as well.

The OCII has prepared an administrative record for the proposed project and associated CEQA review process in accordance with the requirements of AB 900. All documents and other materials placed in the administrative record have been posted on, and are downloadable from, the following website http://gsweventcenter.com/, commencing with the date of the release of the Draft SEIR. The administrative record includes the Draft SEIR and all other documents submitted to, or relied on by, the lead agency in the preparation of the Draft SEIR. In addition, a document prepared by the lead agency or submitted by the applicant after the date of the release of the Draft SEIR that is a part of the record of the proceedings will be made available to the public in a readily accessible electronic format within the timeframes specified by this act.

Section 21185 of the Public Resources Code requires that the Judicial Council adopt a rule of court to establish procedures applicable to actions or proceedings brought to attack, review, set aside, void or annul the certification of the environmental impact report for an environmental leadership development project certified by the Governor or the granting of any project approvals that require the actions or proceedings, including any potential appeals therefrom, be resolved within 270 days of certification of the record of proceedings pursuant to Public Resources Code 21186. This creates an accelerated timeframe for CEQA litigation. It applies to projects that have a certified EIR and are certified by the Governor as "environmental leadership development projects" by January 1, 2016. AB 900 remains effective until January 1, 2017, and as of that date, is repealed unless a later enacted statute extends or repeals that date.

2.8 Senate Bill 743

On September 27, 2013, Governor Jerry Brown signed SB 743 (Chapter 386 of the 2013 California Legislation Session), which became effective on January 1, 2014.[10] Among other provisions, SB 743 amends the California Environmental Quality Act (CEQA) by adding Public Resources Code Section 21099 regarding analysis of aesthetics and parking impacts for urban infill projects and modifies AB 900 as discussed above.

Public Resources Code Section 21099(d), effective January 1, 2014, provides that, "aesthetics and parking impacts of a residential, mixed- use residential, or employment center project on an infill site located within a transit priority area shall not be considered significant impacts on the environment."[11] Accordingly, aesthetics and parking are no longer to be considered in determining if a project has the potential to result in significant environmental effects for projects that meet all of the following three criteria:[12]

a) The project is in a transit priority area; and
b) The project is on an infill site; and
c) The project is residential, mixed-use residential, or an employment center.

The proposed project meets each of the above three criteria: the project is located in proximity to several transit routes, including SFMTA Muni Metro stops; the project is located on an infill site that has previously been developed with industrial and commercial uses, is surrounded by areas of either recently completed or planned urban development, and is zoned for commercial uses with a floor area ratio (FAR) greater than 0.75; and the project would be an employment center

10 SB 743 can be found on-line at: http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB743.
11 A "transit priority area" is defined in as an area within one-half mile of an existing or planned major transit stop. A "major transit stop" is defined in Section 21064.3 of the California Public Resources Code as a rail transit station, a ferry terminal served by either a bus or rail transit service, or the intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning and afternoon peak commute periods.
12 See Public Resources Code Section 21099(d).

supporting a range of commercial uses.[13] Thus, this SEIR does not consider either aesthetics or the adequacy of parking in determining the significance of project impacts under CEQA.

Public Resources Code Section 21099(d) states that a Lead Agency maintains the authority to consider aesthetic impacts pursuant to local design review ordinances or other discretionary powers and that aesthetics impacts do not include impacts on historical or cultural resources. As such, there will be no change in the standard protocol used by OCII related to design and historic review for this project. The applicable urban design standards and guidelines governing the project site and proposed project — which are contained in the Mission Bay South Plan, Mission Bay South Design for Development and Mission Bay South Signage Master Plan — would apply to the proposed project. Furthermore, the project would be subject to all applicable design review approvals under the South OPA, including Major Phase approval for Blocks 29-32 and Schematic Designs for each building and private open spaces. The design review process would consider relevant design and aesthetic issues. Project impacts on historical and cultural resources are addressed in the Initial Study (see Appendix NOP-IS).

The OCII recognizes that the public and decision makers nonetheless may be interested in information pertaining to the aesthetic and parking effects of a proposed project and may desire that such information be provided as part of the environmental review process. Therefore, Chapter 3, Project Description, includes graphic depictions of the project. However, this information is provided solely for informational purposes and is not used to determine the significance of the environmental impacts of the project, pursuant to SB 743. Similarly, Chapter 5, Section 5.2, Transportation and Circulation, of this SEIR presents a parking demand analysis for informational purposes and considers any secondary physical impacts associated with constrained supply (e.g., queuing by drivers waiting for scarce onsite parking spaces that affects the public right-of-way) as applicable in the transportation analysis.

2.9 Contents and Organization of the EIR

This SEIR describes the proposed project and required approvals, analyzes potential environmental impacts of the proposed project and a project variant, identifies mitigation measures where those impacts are significant, identifies cumulative adverse impacts to which the proposed project could make a substantial contribution, and evaluates alternatives to the project that could avoid or reduce significant impacts while still meeting most of the project's objectives.

This SEIR is organized as follows:

- **Chapter 1, Summary.** This chapter summarizes the contents of the entire SEIR by presenting a concise overview of the project description and providing in a tabular format a summary of the environmental impacts that would result from the project, mitigation

[13] San Francisco Planning Department, Transit-Oriented Infill Project Criteria Checklist: Event Center and Mixed-Use Development at Mission Bay Blocks 29-32, November 10, 2014. This document is available for review at the Planning Department, 1650 Mission Street, Suite 400, in Case File No. 2014.1441E.

measures identified to reduce or avoid significant impacts. It also briefly describes the project variant and its impacts, and the alternatives to the proposed project.

- **Chapter 2, Introduction.** This chapter describes the environmental review process, the previous environmental review of the Mission Bay Redevelopment Plans, the public and agency comments received on the scope of the SEIR, and the organization of the SEIR.

- **Chapter 3, Project Description.** This chapter discusses the project's background, objectives, and location; describes the physical characteristics of the project, including both the construction and operational phases; and identifies required project approvals.

- **Chapter 4, Plans and Policies.** This chapter provides a summary of the applicable plans, policies, and regulations of the local, regional, state, and federal agencies that have policy and regulatory control over the project site, and discusses the proposed project's consistency with those plans, policies, and regulations.

- **Chapter 5, Environmental Setting, Impacts and Mitigation Measures.** This chapter describes the project's existing setting and environmental impacts with respect to transportation and circulation, noise and vibration, air quality, greenhouse gas emissions, wind and shadow, utilities and service systems, public services, and hydrology and water quality. Each environmental topic is discussed in a separate section within this chapter, and each section identifies the thresholds of significance used to assess the severity of the impacts. Within each section, there is a summary of the relevant sections of the Mission Bay FSEIR, descriptions of the setting and regulatory framework, and impact analyses of both project-specific and cumulative impacts of the proposed project and a determination of the significance of each impact. For impacts determined to be significant, mitigation measures that would reduce or avoid those impacts are presented.

- **Chapter 6, Other CEQA Issues.** This chapter addresses any growth-inducing impacts that would result from the proposed project, the significant environmental effects of the project that cannot be mitigated to a less-than-significant level, and areas of known controversy.

- **Chapter 7, Alternatives.** This chapter presents and evaluates alternatives to the proposed project that could feasibly attain most of the project's objectives as well as reduce identified significant adverse impacts of the project. It also identifies the environmentally superior alternative and describes other alternatives that were considered but rejected.

- **Chapter 8, Third Street Plaza Variant.** This chapter describes and analyzes a variant to the proposed project at an equal level of detail as the proposed project.

- **Chapter 9, Report Preparers.** This chapter identifies the SEIR authors and consultants; project sponsor and consultants; and agencies and persons consulted.

- **Appendices.** The appendices include the Notice of Preparation, the complete Initial Study, and supporting technical information for the SEIR.

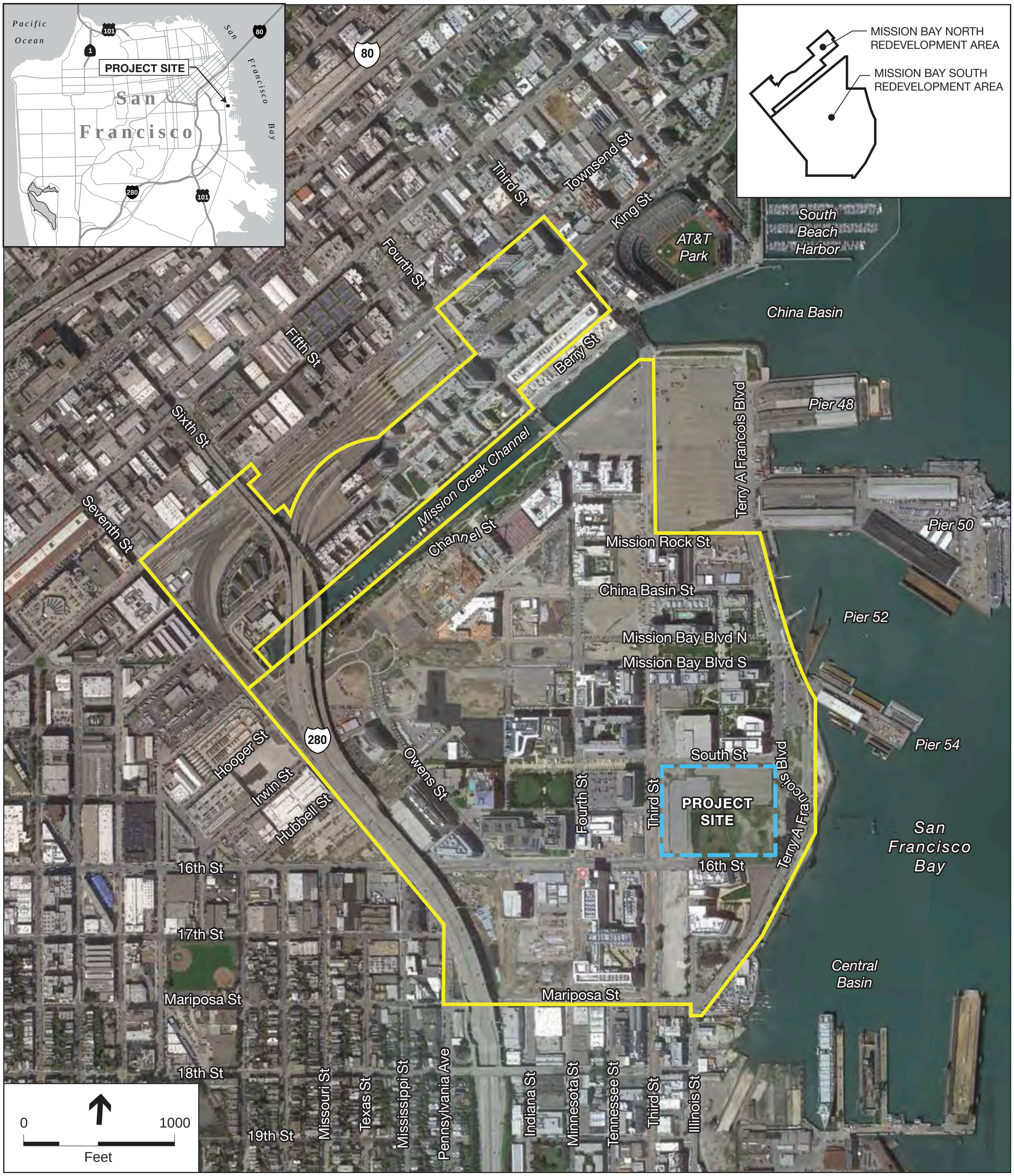
CHAPTER 3
Project Description

3.1 Project Overview

GSW Arena LLC (GSW), an affiliate of Golden State Warriors, LLC, which owns and operates the Golden State Warriors National Basketball Association (NBA) team, proposes to construct a multi-purpose event center and a variety of mixed uses, including office, retail, open space and structured parking on an approximately 11-acre site (Blocks 29-32) within the Mission Bay South Redevelopment Plan Area of San Francisco (see **Figure 3-1** for aerial photograph and **Figure 3-2** for existing roadway network in Mission Bay). The project site is bounded by South Street on the north, Third Street on the west, 16th Street on the south, and by the future planned realigned Terry A. Francois Boulevard on the east. The proposed event center would host the Golden State Warriors basketball team during the NBA season, and provide a year-round venue for a variety of other uses, including concerts, family shows, other sporting events, cultural events, conferences and conventions. GSW has entered into an agreement to purchase the project site from the current site owner, an affiliate of salesforce.com.

Development is allowed within the Mission Bay South Redevelopment Plan Area, including Blocks 29-32, consistent with the land use program and subject to the development controls of the *Mission Bay South Redevelopment Plan*, *Mission Bay South Design for Development*, and other related documents (see *Background*, below). No amendment to the *Mission Bay South Redevelopment Plan* would be required, although the proposed project at Blocks 29-32 would require certain amendments and/or variations to other documents (see *Intended Uses of this EIR and Approvals Required*, below).

This Project Description is organized as follows: Section 3.2 presents the project objectives; Section 3.3 provides background information, including the development context for Mission Bay; Section 3.4 describes characteristics of the existing project site and vicinity; Section 3.5 provides a brief history of the Golden State Warriors and describes their existing operations and facilities; Section 3.6 present project characteristics, including a description of the proposed development plans at the project site, discussion of the proposed project operations and employment, and description of project construction details; Section 3.7 presents a number of graphic exhibits that have been prepared for the proposed development, and Section 3.8 describes the intended uses of this Subsequent EIR (SEIR) and lists the required approvals for the project.



Mission Bay Redevelopment Plan Area Boundary

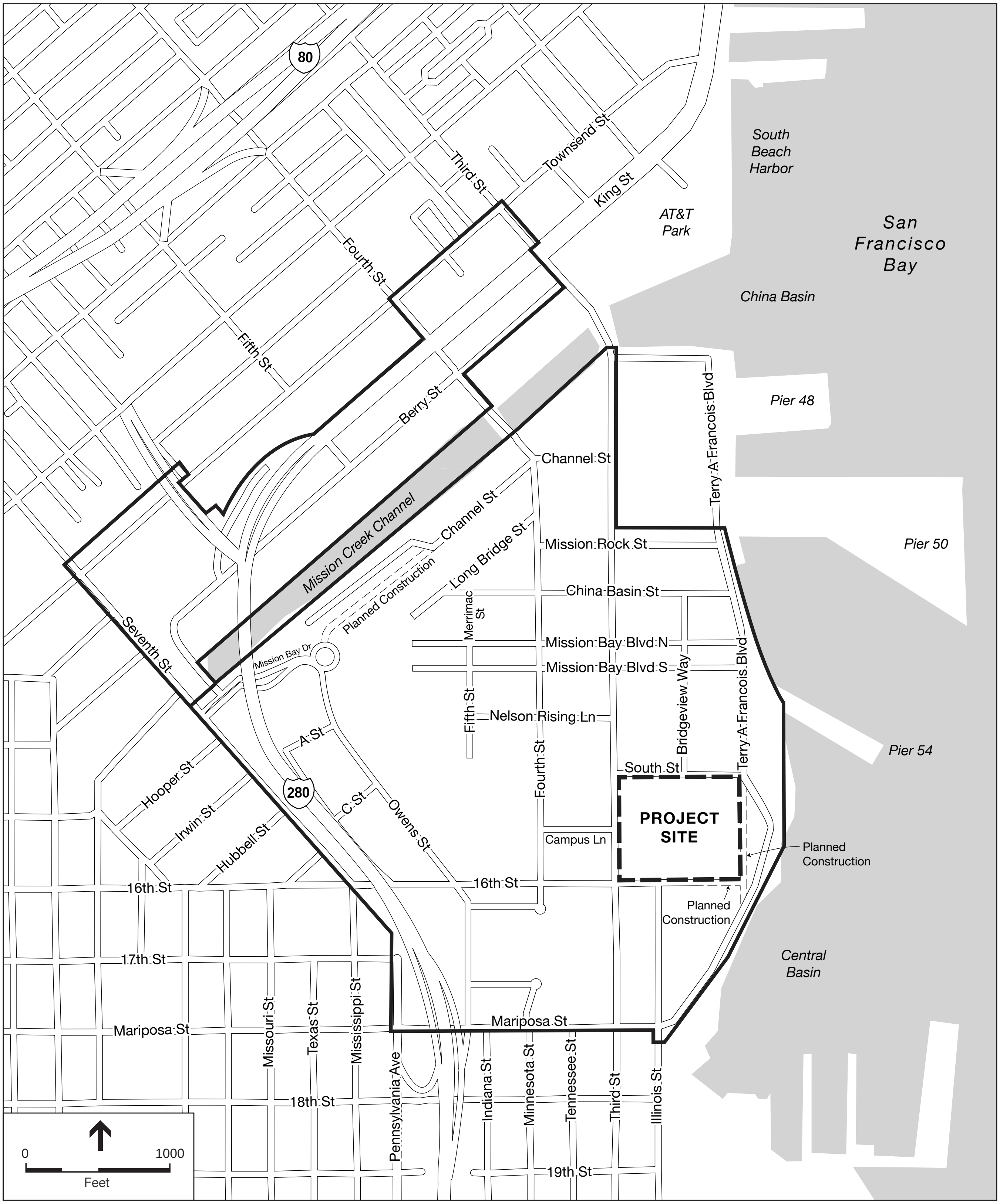
Project Site Boundary

Note: Please see also Figure 3-2, Existing Roadway Network in Mission Bay, for recent roadway improvements in Mission Bay.

SOURCE: Google Maps, ESA, 2014

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E: Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 3-1
Aerial Photograph of Mission Bay



Mission Bay Redevelopment Plan Area Boundary

Project Site Boundary

SOURCE: ESA, 2014

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 3-2
Existing Roadway Network in Mission Bay

3.2 Project Objectives

The Office of Community Investment and Infrastructure (OCII, formerly the San Francisco Redevelopment Agency) and FOCIL-MB, LLC (formerly Catellus Development Corporation) are the co-sponsors of the Mission Bay Redevelopment Plan. The primary objectives of the Mission Bay Redevelopment Plan project sponsors as presented in the *Mission Bay Final Subsequent Environmental Impact Report* (Mission Bay FSEIR), certified in September 1998, were:[1]

- Eliminating blighting influences and the correction of environmental deficiencies in the Project Area, including, but not limited to, abnormally high vacancies, abandoned buildings, incompatible land uses, depreciated or stagnant property values, and inadequate or deteriorated public improvements, facilities, and utilities.
- Retaining and promoting, within the City and County of San Francisco, academic and research activities associated with the University of California San Francisco, which seeks to provide space for existing and new programs and consolidate academic and support units from many dispersed sites at a single major new site which can accommodate the 2,650,000-gross sq. ft. program analyzed in the UCSF 1996 LRDP.
- Assembling of land into parcels suitable for modern, integrated development with improved pedestrian and vehicular circulation in the Project Area.
- Replanning, redesigning, and developing of undeveloped and underdeveloped areas which are improperly utilized.
- Providing flexibility in the development of the Project Area to respond readily and appropriately to market conditions.
- Providing opportunities for participation by owners in the redevelopment of their properties.
- Strengthening the community's supply of housing by facilitating economically feasible, affordable housing through the installation of needed site improvements and expansion and improvement of the housing supply by the construction of approximately 6,090 market-rate units, including 1,700 units of very low-, low- and moderate-income housing.

[1] The land use program in the adopted Mission Bay plan was developed from the proposed plan plus a combination of plan variants described and analyzed in the Mission Bay FSEIR. The Mission Bay FSEIR concluded that the environmental effects of the combination of plan variants would be similar to those of the proposed plan, and consequently, would not result in any new or substantially more severe significant effects identified in the Mission Bay FSEIR for the proposed plan. In addition, subsequent to plan adoption, the Mission Bay plan was subject to a number of minor revisions to the land use program. Addendums to the Mission Bay FSEIR similarly found that these revisions would not result in any new or substantially more severe significant effects identified in the Mission Bay FSEIR for the proposed plan. Also, subsequent to plan adoption, UCSF is increasing planned development on the UCSF campus, which has been the subject of separate CEQA review. Consequently, the specific estimates of land use development in the adopted Mission Bay plan are slightly different from that in the Mission Bay FSEIR Project Objectives presented here. However, the overall project objectives originally presented in the Mission Bay FSEIR are still substantively representative of the proposed Mission Bay plan. Please see Chapter 2, Introduction for additional detail.

- Strengthening the economic base of the Project Area and the community by strengthening retail and other commercial functions in the Project Area through the addition of approximately 1.5 million gross sq. ft. of retail space, a major hotel, and about 5,557,000 gross sq. ft. of mixed office, research and development, and light manufacturing uses.

- Facilitating emerging commercial-industrial sectors, including those expected to emerge or expand due to their proximity to the UCSF new site, such as research and development, biotechnical research, telecommunications, business service, multi-media services, and related light industrial through improvement of transportation access to commercial and industrial areas, improvement of safety within the Project Area, and the installation of needed site improvements to stimulate new commercial and industrial expansion, employment, and economic growth.

- Facilitating public transit opportunities to and within the Project Area to the extent feasible.

- Providing land in an amount of approximately 47 acres for a variety of open spaces.

- Achieving the objectives described above in the most expeditious manner feasible.

Consistent with the overall objectives of the Mission Bay Redevelopment Plan, GSW's objectives for the proposed Event Center and Mixed-Use Development at Blocks 29-32 are to:

- Construct a state-of-the-art multi-purpose event center in San Francisco that meets NBA requirements for sports facilities, can be used year-round for sporting events and entertainment and convention purposes with events ranging in capacity from approximately 3,000-18,500, and expands opportunities for the City's tourist, hotel and convention business.

- Provide sufficient complementary mixed-use development, including office and retail uses, to create a lively local and regional visitor-serving destination that is active year-round, promotes visitor activity and interest during times when the event center is not in use, provides amenities to visitors of the event center as well as the surrounding neighborhood, and allows for a financially feasible project.

- Develop a project that meets high-quality urban design and high-level sustainability standards.

- Optimize public transit, pedestrian and bicycle access to the site by locating the project within walking distance to local and regional transit hubs, and adjacent to routes that provide safe and convenient access for pedestrians and bicycles.

- Provide adequate parking and vehicular access that meets NBA and project sponsor's reasonable needs for the event center and serves the needs of project visitors and employees, while encouraging the use of transit, bicycle, and other alternative modes of transportation.

- Provide the City with a world class performing arts venue of sufficient size to attract those events which currently bypass San Francisco due to lack of a world class 3,000-4,000 seat facility.

- Develop a project that promotes environmental sustainability, transportation efficiency, greenhouse gas reduction, stormwater management using green technology, and job creation consistent with the objectives of the California Jobs and Economic Improvement Through Environmental Leadership Act (AB 900),[2] as amended.

3.3 Background

A detailed discussion of the Mission Bay Redevelopment Plan approval process (including OCII and OCII Commission), prior environmental review of the Mission Bay Redevelopment Plan (including the Mission Bay FSEIR), and the relationship of this SEIR to the Mission Bay FSEIR is presented in Chapter 2, Introduction. The following provides a description of applicable development controls in the Mission Bay South Redevelopment Plan, including those for the project site.

3.3.1 South Plan Area Development Controls

The land uses in the adopted Mission Bay Redevelopment Plan are generally illustrated in **Figure 3-3**. The primary development controls for the Mission Bay South Redevelopment Plan Area ("South Plan Area") are the South Plan and the South Design for Development, which together specify development standards for the project site at Blocks 29-32, including standards and guidelines for height, setbacks, and coverage. In accordance with the California Community Redevelopment Law, when the Board of Supervisors approved the South Plan in 1998, land use and zoning approvals within Mission Bay came under the jurisdiction of the former Redevelopment Agency, now OCII[3]; see Chapter 2, Introduction for additional detail. Together, the South Plan and South Design for Development constitute the regulatory land use framework for the project site, and they supersede the City's *Planning Code*, except as otherwise specifically provided in those documents and associated documents for implementing the Plans.

The master developer, FOCIL-MB, LLC, is responsible for the infrastructure serving the South Plan area, consistent with the South Owner's Participation Agreement (South OPA), including implementation of the Mission Bay South Infrastructure Plan (Attachment D to the South OPA). The South OPA includes triggers for the phasing of required infrastructure improvements based on adjacency, ratios, and performance standards to ensure that the master developer phases the required infrastructure to match the phasing of private development occurring on adjacent blocks. In addition to the South Plan and South Design for Development, the other major development controls that apply to the project site include:

- Mitigation measures included in the Mission Bay FSEIR and which OCII has identified as required to be implemented by the developer of the project site;

2 AB 900, effective January 1, 2012, provides streamlining benefits under CEQA for privately-financed projects located on an infill site that has been determined to generate thousands of jobs and include state-of-the-art pollution reductions.

3 This was reaffirmed by the San Francisco Board of Supervisors in 2012 (as part of the Successor Agency Legislation - Resolution No. 11-12 and Ordinance No. 214-12).

Mission Bay Redevelopment Plan Area Boundary

Project Site Boundary

0 1000 Feet

Note: Numbers in figure represents Mission Bay Redevelopment Plan block numbers
"X" represents parcels not owned by master developer at the time Mission Bay Redevelopment Plan was adopted
"P" represents open space parcels
"N" represents blocks within Mission Bay North Redevelopment Area

SOURCE: OCII, ESA, 2014

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 3-3
Land Uses in the Mission Bay Redevelopment Plan

- All other associated adopted plans and documents that apply in the South Plan area under the South Plan and South OPA, such as the 1999 Mission Bay Risk Management Plan, with amendments (including Article 22A of the San Francisco Health Code for analyzing soils for hazardous waste), Mission Bay South Streetscape Master Plan, and Mission Bay South Signage Master Plan; and

- Other adopted City plans and regulations that apply in the South Plan area, such as the San Francisco Building Code; Chapter 7 of the San Francisco Environment Code, "Resource Efficiency Requirements," and any engineering requirements applicable under City Code to the development.

The mitigation measures in the Mission Bays FSEIR are provided in Appendix MIT of this SEIR, which also indicates the specific measures applicable to the proposed project. Relevant portions of the South Plan and South Design for Development as they pertain to Blocks 29-32 are described below.

South Plan Development Controls for Blocks 29-32

In addition to providing overall planning objectives for the plan area, the South Plan designates land uses for specific parcels. Proposed land uses to be permitted for Blocks 29-32 are designated as Commercial Industrial/Retail (Attachment 3 of the South Plan), and the plan provides for either principal or secondary uses at this site. Primary uses are permitted in accordance with the plan's provisions, and secondary uses are permitted provided that such use generally conforms with redevelopment objectives and planning and design controls established pursuant to this plan. The OCII Executive Director must make a determination that secondary uses make a positive contribution to the character of the plan area, and that the secondary use "will provide a development that is necessary or desirable for, and compatible with, the neighborhood or the community."

The South Plan identifies the following principal uses under the Commercial Industrial/Retail land use designation applicable to Blocks 29-32: manufacturing; institutions; retail sales and services; arts activities and spaces; office use; home and business services; animal care; wholesaling; automotive; and other uses (e.g., greenhouse, nursery, open recreation and activity areas, parking and certain telecommunications-related facilities). The following secondary uses are identified: institutions, assembly and entertainment, and other uses (public structure or use of a nonindustrial character).

The South Plan also describes general controls and limitations for development, and sets limits on leasable square footages of various uses within defined zones within the plan area, including the project site. The plan sets a maximum floor area ratio of 2.9 to 1 for the commercial industrial and commercial industrial/retail uses averaged over the entire area of these two land use districts, and the maximum building height within the entire plan area is 160 feet. The plan further indicates that within the limits, restrictions and controls established in the plan, OCII is authorized to establish heights of buildings, land coverage, density, setback requirements, design and signage criteria, traffic circulation and access standards, and other development and design controls in the South Design for Development.

South Design for Development Controls for Blocks 29-32

The Mission Bay South Design for Development, a companion document to the South Plan, contains the design standards and design guidelines applicable to Blocks 29-32. The project site is within Height Zone 5, which specifies that 7 percent of the developable area (within the entire height zone) may be occupied by a maximum of three towers up to 160 feet in height, and the remaining 93 percent of the development could be at a maximum of 90 feet. However, buildings along Terry A. Francois Boulevard, including Blocks 30 and 32, may not exceed 90 feet in height, and no towers are permitted on Blocks 30 and 32.

Within this Height Zone 5, the South Design for Development also establishes bulk limits for development at a height greater than 90 feet (i.e., towers). The maximum tower length above 90 feet is 200 feet, and the maximum floor plate is 20,000 square feet. Further, the South Design for Development identifies setback requirements applicable to Blocks 29-32, with a minimum of 5 feet along Third Street and 20 feet along 16th Street; these setbacks are in addition to specified sidewalk widths on these streets and may be used for paved pathways and landscaping as appropriate. The minimum streetwall height is 15 feet.

Design guidelines for Commercial/Industrial buildings along the Bayfront Park (adjacent to the project site) indicate that homogeneous and unrelieved façades should be avoided. Design guidelines for city-serving retail uses at Blocks 29-32 include guidance that: street level frontage should provide visually interesting features; the block façade line should be consistent with block development throughout Mission Bay; and curb cuts are strongly discouraged along Third Street.

3.4 Project Site Location

3.4.1 Mission Bay

The approximate 300-acre Mission Bay Redevelopment Plan area is located along San Francisco's central Bay waterfront, straddling Mission Creek Channel. In general, the plan area is bounded by Townsend Street to the north, Interstate 280 and Seventh Street to the west, Mariposa Street to the south, and San Francisco Bay to the east.

Before 1998, Mission Bay was characterized by low-intensity industrial development and vacant land. Since adoption of the North and South Plans in 1998, Mission Bay has undergone redevelopment into a mixture of residential, commercial (light industrial, research and development, labs and offices), retail, and educational/institutional uses and open space. As of 2014, 4,067 housing units (including 822 affordable units) of the planned 6,400 housing units within Mission Bay (roughly 64 percent) were complete, with another 900 (including 150 affordable units) under construction. Regarding office and laboratory space, approximately 1.7 million square feet of the 4.4 million square feet in the Mission Bay plan area (approximately 39 percent) was complete. Approximately 82 percent of the previously-approved 2.65 million-square-foot UCSF North Campus has been developed, including six research buildings, an academic/office building, a campus community center, and a university housing development. The first phase of the UCSF Mission Bay Medical Center opened in early 2015. In addition, in November 2014, UCSF approved the Final UCSF 2014 Long Range Development Plan, which provides for additional planned development on the UCSF campus at Mission Bay through 2035. The City's new Public Safety Building at Third and Mission Rock Streets also became operational in April 2015. More than 15 acres of new non-UCSF parks and open space within Mission Bay have also been completed.

3.4.2 Project Site and Existing Uses

Figure 3-4 presents an aerial map of the project site vicinity. The approximate 11-acre project site encompasses Blocks 29, 30, 31, and 32 within the Mission Bay South Redevelopment Plan area. The project site consists of the majority of Assessor's Block 8722, Lot 001, and all of Assessor's Block 8722, Lot 008. The project site is bounded by South Street on the north, Third Street on the west, 16th Street on the south, and by the future planned realigned Terry A. Francois Boulevard on the east. The City has designated the Mission Bay South Redevelopment Plan Area as a Priority Development Area (PDA). The project site is also located in the southeast corner of the City's South of Market neighborhood, and just north of the City's Potrero Hill and Dogpatch neighborhoods.

The ground surface elevations at the project site range between approximately -1 foot to +3 feet San Francisco City Datum (SFD),[4] roughly equivalent to 6½ to 10½ feet above mean sea level. The existing site slopes gently down from west to east towards the Bay.[5] Paved surface metered parking facilities currently operate in the west and north portions of the site. Parking Lot E, accessed from 16th Street, contains 289 parking spaces; and Parking Lot B, accessed from South Street, contains 316 parking spaces, for a total of 605 parking spaces. These parking facilities contain night lighting. Immediately east of, and adjacent to, Parking Lot B is a depressed area (measuring approximately 320 feet by 280 feet) created by an excavation and backfill associated with a prior environmental cleanup of that portion of the site. A surface swale extends west within this portion of the site to allow for drainage of surface water into the depression.[6] Chain link fencing is installed on the perimeter of the project site and around Parking Lots B and E within the site.

3.4.3 Surrounding Uses

The University of California at San Francisco (UCSF) Mission Bay campus is located west, northwest, southwest, and partially south of the project site. Fronting on Third Street directly west of the project site is an eight-story UCSF parking structure (Third Street Garage), and the UCSF Global Health and Clinical Sciences Building (Mission Hall). To the northwest of the

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4 For purposes of this SEIR, existing ground elevations are as measured relative to San Francisco City Datum (SFD). SFD establishes the City's zero point for surveying purposes at approximately 8.6 feet above the mean sea level established by 1929 U.S. Geological Survey datum, and approximately 11.3 feet above the current 1988 North American Vertical Datum.

5 Along the north site border, the site slopes down approximately 2 feet between Third Street and Terry A. Francois Boulevard. Along the site south border, the site slopes down approximately 3.5 feet between Third Street and Terry A. Francois Boulevard.

6 Langan Treadwall Rollo, *Updated Phase I Environmental Site Assessment, Mission Bay Blocks 29-32, San Francisco, California*, April 11, 2014.

SOURCE: Google Maps, ESA, 2014

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E: Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 3-4
Aerial Photograph of Project Site Vicinity

project site fronting along Third Street is UCSF Hearst Tower, a 14-story building containing student housing; and to the north of that, the UCSF Helen Diller Family Cancer Research building. To the southwest of the project site fronting along Third Street is the UCSF Energy Center, Betty Irene Moore Women's Hospital, Bakar Cancer Hospital, and Benioff Children's Hospital, which opened in February 2015. The UCSF Benioff Children's Hospital helipad, located atop the roof of the UCSF Ron Conway Gateway Medical Building at 1825 4th Street, also began operating in February 2015. Directly south of the project site across 16th Street, between Third Street and Illinois Street, is a vacant lot recently acquired by UCSF (Blocks 33 and 34), which is planned for office space development starting in 2016.

Directly south of the project site across 16th Street, between Illinois Street and Terry A. Francois Boulevard, is a recently-constructed six-story office building (409 Illinois Street) housing FibroGen Life Science and other biotech/high tech companies, and south of that another recently-constructed six-story office building (499 Illinois Street) with biotech and UCSF clinical uses. Directly north of the project site across and fronting on South Street are (from west to east) a vacant lot (recently acquired by Uber Technologies and Alexandria Real Estate Equities) and planned for development of office space in 2015, a six-story parking garage (450 South Street), and a six-story office building housing the Old Navy corporate headquarters. Immediately east of the project site and west of Terry A. Francois Boulevard are City-owned parcels containing covered stockpiled materials.

The planned Bayfront Park is located on Mission Bay Plan parcels P21 through P24, located northeast, east and partially south of the project site. The north portion of the park (P21, located east of Terry A. Francois Boulevard, between Mission Bay Boulevard South and just south of Pierpoint Lane) is complete, and includes a landscaped parking lot and boat launch. The currently undeveloped central portion of the Bayfront park is located east of the project site across Terry A. Francois Boulevard (on P22, from just south of Pierpoint Lane to just south of 16th Street). This portion of the park presently includes a paved trail (which constitutes a segment of the Bay Trail), surface parking lot, and unimproved open space. Construction of the south portion of Bayfront Park (on P23 and P24), located west of Terry A. Francois Boulevard between 16th Street and Mariposa Street, is currently underway in 2015 and scheduled for completion in 2016.

Third Street, a north-south major arterial roadway defined as a Transit Important Street in the San Francisco General Plan, extends along the west project site boundary providing access to and from downtown San Francisco to the north and the Bayview neighborhood to the south. Third Street contains two vehicular travel lanes in each direction, separated by a paved median and Muni light rail tracks. Muni light rail lines K-Ingleside and T-Third Street operate along Third Street, with the Muni UCSF/Mission Bay Station located at South Street and the Muni Third & Mariposa Street Station located one block south of the project site. Muni bus routes 91 and T-Owl operate along Third Street, with a Muni bus stop located north of the project site on Third Street. Campus Lane, a two-lane east-west local street, terminates at the intersection with Third Street, directly across from and west of the project site.

Sixteenth (16th) Street extends east of Third Street along a portion of the south project site boundary, terminating just east of Illinois Street. There are two vehicular travel lanes on 16th Street adjacent to the project site, increasing to four lanes west of Third Street. Bollards installed on

16th Street east of Illinois Street prevent through vehicular travel between Third Street and Terry A. Francois Boulevard. 16th Street is defined as a secondary arterial west of Third Street in the San Francisco General Plan. 16th Street contains a Class III bicycle route between Illinois Street and Third Street, and two Class II bike lanes west of Third Street. Illinois Street, a two-lane north-south local street, terminates at the intersection with 16th Street, directly across from and south of the project site. Illinois Street contains a Class II bicycle lanes between 16th Street and Mariposa Street.

Terry A. Francois Boulevard roughly follows the Bay shoreline east of the project site. There are currently two vehicular travel lanes and a Class II bicycle lane in each direction. Terry A. Francois Boulevard is signed as a Tsunami Evacuation Route.

South Street extends along the north boundary of the project site between Third Street and Terry A. Francois Boulevard. South Street contains two vehicular travel lanes in each direction.

Bridgeview Way, a two-lane north-south local street, terminates at the intersection with South Street, directly across from and north of the project site.

Vehicle parking is currently provided along 16th Street and Terry A. Francois Boulevard adjacent to the project site.

See description of South Plan improvements planned in the vicinity of the project site, including the realignment of Terry A. Francois Boulevard and public access improvements at Bayfront Park, below.

3.5 Golden State Warriors Background

3.5.1 History and Relationship to San Francisco Bay Area

The Warriors were founded in 1946 as the Philadelphia Warriors, one of the 11 original teams of the Basketball Association of America (BAA). The Warriors are one of only three charter members of the BAA still in existence, along with the Boston Celtics and the New York Knickerbockers (Knicks). The Warriors hold the distinction of winning the BAA's first ever championship, claiming the title in the inaugural 1946–47 season by defeating the Chicago Stags. The BAA merged with the National Basketball League (NBL) in 1949, forming the National Basketball Association (NBA). The Warriors won their first NBA championship in Philadelphia in the 1955–56 season, beating the Fort Wayne Pistons.

In 1962, the Warriors franchise was relocated to San Francisco and renamed the San Francisco Warriors. The Warriors played most of their home games at the Cow Palace in Daly City (just south of the San Francisco city limit) from 1962–64 and at the San Francisco Civic Auditorium[7] from 1964–66, as well as several home games in 1966 at the University of San Francisco War Memorial Gymnasium. The Warriors also played home games at several other Bay Area locations in the 1960s, including Richmond, San Jose, Stockton and Sacramento. When the Oakland-

7 The San Francisco Civic Auditorium is now named the Bill Graham Civic Auditorium.

Alameda County Coliseum Arena (Coliseum Arena) opened in 1966, the Warriors began scheduling an increasing number of home games at that facility. The Warriors reached the NBA playoffs in 1964, 1967 through 1969, and 1971 (their final season as the San Francisco Warriors).

The San Francisco Warriors changed their name to the Golden State Warriors for the 1971–72 season, in part to acknowledge the team's fan base that had extended throughout Northern California, and played the majority of their home games that season at the Coliseum Arena. The Warriors made the NBA playoffs every season from 1972 to 1977 (excluding 1974), and won their first NBA championship on the West Coast in the 1974–75 season. The Warriors have since reached the playoffs nine additional times (1987, 1989, 1991, 1992, 1994, 2007, and 2013 through 2015). The Warriors have played home games exclusively in the Coliseum Arena since 1972, with the exception of a one-year hiatus (1996–97 season) in which they played at the San Jose Arena[8] while the Coliseum Arena was remodeled.[9] In 2014-15, the Warriors celebrated their 54th season in the Bay Area.

3.5.2 Existing Golden State Warriors Basketball Operations and Facilities

The Golden State Warriors are one of 30 franchised basketball teams in the NBA. The current league organization divides the teams into two conferences of three divisions with five teams each. The Golden State Warriors play within the Western Conference, Pacific Division.

Typically, the NBA preseason runs approximately two weeks in mid-October, the NBA regular season between late October and mid-April, and NBA playoff season runs from mid-April through mid-June. The Golden State Warriors currently play approximately 8 preseason games per season, 2 to 3 of which are home games. The Warriors play 82 regular season games per season, consisting of 41 home games and 41 away games. In the event of reaching the playoffs, the Golden State Warriors would play in up to four best-of-seven series playoff rounds (i.e., First Round, Semi-Conference Finals, Conference Finals, and NBA Finals), with approximately half of the playoff games in their home court.

As indicated above, the Golden State Warriors currently play their home games at Oracle Arena, located at 7000 Coliseum Way in Oakland. Oracle Arena is owned by the Oakland-Alameda County Coliseum Authority (City of Oakland and Alameda County) and operated by Anschutz Entertainment Group (AEG). The Golden State Warriors currently maintain a lease agreement to play their basketball games at Oracle Arena through the NBA 2016–17 season. Oracle Arena's maximum seating occupancy is 19,596 for basketball games, including 72 luxury suites. Oracle Arena also includes 3 exclusive clubs, 5 concourses, a box office, and team stores. Oracle Arena is located adjacent to the Oakland–Alameda County Coliseum (O.co Coliseum), and collectively, this complex offers parking for 10,000 vehicles.

8 The San Jose Arena is now named the SAP Center.
9 The Coliseum Arena was renamed The Arena in Oakland in 1997, the Oakland Arena in 2004, and Oracle Arena (present name) in 2006.

The Golden State Warriors organization maintains approximately 150 full-time employees, consisting of the team's basketball players, basketball operations staff (including General Manager, coaching and training staff, and scouts); medical team; an executive board and executive management; media and broadcasting staff; and numerous operations and support services, including but not limited to, marketing, finance, ticket sales/operations/services, public and community relations, hospitality services, and administration.

The Golden State Warriors currently lease their management offices and practice facility at the Oakland Convention Center at 1011 Broadway in downtown Oakland (these facilities are built atop the Convention Center's parking garage). These facilities provide approximately 16,000 square feet of office space, 2½ full length basketball courts, and supporting facilities (e.g., weight room, locker rooms, and lounge).

3.6 Project Characteristics

This section describes the characteristics of the proposed project, including detailed descriptions of the proposed facilities and operations, as well as project construction.

3.6.1 Proposed Facilities

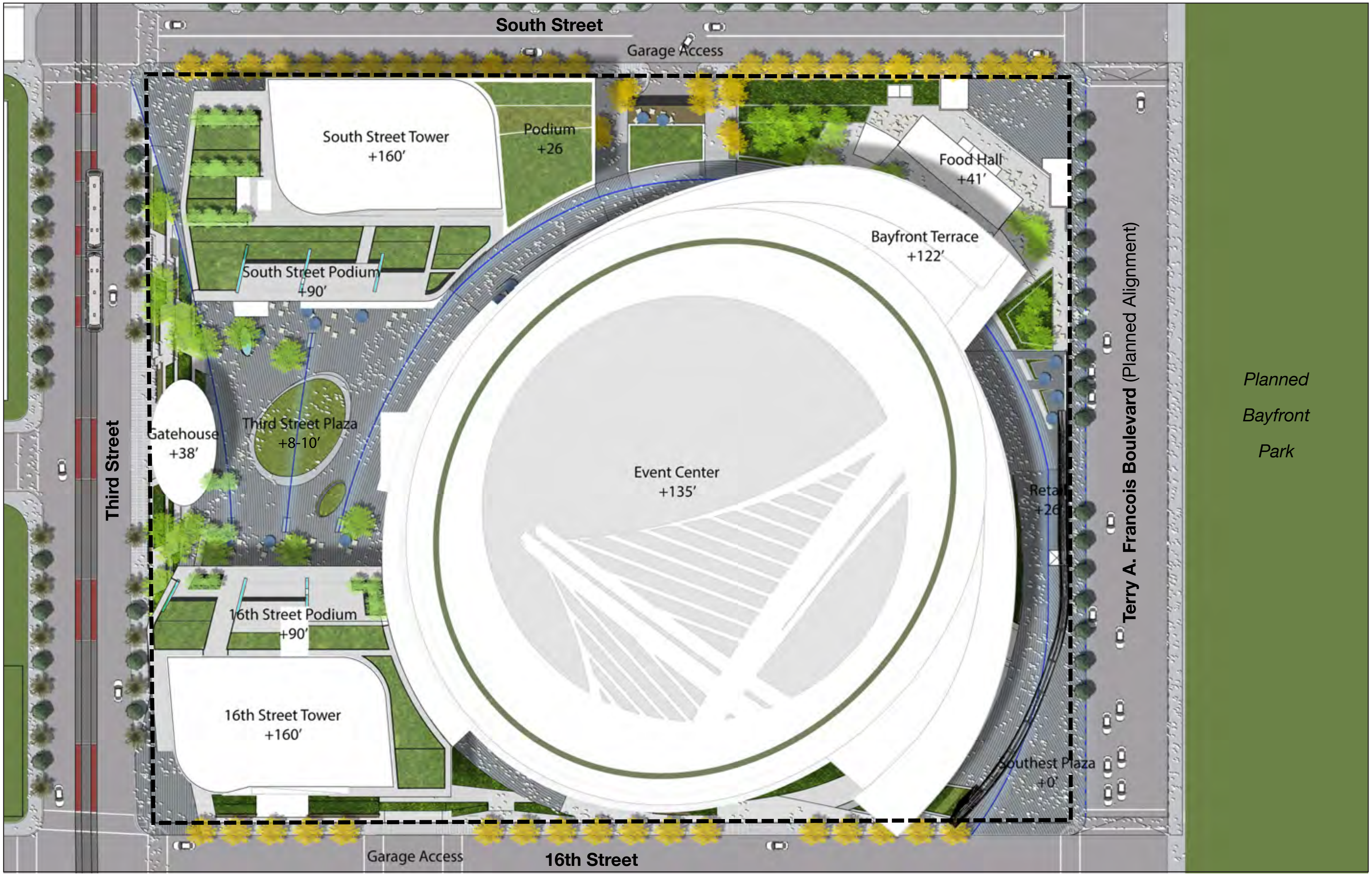
Development Plan Overview

Under the project, Blocks 29-32 would be developed with a multi-purpose event center and a variety of mixed uses, including office, retail, open space and structured parking on the approximately 11-acre site. **Figure 3-5** presents the conceptual project site plan, illustrating primary project features and associated building heights. **Table 3-1** provides a summary overview of the key characteristics of the project facilities.

Event Center

The proposed roughly circular-shaped event center building would be located in the central-east portion of the site. The event center building would be approximately 135 feet[10] tall at its roof peak, and would include multiple levels of varying heights. The event center building would consist of nine levels (Event, Ground, Mezzanine, Main Concourse, Suite, Theater/Loge, Upper Concourse, Bayfront Terrace and Mechanical). The event center would include a wide variety of facilities, including spectator seating and suites, restaurants/bars and clubs, meeting rooms; spectator support facilities such as food service/kitchens, concessions, merchandising and restrooms; Golden State Warriors management offices, practice facility and locker rooms; command center and operations space for police/security, fire protection services and traffic control; media support facilities; and event center operations such as loading, staging and marshaling areas, mechanical/electrical/plumbing space and storage and maintenance facilities.

[10] All building heights in this SEIR measured from finished grade to top of building. Please see footnote "e" in Table 3-1 for additional detail.



Project Site Boundary

0 100
Feet

SOURCE: Manica Architecture, 2015

Note: All building elevations were estimated per *Mission Bay South Design for Development* guidelines; please see text for additional description.

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 3-5
Conceptual Project Site Plan

TABLE 3-1
SUMMARY OF PROPOSED PROJECT FACILITIES AND DESIGN FEATURES

Project Component	Characteristic
Event Center Basketball Seating Capacity	18,064 seats[a]
Size	Total GSF
Event Center[b]	750,000
Golden State Warriors Office Space	25,000
Office Space	580,000
Retail Space[c]	125,000
Parking and Loading	475,000
Total Building Area	**1,955,000 GSF**[d]
Height[e,f]/Levels	
Event Center	135 feet
Office and Retail Buildings	160 feet (11 stories) total [90-foot (6-story) podiums with 70-foot (5-story) towers above]; retail uses within street level and plaza-level floors
Retail-only Buildings	41 feet in market hall building northeast corner of site; 38 feet in gatehouse building along Third Street
Parking/Loading Spaces	Blocks 29-32: 950 parking stalls below-grade or at-grade (concealed by Third Street Plaza) 13 truck docks below-grade Existing off-site at 450 South Street Parking Garage: 132 parking stalls
Vehicular Access	Access point for autos and all trucks on 16th Street at Illinois Street Access point for autos on South Street at Bridgeview Way
Open Space	3.2 acres

NOTES:

GSF = gross square feet.

[a] Presented maximum seating capacity is for basketball games. However, as discussed under *Proposed Operations and Employment*, below, there would other types of events at the event center, including certain concerts and conventions, that would be able to accommodate a maximum attendance of up approximately 18,500 patrons with the addition of floor seats and/or standing room-only spaces (see Table 3-3 for more detail).

[b] The event center would include a variety of supporting uses, including Golden State Warriors practice facility and management offices, bayfront terrace, retail, and other uses. For purposes of estimating areas, the Golden State Warriors management office space square footage is presented separately from square footage of the other event center uses.

[c] Proposed retail uses are approximately 51,500 GSF sit-down restaurant, 11,000 quick-service restaurant, and 62,500 GSF soft goods retail including food retail.

[d] The CEQA analyses are based on gross square footage. However, the Mission Bay South Redevelopment Plan permits development based on adjusted gross square footage and leasable square footage. Gross Square Footage and Leasable Square Footage as defined in the Mission Bay South Redevelopment Plan for this project would be less than the gross square footage presented in this environmental document.

[e] All building heights in this SEIR, unless otherwise noted, are measured from finished grade to top of building, consistent with the South Design for Development guidelines. Please note the project site would continue to be slightly sloped, as under existing conditions. Per the South Design for Development guidelines, building height measurements are taken at the median grade height for each building face, and the total building height is calculated by averaging the height of the individual building faces.

[f] Heights of proposed office and retail buildings exclude unoccupied top floor level with mechanical equipment. Mechanical equipment and associated enclosure may be up to 20 feet above the rooftop of building.

SOURCE: Manica Architecture, 2014, 2015

The event center would be programmed with a capacity of 18,064 seats for basketball games, approximately 70 percent of which would be general assigned seating. The remaining seating would consist of loge, club and suite seating, courtside seating, and seating for media and officials. A portion of the event center lower bowl would contain retractable seating to accommodate certain non-Golden State Warriors events requiring a larger floor area. In addition, for non-Golden State Warriors events with small attendance, the event center performance and seating areas could be re-configured in a cut-down theater configuration, and event patron access managed to create the impression of a smaller venue space and more intimate experience for the performances. The event center would also include an ice slab to accommodate a range of ice-related events such as hockey games and Disney on Ice.[11]

The event center would also include a "bayfront terrace," an extension of the event center (pedestrian deck would be 97 feet in height, and terrace roof would be 122 feet in height), that would provide views of the San Francisco skyline, Bay Bridge, Bay waters and East Bay shoreline. Portions of the bayfront terrace would connect to the interior of event center, and other portions of the terrace would connect to the main pedestrian path at the base of the event center, and to a lobby located on Terry Francois Boulevard, via elevators.

(See Section 3.5.2, *Proposed Operations*, below, for a detailed description of proposed Golden State Warriors games and non-Golden State Warriors events at the event center).

Office and Retail Buildings

Two office and retail buildings would be located on the west side of the project site, at the corner of Third and South Streets (northwest corner of site) and at the corner of Third and 16th Streets (southwest corner of the site). These buildings would each be 11 stories (160 feet tall at building rooftop[12]); each office and retail building would consist of a podium ground level plus 5 podium levels (90 feet tall), with a 5-story (70-foot tall) tower (with smaller floorplate than the podium) above. The South Street office and retail building would be approximately 345,000 gsf, and the 16th Street office and retail building would be approximately 300,000 gsf. These buildings could serve a variety of office and/or research and development uses. Retail uses would occupy the lower floor(s) of the office and retail buildings.

Gatehouse, Food Hall and Other Retail Amenities

Additional retail uses would front on South Street and Terry A. Francois Boulevard, located within or adjacent to certain plaza-facing areas of the event center, and along the main pedestrian path. A 2-story, 38-foot high[13], 11,550 gsf "gatehouse" building located mid-point along Third Street would provide retail uses and house elevators/escalators connecting to parking facilities on lower floors. A 41-foot high, approximately 32,000 gsf "food hall" would be located at the corner of Terry A.

[11] The ice slab would consist of an ice floor, ice pits and trenches, and refrigeration equipment. For non-ice related events at the arena, insulated fiberglass panels would first be installed above the ice layer, after which wood parquet panels (to create the basketball court) or other appropriate flooring would be installed depending on type of event.

[12] Please see footnotes "e" and "f" in Table 3-1 for additional detail on building heights.

[13] Height at the gatehouse building's sloping roof peak.

Francois Boulevard and South Street. The food hall would house stalls for local vendors of food and beverage offerings or artisanal goods.

Plazas/Open Space

Approximately 3.2 acres of open space would be designed within the site, including a proposed Third Street Plaza (elevated at approximately 8 to 10 feet above Third Street) on the west side of the project site between the event center and Third Street, and a proposed ground-level Southeast Plaza in the southeastern corner of the site. These plazas would be connected by a pedestrian ramp wrapping around the exterior of the north and eastern sides of the event center. On the east side of the event center, the pedestrian path would offer a "bayfront overlook" to provide eastward views across the Bay. Another pedestrian path would wrap around the southwest portion of the event center.

Vehicle Parking Facilities

Table 3-2 summarizes proposed on-site vehicular parking facilities. Three levels of enclosed on-site parking (two below grade: Lower Parking Levels 1 and 2, and one at street level: Upper Parking Level) would be located below the office and retail buildings and plaza areas. A total of 950 vehicle parking spaces are proposed on-site. Of the 950 vehicle parking spaces, the sponsor would provide 21 Fuel Efficient Vehicle (FEV) spaces, 30 Vehicle Charging System (VCS) parking spaces, and 51 spaces for carpool vehicles. In the event that 30 VCS parking spaces are not feasible the sponsor would provide 51 FEV and 51 carpool spaces.

Parking is proposed to be provided for specialized groups including office parkers, patrons of the event center, retail and restaurant valet and self-parkers. Under the project, the South Design for Development, as amended, would specify the minimum and maximum number of parking spaces that would be provided for the event center and office uses, by building. The number of parking spaces provided for the event center would be reserved for event patrons at all times. The number of parking spaces provided for the office buildings may be made available for use by event patrons on a shared-parking basis (i.e., as available). The truck loading dock area (described under *Loading Facilities*, below) may also be used for a small number of parkers during events.

TABLE 3-2
ON-SITE VEHICLE PARKING, BY LEVEL

	Vehicular Parking		
Parking Level	**Parking Spaces**	**ADA[a] Spaces**	**Total Spaces**
Upper Parking Level (street level)	113	4	117
Lower Parking Level 1 (below grade)	370	13	383
Lower Parking Level 2 (below grade)	442	8	450
Total	**925**	**25**	**950**

[a] ADA = American's with Disabilities Act accessible spaces

SOURCE: Manica Architecture, 2014

For Golden State Warriors games, prepaid parking is proposed for patrons to access the parking garage, where the parking attendant would scan a prepaid barcode hang tag on vehicles (prepaid credentials would be sold through the Golden State Warriors ticketing process). An Automatic Vehicle Identification System (AVI) system may also be used for a limited number of vehicles to access the garage. During non-event periods, a more traditional system using ticket-issuing machines paired with a pay-on-foot ticket kiosks would be utilized for self-parkers, while an AVI system would be available for on-site employees. Valet parking would also be available during event and non-event periods. Additional information on proposed parking areas, by level, and vehicular access to proposed on-site parking facilities is described under *Building Floor Plans*, and *Vehicular Access and Circulation*, below.

As part of the project, the sponsor has also acquired the use of 132 existing off-site parking spaces in the 450 South Street parking garage, primarily accessed from South Street directly north of the project site, to provide additional parking to serve the project employees.

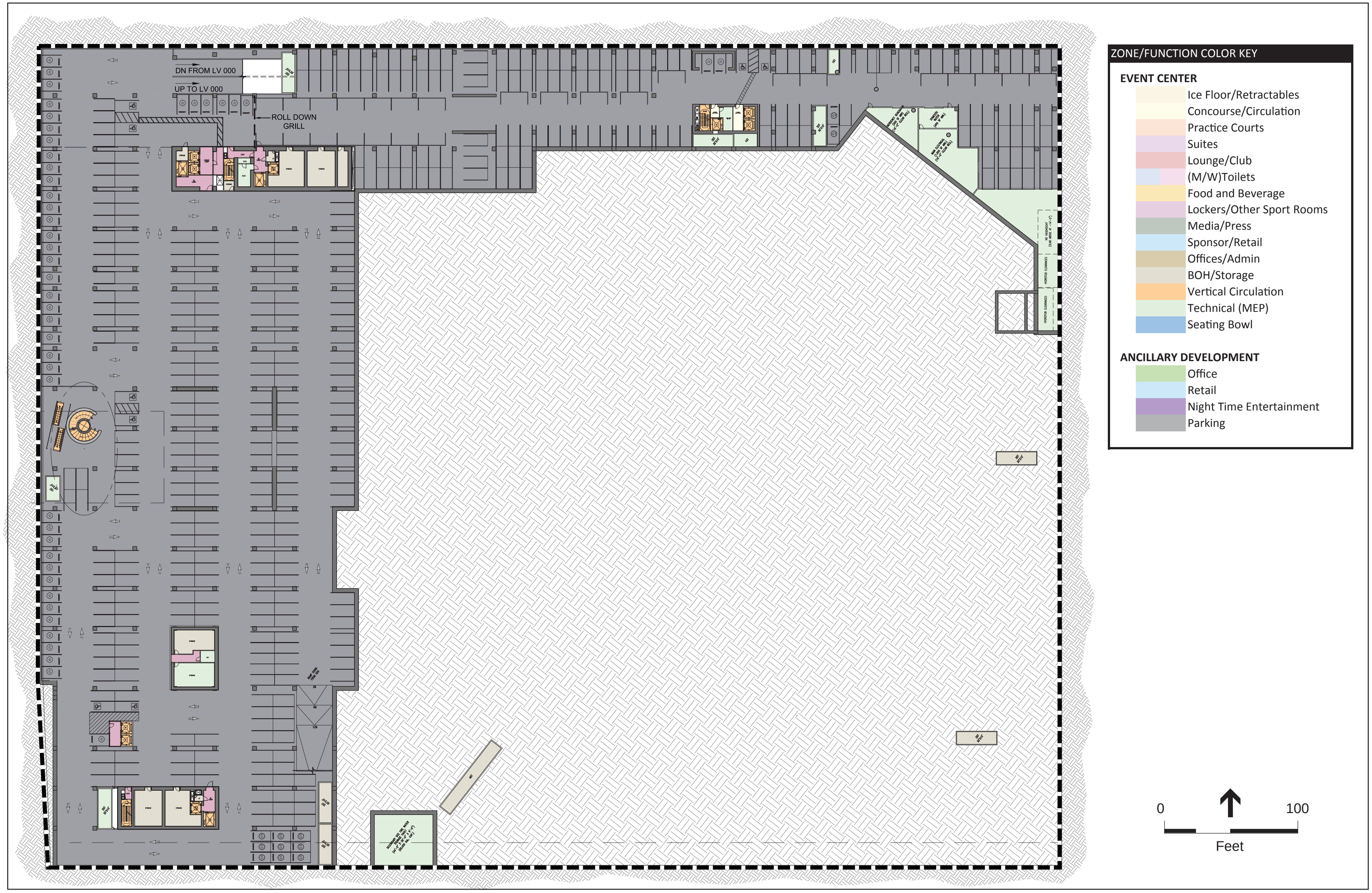
Loading Facilities

Thirteen on-site truck loading docks are proposed to serve the event center and office and retail uses. The loading and service areas, including 13 truck loading docks, would be located on the Lower Parking Level 1. The dimensions of each loading space would be at least 10-feet wide and 35-feet long, with 14 feet of vertical clearance. Additional information on vehicular access to proposed loading areas is described under *Building Floor Plans*, and *Vehicular Access and Circulation*, below. In addition to the 13 on-site below grade loading area, 17 on-street commercial loading spaces would be provided on South Street (8 spaces), Terry A. Francois Boulevard south of South Street (8 spaces), and 16th Street (1 space) to serve the office uses, and the restaurant and retail uses at Market Hall. Overall, the proposed project would have 30 commercial loading spaces serving the project uses.

Building Floor Plans

Figures 3-6 through **3-11** present project building floor plans for several representative floors for the site's buildings, from low to high in height.[14] Figure 3-6 presents the floor plan for the subgrade Lower Parking Level 2. This level would be situated within the north and west sides of the project site and would provide 450 vehicle parking spaces. Auto vehicular ramps located on the north and south sides of the parking garage would provide access between this level and the Lower Parking Level 1 above. This level would also contain stairs and elevators for pedestrian access to/from upper floors.

[14] Certain levels discussed here contain a range of heights, depending on location and use. However, they are grouped, as feasible.



▬ ▬ ▬ ▬ Project Site Boundary

SOURCE: Manica Architecture, 2015

Note: All floor elevations were estimated per *Mission Bay South Design for Development* guidelines; please see text for additional description.

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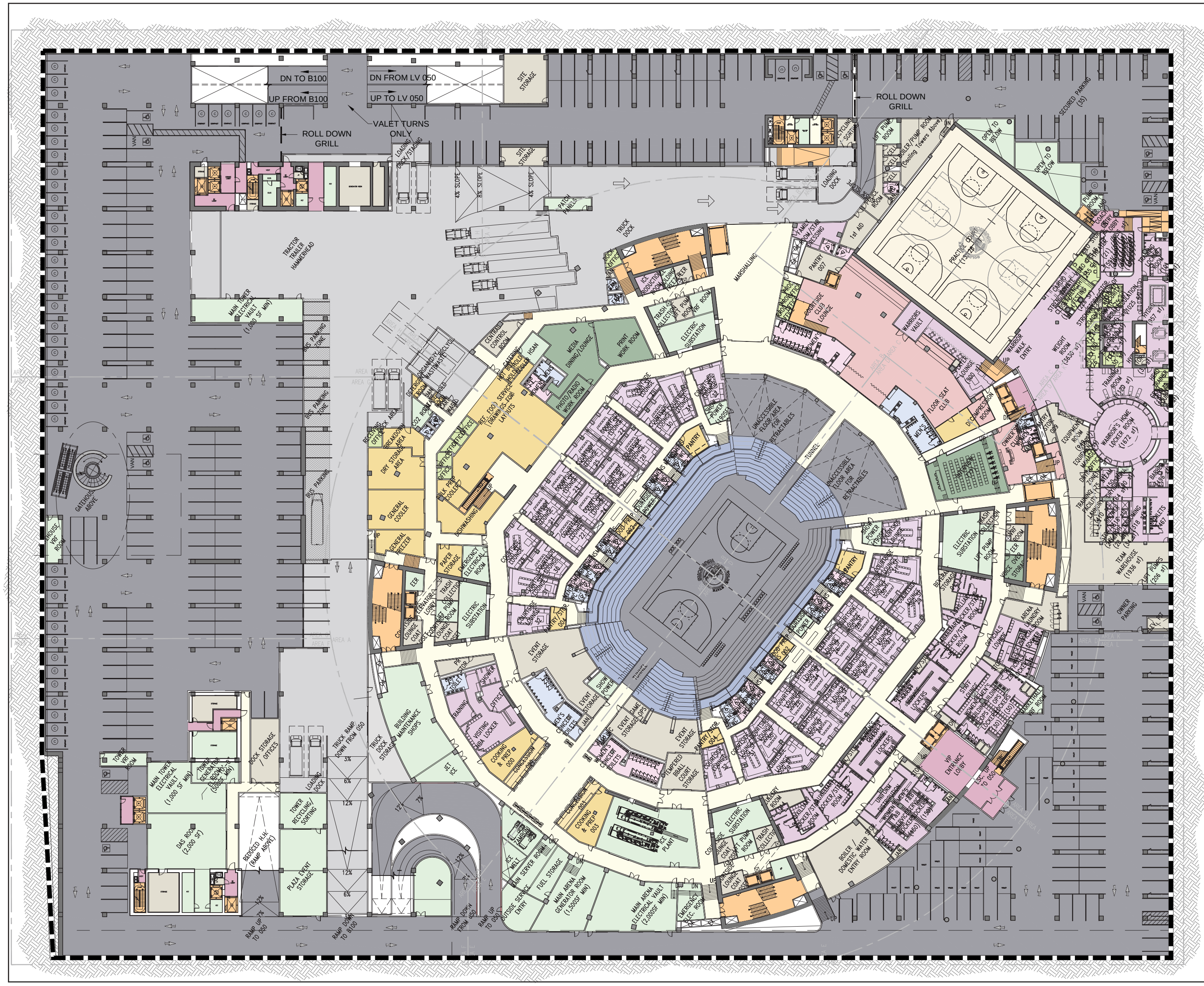
Figure 3-6

Floor Plan – Lower Parking Level 2



ZONE/FUNCTION COLOR KEY

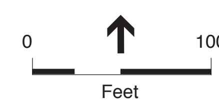
EVENT CENTER
- Ice Floor/Retractables
- Concourse/Circulation
- Practice Courts
- Suites
- Lounge/Club
- (M/W)Toilets
- Food and Beverage
- Lockers/Other Sport Rooms
- Media/Press
- Sponsor/Retail
- Offices/Admin
- BOH/Storage
- Vertical Circulation
- Technical (MEP)
- Seating Bowl

ANCILLARY DEVELOPMENT
- Office
- Retail
- Night Time Entertainment
- Parking

Subgrade Parking Level 1: Middle parking level and loading dock level, located at -10'0'

Practice Court: Floor of Golden State Warriors Practice Facilities, located at -14'0"

Event Level: Floor of the basketball court a significant back-of-house and guest amenity space within the Event Center, located at-6'0"



Project Site Boundary

SOURCE: Manica Architecture, 2015

Note: All floor elevations were estimated per *Mission Bay South Design for Development* guidelines; please see text for additional description.

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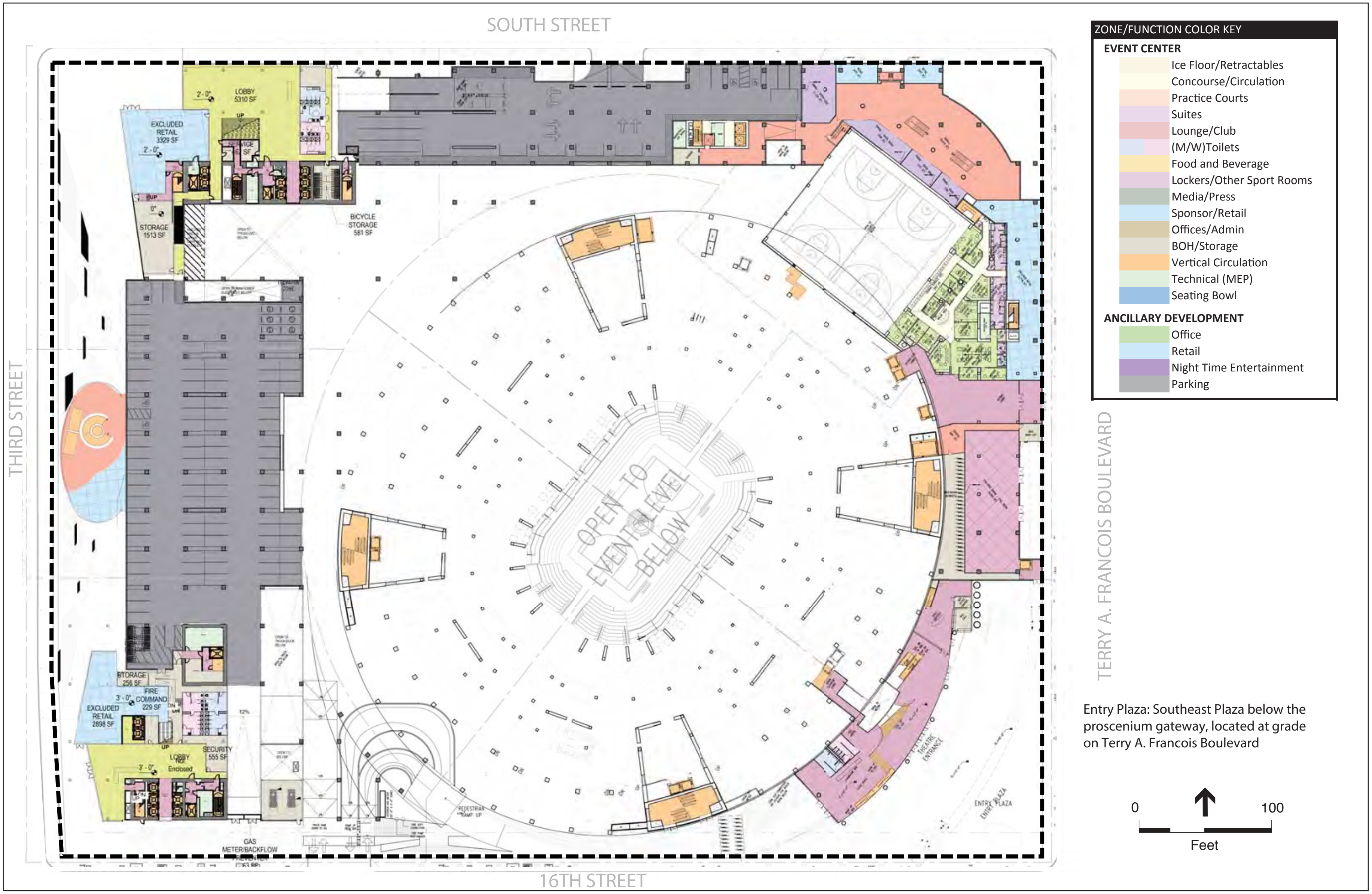
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 3-7

Floor Plan - Event Center Event Level / Lower Parking Level 1

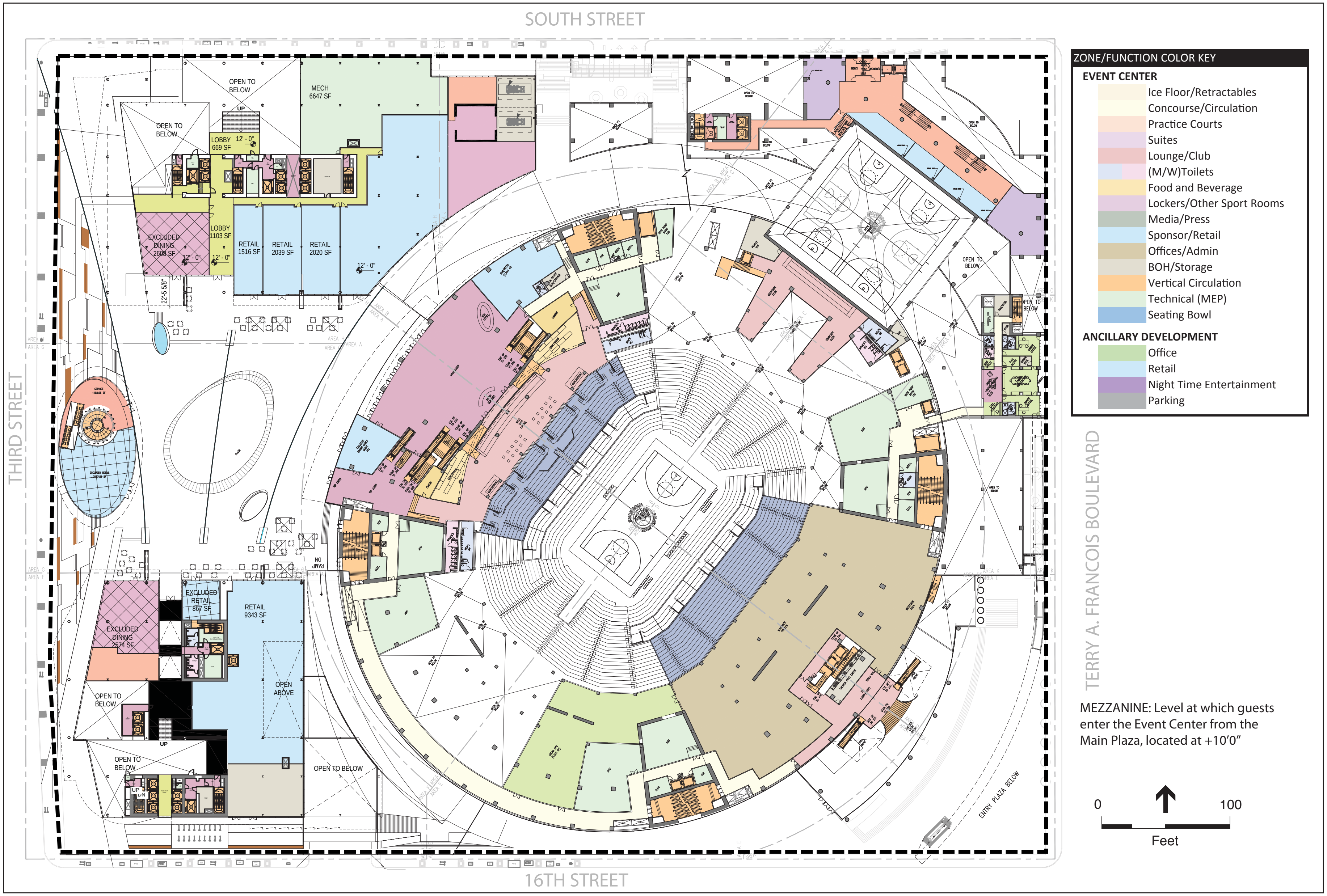


Project Site Boundary

SOURCE: Manica Architecture, 2015

Note: All floor elevations were estimated per *Mission Bay South Design for Development* guidelines; please see text for additional description.

Figure 3-8
Floor Plan - Ground Level / Upper Parking Level



Project Site Boundary

SOURCE: Manica Architecture, 2015

Note: All floor elevations were estimated per *Mission Bay South Design for Development* guidelines; please see text for additional description.

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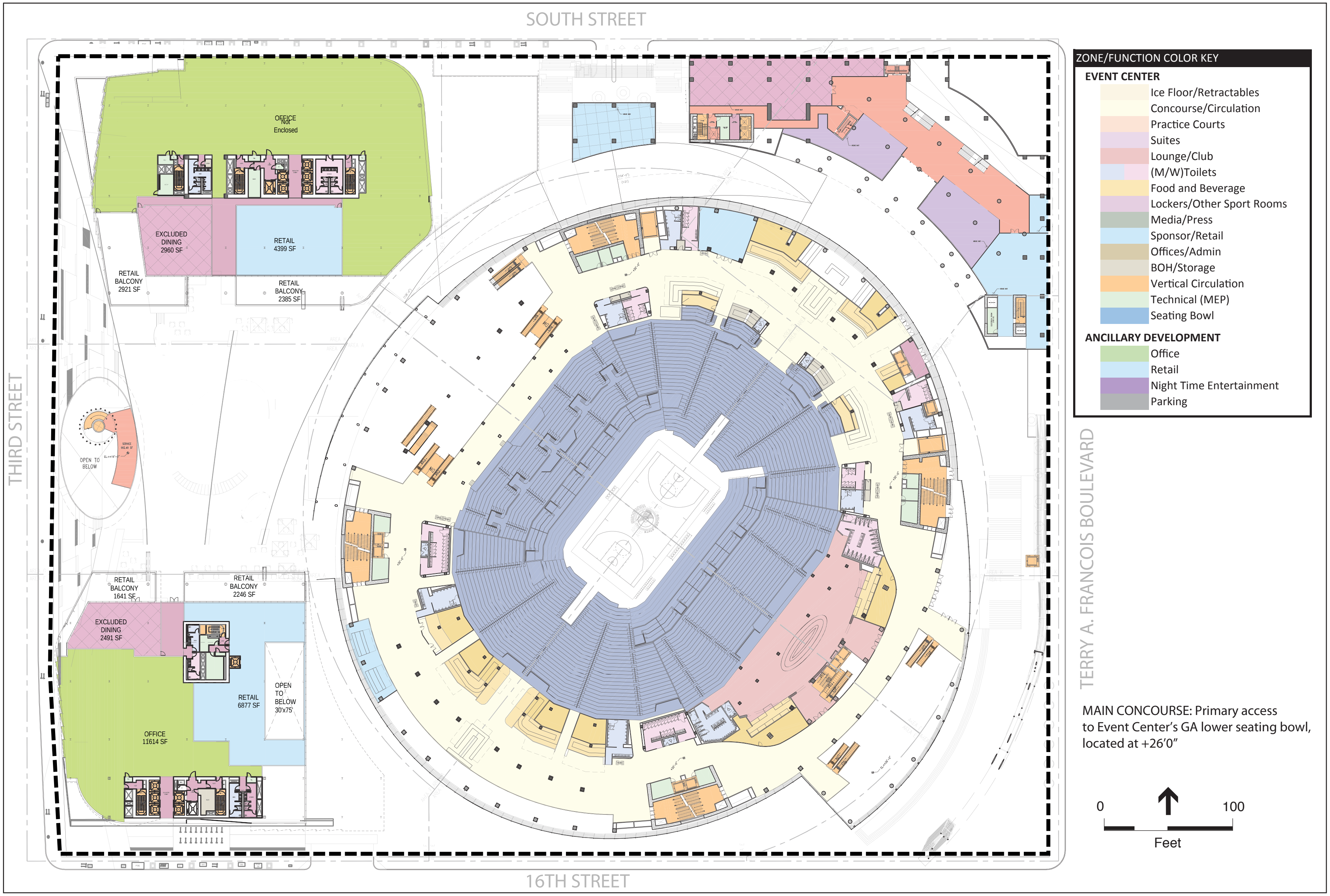
Figure 3-9

Floor Plan - Event Center Mezzanine / Plaza Level



Project Site Boundary

SOURCE: Manica Architecture, 2015

Note: All floor elevations were estimated per *Mission Bay South Design for Development* guidelines; please see text for additional description.

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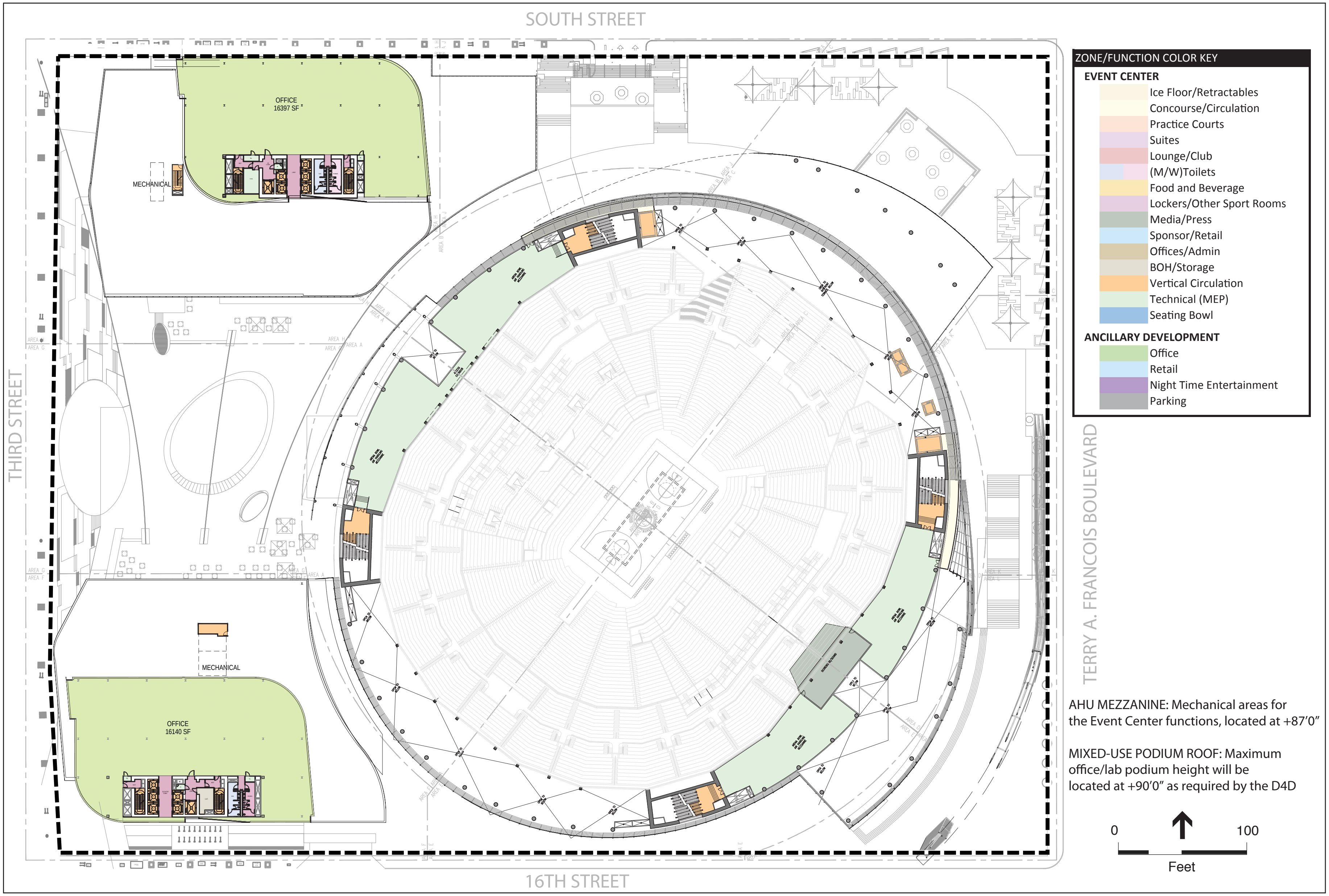
Figure 3-10
Floor Plan - Event Center Main Concourse / Office and Retail Building Level 1



Project Site Boundary

SOURCE: Manica Architecture, 2015

Note: All floor elevations were estimated per *Mission Bay South Design for Development* guidelines; please see text for additional description.

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Figure 3-11

Floor Plan - Event Center AHU Mezzanine / Office Tower Level
(Shows Representative Floor Plate for the Office and Retail Building Towers)

Figure 3-7 presents the floor plan for the subgrade Event Center Event Level/Lower Parking Level 1. The Event Level would contain the event center's main exhibition floor, courtside and VIP seating, suites, lounge/club space, team practice facilities, and a variety of spectator and operations support facilities. The team practice facilities would also be located primarily on this level in the northeast corner of the event center, and include two full-size basketball courts and supporting facilities. Separate truck loading and vehicle parking facilities would be provided on Lower Parking Level 1, with access to/from the Upper Parking Level by separate auto and truck ramps located on the south side of the site. Lower Parking Level 1 would provide 383 vehicle parking spaces distributed in the north, west, and southeast area portions of the site. A second truck ramp would provide direct access between the main loading area and the event floor for loading/unloading at this location. Additional auto ramps (for use primarily by valet) would be located on the north side of the parking garage to provide access for autos between this level and the parking levels above and below.

Figure 3-8 presents the floor plan for the Ground Level / Upper Parking Level. Several street-level pedestrian entrances would be located on the Ground Level to access project buildings, including the "theater" entrance to the event center (as described above, this entrance would provide exclusive access to smaller capacity events, as well as tertiary access to full-arena events), and entrances to the bayfront terrace lobby and elevator, office and retail building lobbies, retail gatehouse building, and food hall. Additional team practice facilities and offices would also be located on this level. The Upper Parking Level would provide 117 vehicle parking spaces situated in the north and west portions of the site. The project driveway entrance on 16th Street at Illinois Street would provide separate auto and truck vehicle ramps (two lanes for autos, and two lanes for trucks) to provide access to/from the parking and loading areas on the Lower Parking Level 1 below. The project driveway entrance on South Street at Bridgeview Lane would provide access to parking spaces located on the north side of this Upper Parking Level; access to the parking spaces on the west side of this level would be accessed by a separate auto vehicular ramp from the Lower Parking Level 1 below. In addition, auto ramps (for use primarily by valet) would be located on the north side of the parking garage to provide vehicular access between this level and the Lower Parking Level 1 below.

Figure 3-9 presents the floor plan for the Event Center Mezzanine / Plaza Level. The primary event patron ingress/egress for large attendance events at the event center would occur at the northwest entrance on this level. A separate VIP entrance to the event center would also be located on this level. Event center facilities on the Mezzanine level would include team management office space, additional practice team facilities, clubs, spectator and operations support uses, and fixed seating. Lobbies and various retail uses would be located within the office and retail podiums on this level, and additional retail uses would be within the gatehouse and food hall.

Figure 3-10 presents the floor plan for the Event Center Main Concourse / Office and Retail Building Level 1. The secondary event patron ingress/egress for large attendance events would occur at the southeast entrance to the event center on this level. Event center facilities on this level would include the main concourse, retail space, spectator support uses, and fixed seating. Office and retail space would be provided within the office and retail podiums on this level, with additional retail uses in the food hall.

The Event Center Suite Level would primarily contain suites, spectator support facilities, and a concourse. The Event Center Loge Level would contain primarily loge boxes, spectator support facilities, and a concourse. The Event Center Upper Concourse Level would contain fixed seating, spectator support facilities, and concourse.

Figure 3-11 presents the floor plan for the Event Center AHU (Air Handling Unit) / Office Tower Level. This figure presents a representative floor plan for the towers of the proposed office and retail buildings, showing the smaller floorplate of the towers in comparison to the podium structures, below. The Event Center Mechanical Level would provide private access to event center mechanical equipment located on this floor, including accommodation for heating, ventilation, and air conditioning.

Building Elevations

Figure 3-12 and **3-13** present elevation massing drawings of the proposed development for the east and north, and south and west perspectives, respectively.

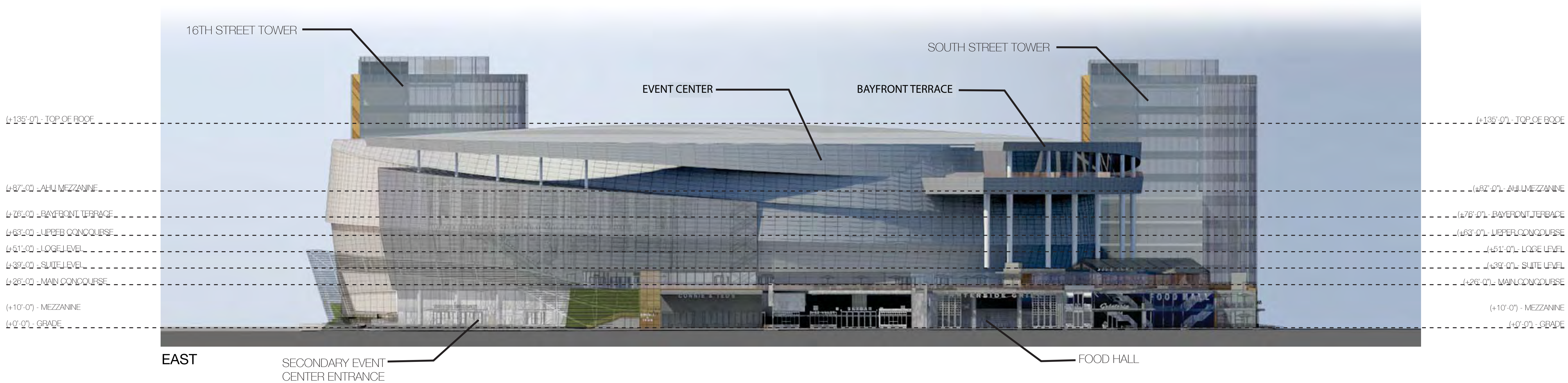
Figure 3-12, top illustration, presents the east elevation (looking west towards Blocks 29-32 from Terry A. Francois Boulevard). The proposed event center, including its elevated bayfront terrace that would extend off the northeast side of the building, and the food hall fronting on Terry A. Francois Boulevard, are prominent in the foreground, behind which the proposed office and retail buildings would rise. The ground-level "theater" entrance to the event center is also visible in this illustration. Figure 3-12, bottom illustration, presents the north elevation (looking south towards Blocks 29-32 from South Street). In this illustration, the event center including its bayfront terrace, and the food hall (fronting on South Street) are visible, as well as the north parking garage entrance on South Street, and on the right-hand side are the two office and retail buildings.

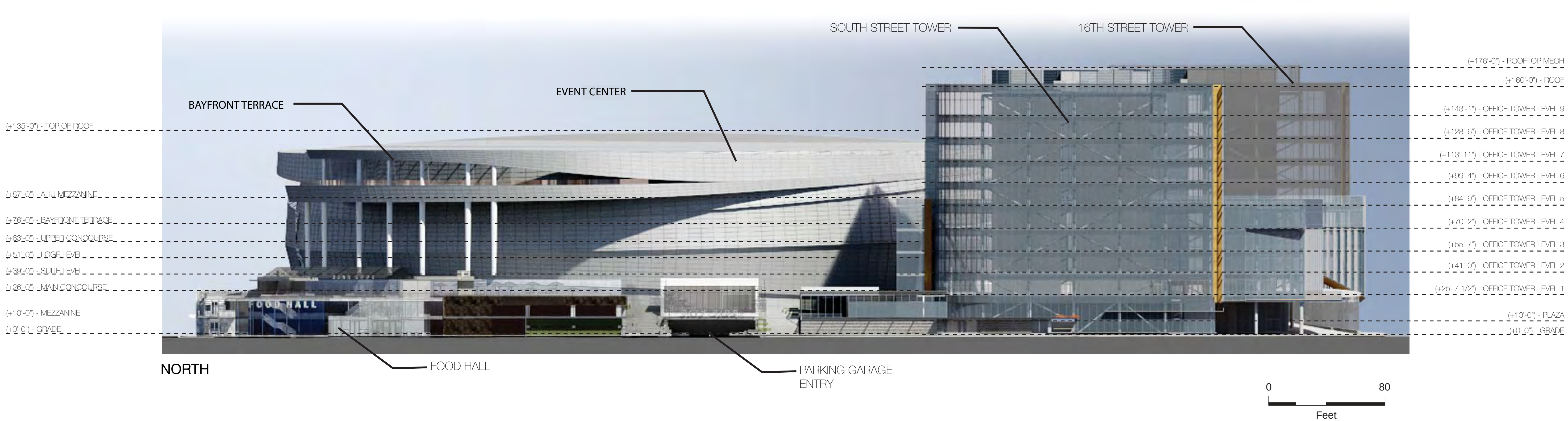
Figure 3-13, top illustration, presents the south elevation (looking north towards Blocks 29-32 from 16th Street). The proposed event center, and the office and retail building at the corner of 16th and Third Streets dominate the foreground, and both the main garage/service entry and the event center theater entrance are visible from this perspective.

Figure 3-13, bottom illustration, presents the west elevation (looking east towards Blocks 29-32 from Third Street). In this illustration, the event center is visible behind the two office and retail buildings, gatehouse building, and the elevated Third Street Plaza.

Bird-Safe Design

The project sponsor proposes to incorporate bird-safe design measures that would reduce the potential effects of the proposed buildings, signage and lighting on birds.





SOURCE: Manica Architecture, 2015

Note: • All building elevations were estimated per *Mission Bay South Design for Development* guidelines; please see text for additional description.

• These drawings show massing for the proposed development, but are not intended to show ideas for building facades, skin or materials

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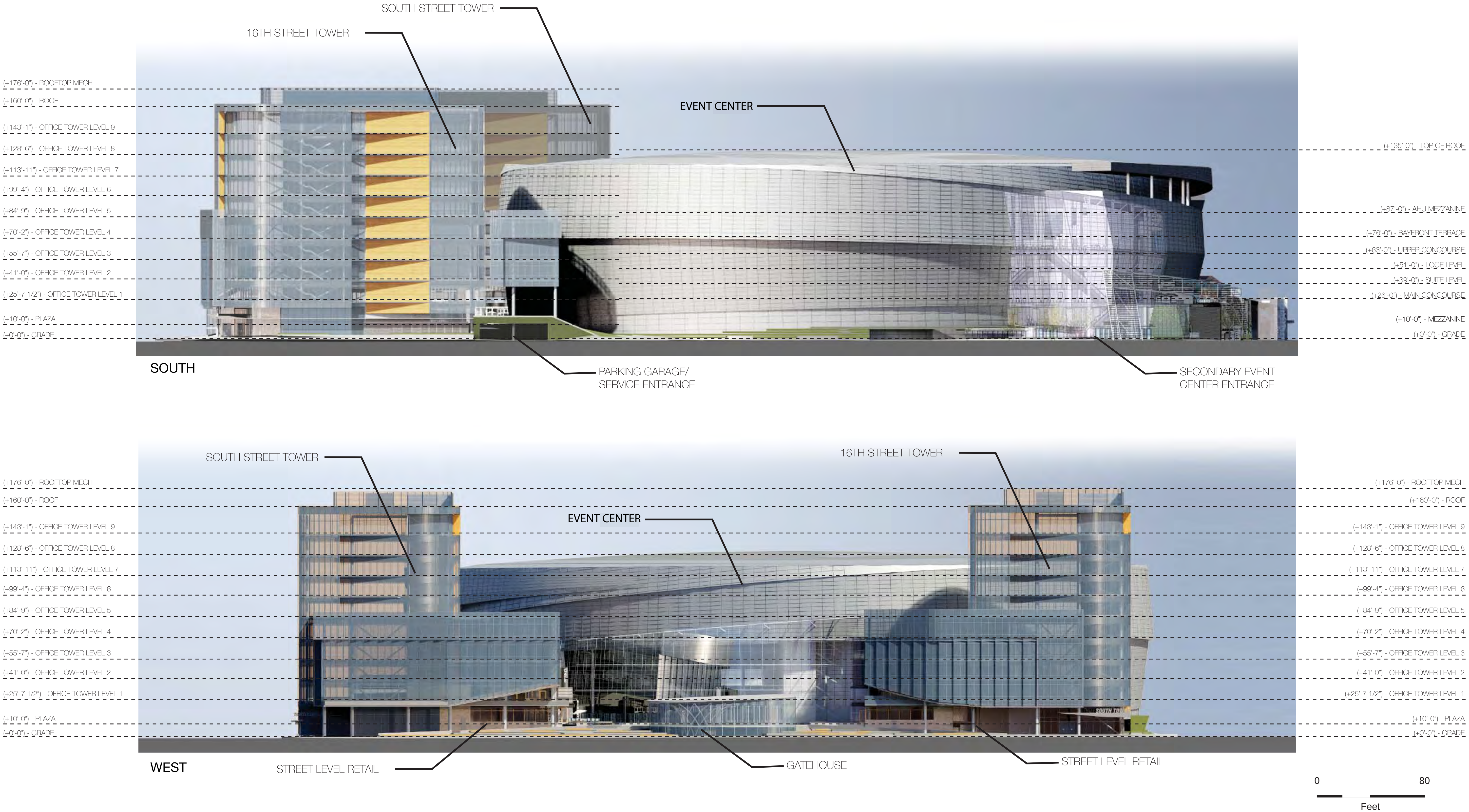
Figure 3-12
Project East and North Elevations

For informational purposes/reference only



SOURCE: Manica Architecture, 2015

Note: • All building elevations were estimated per *Mission Bay South Design for Development* guidelines; please see text for additional description.

• These drawings show massing for the proposed development, but are not intended to show ideas for building facades, skin or materials

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Figure 3-13
Project South and West Elevations

Vehicular Access and Circulation

As shown in the project site plan in Figure 3-5, all vehicular ingress/egress for the garage would occur at 16th Street (at Illinois Street) or South Street (at Bridgeview Way). The 16th Street driveway would serve as the primary vehicular access point for autos to the parking garage, and the sole access point for trucks to the below-grade loading docks. The 16th Street driveway would be 48 feet wide and accommodate four 12-foot wide lanes (2 lanes dedicated for autos and 2 lanes dedicated for trucks). The South Street driveway would provide a secondary access for autos to the garage. The South Street driveway would be 30 feet wide and accommodate three 10-foot wide lanes.

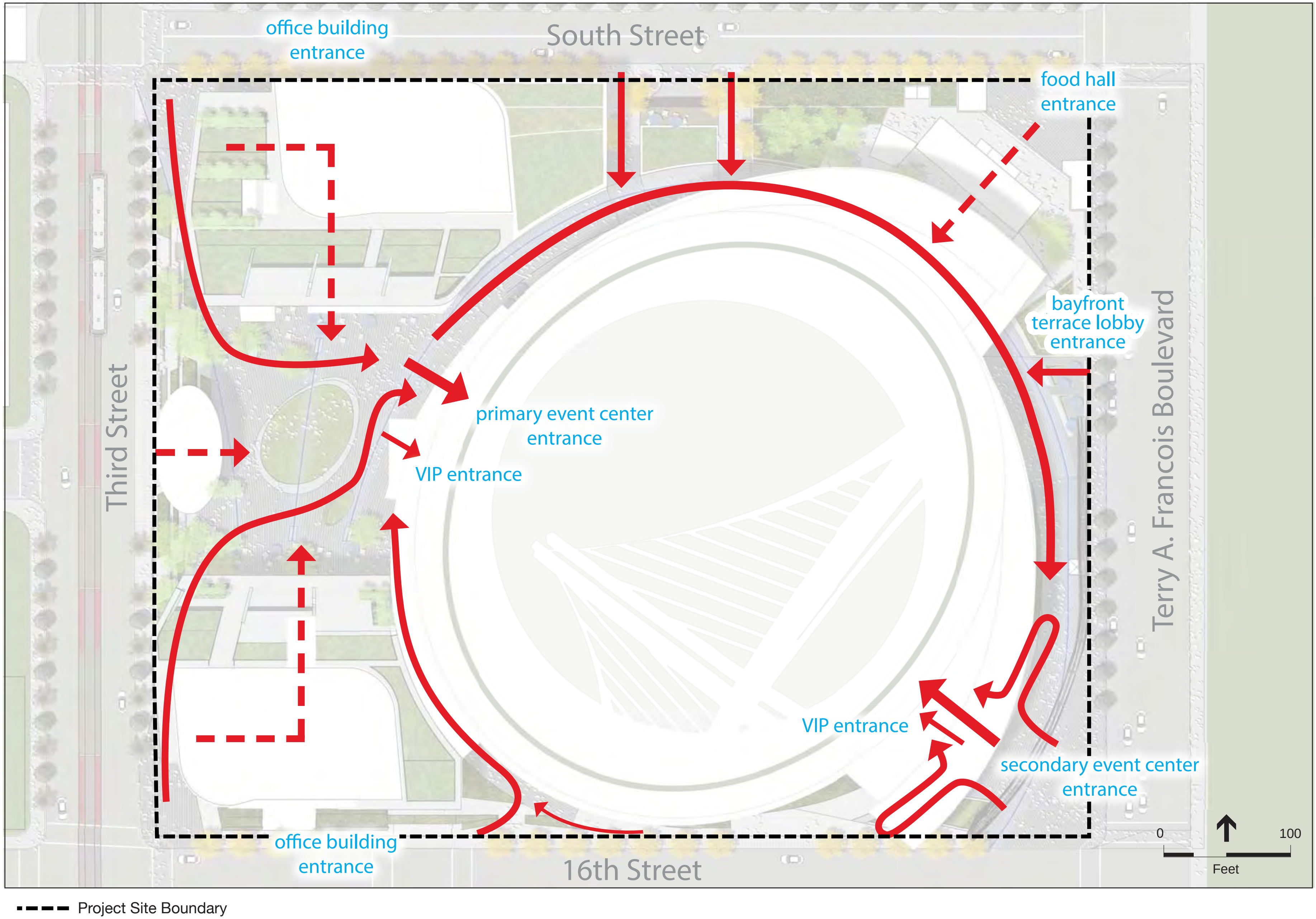
Event ingress would be only from the 16th Street driveway, while event egress would be through both the 16th and South Streets driveways. Office ingress/egress would be via the 16th Street driveway. Retail and restaurant ingress/egress would be via the South Street driveway. (See *Parking Facilities and Loading Facilities*, above for additional detail on vehicular access to and within those facilities; see also *Proposed Operations and Employment*, below, for a description of the proposed *Transportation Management Plan* that the sponsor would implement as part of the project.)

Pedestrian and Bicycle Access

Figure 3-14 presents the proposed pedestrian circulation at the project site. Pedestrian access to the project site uses, including buildings and plazas, would be available from multiple locations along all four perimeter streets. Within the project site, a 40-foot wide curving pedestrian path would lead from the elevated Third Street Plaza (ranging between 8 and 10 feet above Third Street) around the north and east sides of the event center, past retail uses and a proposed bayfront overlook, and terminate on the southeast side of the event center at 26 feet above ground level. Another pedestrian path would extend from ground level on 16th Street curving around the southwest side of the event center to the Third Street Plaza.

The primary pedestrian access to the event center for large attendance events would be on the northwest side of the event center via the elevated Third Street Plaza. A secondary access point to the event center for large-attendance events would be on the southeast side of the event center via the elevated pedestrian path. The primary pedestrian access to the event center for smaller-attendance events, and tertiary access point to the event center for large-attendance events, would be at the ground-level "theater" entrance on the southeast side of the event center, via the Southeast Plaza.

Pedestrian access to the two office and retail building lobbies would be available on South and 16th Streets and from the Third Street Plaza, with additional access to ground-floor retail uses within those buildings available via South and Third Streets and from the Third Street Plaza. The food hall in the northeast corner of the site would be accessed directly via Terry A. Francois Boulevard and South Street, and also from the elevated pedestrian path within the project site. The gatehouse would provide direct access for pedestrians between the Third Street Plaza and the on-site garage.



SOURCE: Manica Architecture, 2015

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Figure 3-14
Proposed Pedestrian Circulation

New sidewalks would be constructed along the perimeter of the project site (see description of proposed off-site pedestrian network improvements, below). The estimated sidewalk widths for the perimeter sidewalks are 15 feet on Third Street, 12½ feet on South Street and Terry A. Francois Boulevard, and 15 feet on 16th Street. The proposed project would provide on-site bicycle storage rooms accommodating 111 Class 1 bicycle parking spaces within the proposed office and retail/restaurant buildings. In addition, an enclosed bicycle parking center would be provided on 16th Street that could accommodate 300 Class 2 bicycle parking spaces on days without an event. On event days, the bicycle parking center would be valet staffed, which would then convert the 300 spaces to Class 1; an additional 100 Class 1 bicycle parking spaces would be provided as needed in temporary bicycle corrals within the Third Street Plaza, Southeast Plaza, for a total of up to 400 bicycle parking spaces on an event day. The bicycle valet is proposed to be staffed by a partner such as the San Francisco Bicycle Coalition for evening uses during peak events such as NBA games and concerts. The valet parking would be attended from two hours prior to the start of the game/event, to approximately an hour after the event ends. The proposed project would also provide 75 Class 2 bicycle parking space via bicycle racks on the adjacent sidewalks (per the Mission Bay Infrastructure Plan) and on-site at key locations (see **Figure 3-15**).

Infrastructure Improvements

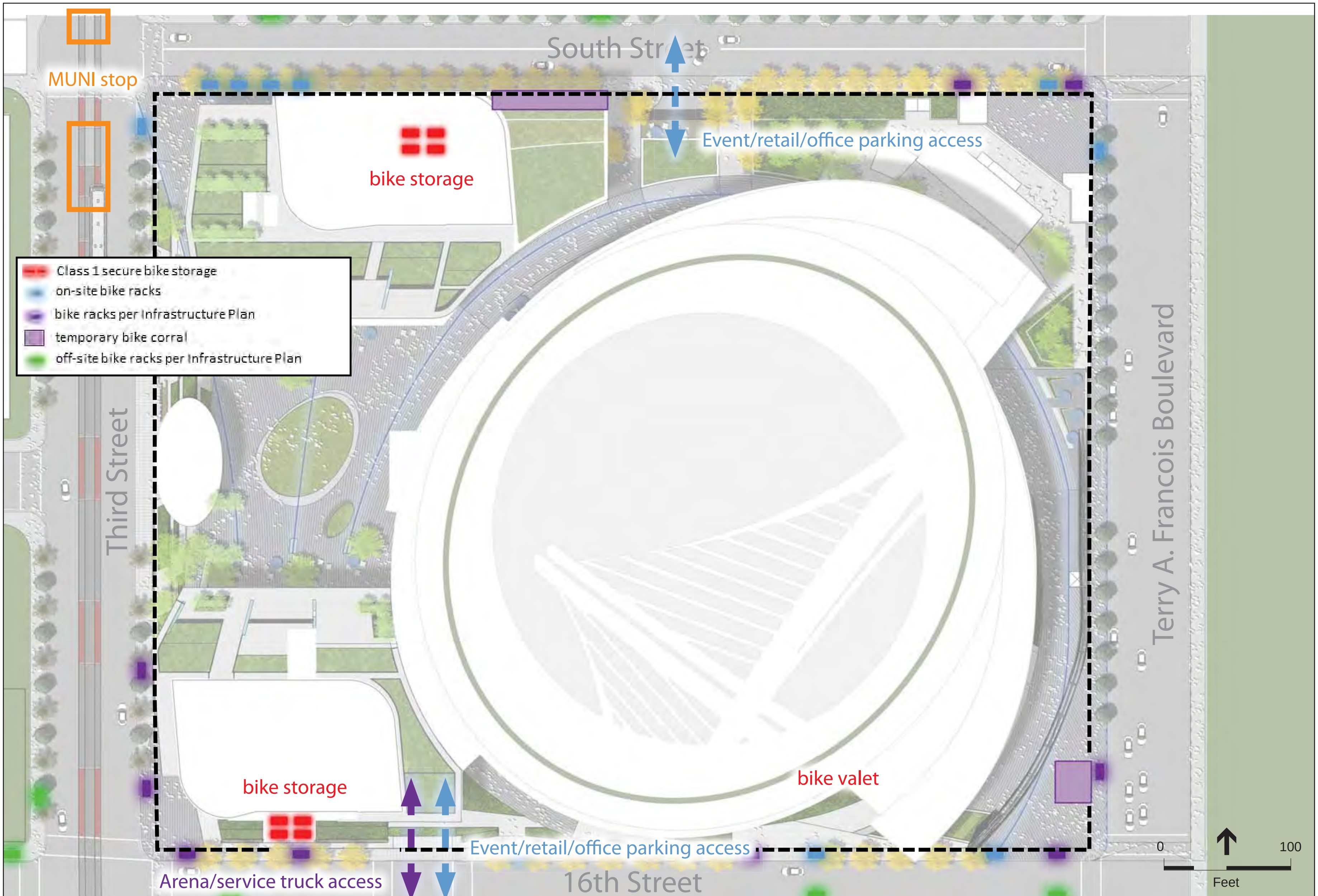
The project proposes to construct all new utility infrastructure facilities on-site, including water supply (low- and high-pressure water lines and recycled water lines); wastewater collection; storm drainage; electrical/gas, and communications. Infrastructure and utilities within adjacent streets that serve the project site are or will be provided by the master developer, FOCIL-MB, LLC, as part of the Mission Bay South Infrastructure Plan.

Stormwater Improvements

Stormwater flows from the project site would drain to a new separate stormwater collection system being constructed as part of the Mission Bay Plan. The project would be subject to the San Francisco Stormwater Guidelines developed by the San Francisco Public Utilities Commission (SFPUC), including a requirement that the project implement best management practices (BMPs) to reduce the flow rate and volume of stormwater and improve the quality of stormwater going into the stormwater drainage system. The stormwater management approach for the proposed project would be required to capture and treat rainfall from the design storm of 0.75 inches. The project would utilize Low Impact Development (LID) strategies to achieve the requirements for capture and treatment of stormwater: green roofs on several proposed buildings (including the office and retail podiums, and food hall), rainwater harvesting, and flow-through biotreatment planters. Treated water from these facilities would be directed to proposed on-site storm drains, which would connect to the separate stormwater collection system beneath the adjacent streets.

Domestic Water and Fire Protection Water

New domestic water and emergency suppression fire water infrastructure would be installed on Blocks 29-32 to serve the proposed uses. All buildings would be equipped with internal fire sprinkler systems as required. Emergency fire water lines and/or fire hydrants would be installed



Project Site Boundary

SOURCE: Manica Architecture, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
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Figure 3-15
Proposed Bicycle Parking Facilities

on-site where required. Proposed domestic and fire water lines would connect to existing City water infrastructure located beneath adjacent streets.

Wastewater Collection

New wastewater collection infrastructure would be installed on Blocks 29-32 to serve the proposed uses. Proposed wastewater lines would connect to existing City sanitary sewer lines located beneath adjacent streets.

Electrical and Gas Service

New electrical and gas infrastructure would be installed on Blocks 29-32 to serve the proposed uses. Proposed electrical and gas lines on the project site would connect to existing PG&E infrastructure located beneath adjacent streets.

The project also anticipates installing on-site generators capable of providing up to three megawatts (MW) of emergency, standby and optional power to the event center in the case of temporary loss of normal utility power.[15] In addition, each office and retail building would have an on-site generator capable of approximately 0.75 MW, and the proposed food hall would have a generator capable of approximately 0.5 MW, to provide fire and life safety emergency power in the case of temporary loss of normal utility power in those uses. All emergency generators would be located within the parking structure on Lower Parking Level 1.

Sustainability

The proposed development would be subject to a number of sustainability requirements, including the California CalGreen Code, City of San Francisco Green Building Code, South Design for Development for the Mission Bay South Area, and the 2012 NBA Arena Design Standards – Sustainability Requirements. The project would be designed to Leadership in Energy and Environmental Design (LEED®) Gold standards using a campus approach, whereby each individual proposed structure as well as the overall site would qualify for individual Gold ratings.[16] This would be achieved through incorporation of a variety of design features and implementation of practices during construction and operation to provide energy and water conservation and efficiency, encourage alternative transportation, promote a healthy indoor environment, minimize waste, and maximize recycling opportunities.

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15 Under such circumstance, the generators would provide power for fire alarms, fire command room, emergency lighting, elevators, smoke control and pressurization, fire pumps, audio system, and certain scoreboard equipment.

16 The Leadership in Energy and Environmental Design (LEED®) is a program developed and administered by the U.S. Green Building Council that provides third-party verification of green building projects. LEED® uses a green building rating system designed to reduce the negative environmental impacts of buildings and improve occupant health and well-being. Building projects satisfy prerequisites and earn points to achieve different levels of certification.

Proposed Off-Site Roadway Network, Transit Network, Pedestrian Network, and Bicycle Network Improvements

The City and sponsor would implement a number of off-site roadway network and curb regulations, transit network, pedestrian and bicycle network improvements in the project site vicinity, including, but not limited to, roadway restriping, intersection signalization, on-street parking, new perimeter sidewalks, bicycle lanes, signage and other improvements, as discussed below.

Roadway Network Improvements and Curb Regulations

- South Street currently has two travel lanes in each direction, with no on-street parking. Under the proposed project, South Street would have one lane in each direction, turn lane improvements, and on-street parking on portions of both sides of the street.

- 16th Street is currently only built out between Third and Illinois Streets. Under the proposed project, 16th Street would be rebuilt and extended to the planned realigned Terry A. Francois Boulevard, and a number of restriping and turn lane improvements would be installed on the intersection approaches and the proposed garage driveway.

- The intersection of Terry A. Francois Boulevard/South Street would be converted from a stop sign controlled intersection to a signalized intersection; the existing uncontrolled intersection of Bridgeview Way/South Street would be converted to a side-street stop sign controlled intersection; the new intersection of Terry A. Francois Boulevard/16th Street would be a signalized intersection; and the existing uncontrolled intersection of Illinois Street/16th Street would be converted to an all-way stop-controlled intersection.

- Adjacent to the site, a Mission Bay Transportation Management Association (TMA) shuttle stop, taxi zone, commercial loading spaces and metered parking spaces would be provided on South Street; commercial loading spaces, a paratransit stop, and metered parking spaces would be located on Terry A. Francois Boulevard; a commercial loading space and metered parking spaces would be provided on 16th Street.

Transit Network Improvements

- The elevated northbound passenger platform at the Muni UCSF/Mission Bay light rail stop on Third Street would be extended from 160 feet in length to 320 feet in length to allow for two two-car light rail trains to simultaneously board or alight passengers along the platform. In addition, crossover tracks would be constructed on Third Street near South Street within the light rail median to enable light rail vehicles to move from one set of tracks to another to reverse travel direction.

- The existing painted median area adjacent to the northbound track between South and 16th Streets would be raised 6 inches. This improvement would allow for staging of two two-car northbound light rail trains.

- As part of the light rail station improvements, fencing would be placed adjacent to the light rail tracks in such a manner as to discourage pedestrian crossings midblock between the intersection of Campus Way with southbound Third Street and the event center on the east side of the street, directly across from Campus Way.

Pedestrian Network Improvements

- New sidewalks would be constructed along the perimeter of the project site on South Street (12.5-feet wide), on Terry A. Francois Boulevard (12.5-feet wide), on 16th Street (15 feet wide), and widening of the existing sidewalk on Third Street from 12 to 16 feet.

- Pedestrian crosswalks (continental design) would be installed at the following intersections: South Street/Bridge View Way, South Street/Terry A. Francois Boulevard (currently there is a crosswalk on the north and west legs of the intersection, not the south), 16th Street/Illinois Street/Project garage driveway, 16th Street/Terry A. Francois Boulevard, and Illinois/Mariposa.

Bicycle Network Improvements

- Class II bicycle lanes would be installed on 16th Street between Third Street and Terry A. Francois Boulevard. Bicycle signals would be installed at the intersections of Terry A. Francois/16th and Illinois/Mariposa, and bicycle turn queue boxes would be installed at the intersection of Terry A. Francois/16th.

A complete description of proposed off-site roadway network and curb regulation, transit network, and pedestrian network improvements is presented in Section 5.2, Transportation and Circulation. See description of the planned realignment of Terry A. Francois Boulevard that would occur pursuant to the Mission Bay South Plan, below. See also proposed Mission Bay TMA Shuttle Program improvements, Special Event Transit Service Plan, and Transportation Management Plan, under Section 3.6.2, *Proposed Operations*, below.

South Plan Improvements Planned in the Vicinity of the Project Site: Terry A. Francois Boulevard Realignment and Public Access Improvements at Bayfront Park

Pursuant to the Mission Bay South Plan and the Mission Bay BCDC Permit No. 5-00, as amended, and independent of the proposed project, development of Blocks 29-32 would trigger the realignment of Terry A. Francois Boulevard to extend adjacent to the east side of Blocks 29-32, and the construction of public access improvements at Bayfront Park east of this realigned roadway. The realigned Terry A. Francois Boulevard would contain four travel lanes (two northbound and two southbound) plus two parking lanes; and - on the east side of the roadway – a two-way cycletrack (bike path) separated from the roadway by a raised buffer.

As discussed above, Bayfront Park is a planned linear park comprising Mission Bay plan parcels P21 through P24, and when completed, will extend from Mission Bay Boulevard south to Mariposa Street. The north portion of the park (P21, located east of Terry A. Francois Boulevard, between Mission Bay Boulevard South and just south of Pierpoint Lane) is complete, and includes a landscaped parking lot and boat launch. Construction is underway in 2015 for the south portion of Bayfront Park (P23 and P24, located west of Terry A. Francois Boulevard, between 16th Street and Mariposa Street), including stormwater infrastructure improvements, and construction of this portion of the park will be complete by the end of 2016. Following realignment of Terry A. Francois Boulevard, the central portion (P22) of Bayfront Park located east of the project site and consisting of approximately 5.5 acres will be developed. Potential park uses for this portion of Bayfront Park being considered at this time include, but are not limited to, pathways, outdoor performance area, kiosks, outdoor dining areas, and informal playing field(s). Both the realignment of Terry A. Francois Boulevard and Bayfront Park public access improvements on P22 are triggered by development on Block 29-32 and would be implemented by the master developer, FOCIL-MB, LLC, prior to occupancy of buildings at the project site.

3.6.2 Proposed Operations

Under the project, the event center at Blocks 29-32 would serve as the new venue for the Golden State Warriors home games, and provide a year-round venue for a variety of other uses, including concerts, family shows, other sporting events, cultural events, conferences and conventions. The event center would be used for up to approximately 225 events per year, with events ranging in capacity from approximately 3,000 patrons up to about 18,500 patrons. All existing Golden State Warriors operations, including management offices and practice facility, would relocate from their existing facilities in Oakland to the new event center. The proposed office and retail facilities on Blocks 29-32 would operate year-round, independent of the event center operations. The following provides additional information for each of the proposed new operational components at Blocks 29-32.

Event Center Programming

Table 3-3 presents a summary of characteristics of proposed events at the event center, including anticipated types and number of Golden State Warriors games and non-Golden State Warriors events, average/maximum game/event attendance, estimated event center day-of-game/event employment, and temporal description of games/events.

Golden State Warriors Games at Event Center

Under the project, all Warriors home basketball games that presently occur at Oracle Arena in Oakland would be played at the proposed event center. The Golden State Warriors would host two to three preseason basketball games (in mid- to late October) and 41 regular season basketball games (from late October to mid-April) at the event center. If the Golden State Warriors reach the postseason, they would host anywhere from 2 to 16 playoff games (from mid-April to mid-June). The large majority of Golden State Warriors home basketball games would start at 7:30 p.m. and conclude between 10:00 p.m. and 10:30 p.m. The home game schedule at the proposed event center would be similar to the Warriors schedule at Oracle Arena, the team's existing home venue in Oakland.

As shown in **Table 3-3**, the maximum basketball seating capacity at the event center would be 18,064, less than the maximum basketball seating capacity of approximately 19,600 at Oracle Arena. Based on historical data for ticket sales and "no-show" rates, the average basketball attendance level at the proposed event center is estimated to be approximately 17,000 during the regular season, with regular season and post-season attendance reaching the maximum capacity of 18,064.

TABLE 3-3
EVENT CHARACTERISTICS AT PROPOSED EVENT CENTER

Event Type	Annual Number of Games/Events at Event Center	Attendance		Event Center Day-of-Game/Event Employment Characteristics	Season	Game/Event Temporal Characteristics
		Average	Maximum			
Golden State Warriors Basketball Home Games	2 to 3 preseason home games	11,000	18,064	1,100[a]	2 weeks mid-October	Regular Season game time: 7:30 p.m. to ~ 9:40 p.m.[c] Preseason/Postseason game time: start time variable Monthly Distribution: ~7 homes games per month Weekly Distribution: 50%/50% weekdays/weekends Monday-Thursday: 2 to 6 home games/month Friday: 1 to 3 home games/month Saturday: 1 to 3 home games/month Sunday: 0 to 1 home games/month
	41 regular season home games	17,000	18,064	1,100[a]	late October to mid-April	
	0 to16 post season home games	18,000	18,064	1,100[a]	mid-April to mid-June	
Concerts	Approximately 30	12,500	14,000 to 18,500[d]	775[b]	major concert season is Fall, Winter and early Spring; Summer is the slow season	Concert time: typically 7:30 p.m. to 10:30 p.m. Weekly Distribution: primarily Friday and Saturday evenings
	Approximately 15	3,000	4,000	675[b]		
Family Shows[e]	Approximately 55	5,000	8,200	675[b]	distributed throughout the year	Family Show characteristics: typically 10 shows over 5 days (Wednesday to Sunday): Wednesday: 1 show, 7:30 p.m. to 9:00 p.m. Thursday: 1 show, 7:30 p.m. to 9:00 p.m. Friday: 2 shows, 10:30 a.m. to 12:00 p.m.; and 7:30 p.m. to 9:00 p.m. Saturday: 3 shows, 11:00 a.m. to 12:30 p.m.; 3:00 p.m. to 4:30 p.m.; and 7:00 p.m. to 8:30 p.m. Sunday: 3 shows, 11:00 a.m. to 12:30 p.m.; 3:00 p.m. to 4:30 p.m.; and 7:00 p.m. to 8:30 p.m.
Other Sporting Events[f]	Approximately 30	7,000	18,064	675[b]	distributed throughout the year; times variable	
Conventions/Corporate Events[g]	Approximately 31	9,000	18,500[h]	675[b]	distributed throughout the year; times variable	

NOTES:

[a] This estimate includes approximately 1,000 event center day-of-game non-Warriors employees, and approximately 100 Warriors employees that would work at the Warriors games. This estimate does not include, however, Warriors employees that would work in the Warriors management offices in the event center during the day (described under *Golden State Warriors Operations*, below), non-Warriors employees of the proposed office and retail uses within the office and retail buildings (described under *Office and Retail Uses*, below), or the visiting team and their support staff at the event center.

[b] This estimate includes event center day-of-event non-Warriors employees. This estimate does not include, however, Warriors employees that would work in the Warriors management offices in the event center during the day (described under *Golden State Warriors Operations*, below), non-Warriors employees of the proposed office and retail uses, and cinema within the mixed-use buildings (described under *Office and Retail Uses*, below), or the visiting event performers and their support staff at the event center.

TABLE 3-3 (Continued)
EVENT CHARACTERISTICS AT PROPOSED EVENT CENTER

NOTES (cont.)

[c] The large majority of Golden State Warriors regular season home games would start at 7:30 p.m. For example, over the course of the most recent full three NBA regular seasons (2010-11, 2012-13, and 2013-14; the 2011-12 NBA season was shortened due to delays in signing of a collective bargaining agreement between NBA owners and players, and consequently is not included), 90 percent of Golden State Warriors home games started at 7:30 p.m., 6 percent of homes games started at 6:00 p.m., and the balance (accounting for one home game or less per season) started at either 1:00 p.m. (on Martin Luther King Jr. holiday), 5:00 p.m., or 7:00 p.m.

[d] Nearly 90 percent of annual concerts at the event center would be in the end-stage concert configuration (14,000 maximum capacity), and the remaining 10 percent (no more than four annually) would be with a 360-degree configuration (18,500 maximum attendance).

[e] Examples of family shows include Disney on Ice, Disney Live, Harlem Globetrotters, and Sesame Street Live.

[f] Examples of Other (non-Warriors) Sporting Events examples include college basketball, hockey, boxing, figure skating, arena football, gymnastics, lacrosse, tennis, and mixed martial arts. These could be professional, collegiate, or amateur competitions.

[g] Examples of Conventions/Corporate Events examples include conventions, conferences, cultural events, civic events and corporate events. It is anticipated that the event center would act as a satellite venue for conventions/conferences held primarily at the Moscone Center when an event or speaker requires more space than can be accommodated at that location.

[h] The maximum number of conference attendees that could be accommodated at the event center is 18,500. This requires a configuration similar to a center stage concert (see footnote d). It is anticipated, however, that average attendance for Convention/Corporate Events would be 9,000 people.

SOURCE: Golden State Warriors, based on data from Oracle Arena (Oakland), SAP Center (San Jose), Toyota Center (Houston), and Barclays Center (Brooklyn, New York City), 2014

It is estimated that approximately 1,000 day-of-game non-Warriors employees[17] would be required on game days at the event center to work in various operations and jobs, including security guards, ushers, ticket takers, team store staff, food service staff, cleaning crew, scoreboard/video operators and staff for other event-related operations. In addition, up to 100 Golden State Warriors' employees (e.g., representatives from Warriors sales, services, marketing and game operations) would work at the games at the event center (please see additional detail of Golden State Warriors employment under *Golden State Warriors Operations*, below).

Non-Golden State Warriors Events at Event Center

The event center would serve as a venue for a variety of non-Golden State Warriors events throughout the year, including concerts, family shows, other sporting events, and conventions/corporate events. Approximately 160 non-Golden State Warriors game events would occur annually at the event center, which could typically include the following:

- **Family Shows:** It is estimated that the event center would host 55 family shows per year. Examples of family shows include Disney on Ice, Disney Live, Harlem Globetrotters, and Sesame Street Live. Family show series would typically occur over a five-day block of time (Wednesday through Sunday) during which time as many as 10 total performances would occur in the daytime and evening periods. Estimated average attendance would be approximately 5,000 patrons, and estimated maximum attendance would be approximately 8,200 patrons.

- **Full Arena Concerts:** It is estimated that the event center would host 30 full arena concerts per year. These concerts would typically occur on Friday and Saturday evenings within a 7:30 p.m. to 10:30 p.m. window. Attendance would vary depending on the artist and stage configuration. Estimated average attendance for full arena concerts would be approximately 12,500 patrons with a maximum capacity of about 18,500.[18]

- **Arena Theater Concerts:** It is estimated that the event center would host 15 arena "theater" (cut-down arena) concerts per year. These concerts typically occur on Friday and Saturday evenings within a 7:30 p.m. to 10:30 p.m. window. Attendance would vary depending on the artist and cut-down configuration. Estimated average attendance for arena theater concerts would be approximately 3,000 patrons with a maximum capacity of approximately 4,000 attendees.

- **Other Sporting Events:** It is estimated that the event center would host 30 non-Warriors sporting events per year. Examples of non-Warriors sporting events include college basketball, hockey, boxing, figure skating, arena football, gymnastics, lacrosse, tennis, and

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17 This event center day-of-game employee estimate does not include Warriors employees that would occupy the management offices in the event center and employees of the proposed office and retail uses on the project site, both of which are described separately, below.

18 The event center design would allow for an end-stage concert configuration that would accommodates up to 14,000 patrons. It is estimated that nearly 90 percent of concerts would use the end stage configuration. Occasionally, concerts would occur in a 360-degree center-stage configuration which would accommodate a maximum attendance of approximately 18,500 patrons. However, no more than four center-stage concerts are expected per year.

mixed martial arts. These events could be professional, collegiate, or amateur competitions. Estimated average attendance for other sporting events would be 7,000 patrons per event, and estimated maximum attendance of 18,064 (consistent with maximum seating capacity for Warriors games). These events would be distributed throughout the year and have variable start times.

- **Conventions, Conferences and Other Events:** It is estimated that the event center would host 31 events annually related to conventions, conferences, cultural events, civic events, corporate events, and other gatherings, with an estimated average attendance level of 9,000 patrons and maximum attendance of 18,500 patrons. For smaller events, the event center would be configured to reduce the perceived bowl volume to create a more intimate experience. These events would be distributed throughout the year and have variable start times; however, the majority of events are expected to occur during day time hours, consistent with typical events at the Moscone Convention Center.

It is estimated that day-of-event employees for non-Golden State Warriors events at the event center would range from 675 to 775, depending on the specific event and anticipated attendance levels.

(Please see also *Golden State Warriors Operations* and *Office and Retail Uses,* below, for a description of operations and additional employment associated with the Golden State Warriors, and for office and retail uses.)

Potential Outdoor Events at the Project Site

The proposed Third Street Plaza would provide opportunities for public gatherings and events, such as spring festivals, a summer film series, fall festivals/pumpkin patch, and a winter tree lighting ceremony/ice skating rink.

Golden State Warriors Operations

As discussed under Section 3.5.2, *Existing Golden State Warriors Operations*, the Golden State Warriors organization currently includes approximately 150 full-time equivalent (FTE) employees, and associated operations are based in Oakland. Under the project, all existing Golden State Warriors employees and operations, including management offices and practice facility, would relocate to the project site at Mission Bay. Furthermore, the Golden State Warriors estimate that up to 105 additional FTE employees would be required for year-round event center and site management, for a total estimated Golden State Warriors employment of 255 FTE employees.

Office and Retail Uses

The proposed office uses on the site would be expected to operate similar to other existing office developments within Mission Bay, and it is estimated to generate approximately 2,100 FTE employees.[19] The proposed retail uses, including restaurants and other food and beverage

[19] Based on San Francisco Planning Department's Transportation Impact Analysis Guidelines rate of 350/240/350 (Sit-down/QSR/In-line) gross square feet per FTE employee.

service, would operate seven days a week, year-round, independently of the event center operations. It is estimated that the uses within the retail areas would require approximately 370 FTE employees.[20]

Table 3-4, below summarizes all estimated full-time employment under the project.

TABLE 3-4
ESTIMATED FULL-TIME EQUIVALENT EMPLOYEES[a]

Project Component	Full-Time Equivalent (FTE) Employees
Golden State Warriors (Team Operations and Event Center Management)	255
Office Uses[b]	2,101
Retail Uses[c]	372
Total	**2,728**

a See also *Golden State Warriors Operations* discussion, above, for how this estimate was developed. In addition, please also see *Golden State Warriors Games at Event Center* and *Non-Golden State Warriors Events at Event Center* discussion for separate estimates of event center day-of-game/event staff.
b Based on San Francisco Planning Department's *Transportation Impact Analysis Guidelines* office rate of 276 square feet per FTE employee.
c Based on San Francisco Planning Department's *Transportation Impact Analysis Guidelines* restaurant rate of 350/240/350 (Sit-down/Quick Service Restaurant/In-line) gross square feet per FTE employee.

SOURCE: Golden State Warriors, 2014

Transportation Management Plan

As part of the project, the project sponsor prepared and would implement a Transportation Management Plan (TMP). The TMP is a management and operating plan to facilitate multimodal access at the event center during project operation. The TMP includes various management strategies designed to reduce use of single-occupant vehicles, minimize conflicts between modes in the project vicinity, and to increase the use of rideshare, transit, bicycle, and walk modes for trips to and from the project site. The TMP program was developed by the project sponsor in consultation with the SFMTA, OCII and the Planning Department. The TMP is a working document that would be expanded and refined over time by the project sponsor and City agencies involved in implementing the plan. As described below, a monitoring and refinement process is included as part of the TMP. The TMP includes the appointment of an Event Center Transportation Coordinator whose responsibilities would include, but not be limited to, distributing information related to temporary travel lane and/or street closures to event center attendees, emergency service providers, UCSF, and other neighbors prior to events.

20 Based on San Francisco Planning Department's Transportation Impact Analysis Guidelines rate of 276 gross square feet per FTE employee.

The following elements of the TMP are summarized below:

- Muni Special Event Transit Service Plan
- Mission Bay TMA Shuttle Event Express Routes
- Event Transportation Management Strategies
- Travel Demand Management Strategies
- Communication
- Monitoring, Refinement, and Performance Standards

Muni Special Event Transit Service Plan

In addition to the existing scheduled transit service in the project vicinity, the SFMTA would provide additional service to accommodate incremental event-driven transit demand. Under the Muni Special Event Transit Service Plan, light rail service on the T Third line would be increased, and three special event shuttles would be implemented by Muni, including a 16th Street BART Shuttle, Van Ness Avenue Shuttle, and Transbay Terminal/Ferry Building Shuttle.

Expansion of Mission Bay TMA Shuttle Program

The existing Transportation Management Association (TMA) shuttle service program would be expanded during evenings and weekends, and a new TMA shuttle stop would be located on South Street east of Third Street adjacent to the project site. The expanded service would include the following:

- Existing TMA shuttle routes would be revised to provide more frequent service, plus extended service to late evenings and on Saturdays. In addition to the expanded service hours on the East route, the route would be modified to travel on South Street and stop at the new TMA shuttle stop. The Mission Bay Loop service would be expanded from 6:00 to 7:00 a.m. to 6:00 to 10:00 a.m., and from 4:00 to 6:00 p.m.

- Three new regular routes (a Fourth/King Caltrain loop route, a 16th Street BART route, and a Transbay Terminal route) would operate throughout the day, similar to the existing shuttle service, but would have extended hours and operate on weekends.

- One Event Express route (the Fourth/King Caltrain route) with limited stops, would be provided prior to and following a peak event (i.e., events with more than 14,000 attendees).

Event Transportation Management Strategies

The TMP identifies event transportation management strategies that would be implemented to accommodate travel to and from the event center during games/events by all modes to enhance safety through reduction of conflicts between modes, facilitate ingress and egress to the project site and vicinity, and minimize traffic congestion and delays to vehicles, including transit. Transportation management strategies include, but are not limited to the following: providing for Muni ticket or Clipper Card sales at the event center box office; designating taxi zones on Terry A. Francois Boulevard and South Street; designating commercial loading zones; dedicating TMA, charter bus, and paratransit stops; assigning a parking control officer supervisor and using of PCOs at key locations throughout the surrounding transportation network; planning for post-peak event temporary lane closures; and coordination with BART, Caltrain, Muni and Giants staff as well as emergency services providers and neighbors.

Three permanent Variable Message Signs (VMS) would be installed to provide traffic alerts, messages, and alternate driving routes for drivers traveling to the event center, to destinations in the vicinity, or through the area. The VMSs would be used during large events. The proposed locations for the new VMSs include westbound 16th Street east of I-280, southbound Third Street south of the Lefty O'Doul Bridge, and eastbound Mariposa Street east of the I-280 ramps.

In circumstance when events at the proposed event center partially or completely overlap with baseball games or other events at AT&T Park, adjustments to the transportation management plan for the proposed event center would be made, including adjusting PCO staffing to eliminate duplication of effort, and directing event center attendees to travel southbound on Terry A. Francois Boulevard, and then westbound on 16th Street to access locations to the north and west.

Travel Demand Management (TDM) Strategies

The TMP includes TDM strategies for both on-site employees and event center visitors. TDM strategies for office, retail, restaurant, or event center employees include, but are not limited to: participation in the federal pre-tax commuter benefits; promoting use of Mission Bay TMA shuttles and the proposed on-site and bicycle parking facilities; providing employee shower locker facilities in each building; allowing work flexible schedules and telecommuting; supporting an employee ride-matching program; and encouraging carpooling, vanpooling and use of electric vehicles (EVs) by reserving certain on-site garage spaces/charging equipment for vehicles using those modes. TDM strategies for visitors include: rewarding or incentivizing patrons arrival via transit; promoting transit access through trip planning tools and transit maps; displaying transit information at the event center; promoting the use of the on-site bicycle valet facility; and designating priority curb areas on-site for taxis and rideshare vehicles.

Communication

The TMP includes strategies related to distributing information on transportation management for various modes for pre-event and post-event conditions as part of the ticket purchase process, and installing wayfinding signage for multi-modal access and egress. The communication strategies would discourage use of private autos and encourage use of transit and other modes.

Monitoring, Refinement, and Performance Standards

The TMP outlines the process to monitor and refine the strategies within the TMP in conjunction with the City throughout the life of the project. Monitoring methods including field monitoring of operations during the first four years and an annual surveying and reporting program thereafter. Surveys of event attendees and event center employees would be conducted annually, and surveys of Mission Bay neighbors and UCSF staff and emergency providers would be conducted in the initial years of operation. The TMP also identifies performance standards that the project sponsor has committed to maintaining, including but not limited to auto mode share targets for event attendees, and maximum vehicle queuing limits on adjacent streets. Please see additional details on the proposed TMP in Section 5.2, Transportation and Circulation, and the full TMP in Appendix TR of this SEIR.

Proposed Event Center Site Management Practices

As part of the project, the sponsor would comply with all applicable City policies and regulations to minimize effects from the event center and associated event patrons on surrounding land uses, including those contained in the City noise regulations. The project would also be subject to the requirements of the San Francisco Entertainment Commission's Place of Entertainment permits, which includes a Good Neighbor Policy (see Chapter 5, Section 5.3, Noise, for further description). Moreover, as part of the project, the sponsor would develop and implement additional Event Center Site Management practices as needed to further minimize potential disruption associated with event center operations to the quality of life for the surrounding neighborhood. This would include contracting with Mission Bay Parks and the Mission Bay Management Corporation, or other provider, to provide certain off-site parks maintenance, garbage disposal, street sweeping, power washing and other services. The sponsor would implement procedures for addressing potential loitering, pedestrian queuing, illegal vendors, outdoor event patron noise, and other disruptions. The sponsor would also establish a central point of contact with real-time connection to the event center's Transportation Management Center, and would promote pre- and post-game pedestrian routes that would avoid residential streets such as Bridgeview Way north of Mission Bay Boulevard and Fourth Street.

3.6.3 Proposed Construction

Overview

Table 3-5 summarizes major construction tasks, and presents a preliminary construction schedule. Construction of the proposed project is anticipated to begin in late 2015 and occur over an approximate 26-month period. Construction activities would include, but not be limited to: site demolition, clearing and excavation; temporary dewatering; pile installation and foundation construction; construction of all proposed development, including event center, podium structure, office towers and plazas; installation of associated utilities; interior finishing; and exterior hardscaping and landscaping improvements.

The sponsor estimates that the maximum depth of excavation on-site (excluding perimeter cut-off wall, described below) would be approximately 30 feet below grade; this would require approximately 350,000 cubic yards of on-site soils to be excavated and removed from the site. Soil on the site would be compacted using rapid soil compaction over approximately 30 work days. The sponsor proposes to install augercast piles[21] using drilling, as opposed to impact pile driving, for

[21] Augercast piles, also known as continuous flight auger piles (CFA), are cast-in-place, and formed by drilling into the ground with a hollow stemmed continuous flight auger to the required depth or degree of resistance. A cement grout mix is then pumped down the stem of the auger. While the cement grout is pumped, the auger is slowly withdrawn, conveying the soil upward along the flights. A shaft of fluid cement grout is formed to ground level. Reinforcing steel is then lowered in to the wet cement grout.

TABLE 3-5
PRELIMINARY PROJECT CONSTRUCTION SCHEDULE

Location	Construction Period	Duration (weeks)
Demolition/Excavation		12 weeks
Demolition / Clear and Grub	Month 1	4
Cut-off Wall / Earth Retention / Excavation	Months 1 - 3	12
Event Center		94 weeks
Foundations	Months 3 - 19.5	70
Structure	Months 3.5 - 20	70
Roofing Systems	Months 12 - 19	32
Enclosure	Months 12 - 21	40
Interior Rough-in	Months 8 - 22	60
Event Level Service Loop	Months 9.5 – 14.5	20
Mechanical Equipment	Months 9.5 - 20	42
Elevators / Escalators	Months 12 - 23	48
Drywall and Interior Finishes	Months 16 – 24.5	38
Food Service Equipment	Months 17 - 23.5	30
Bowl Rough-in / Finishes	Months 19 – 23.5	22
Sports Equipment and Systems	Months 20.5 – 25.5	20
Commissioning / Project Closeout	Months 25.5 – 26.5	4
Parking Garage and Podium		44 weeks
Foundations	Months 3.5 - 9	22
Structure	Months 6 – 14.5	38
Southwest Tower		72 weeks
Structure	Months 9 - 18	40
Roofing Systems	Months 17.5 – 19.5	8
Enclosure	Months 16 - 20	20
Interior Rough-in	Months 15 - 22	32
Elevators / Escalators	Months 19.5 - 24	18
Drywall and Interior Finishes	Months 18 - 25	32
Commissioning / Project Closeout	Months 21.5 - 26	18
Northwest Tower		74 weeks
Structure	Months 6.5 - 16	38
Roofing Systems	Months 15.5 – 17.5	8
Enclosure	Months 14 - 18	20
Interior Rough-in	Months 12.5 - 20	30
Elevators / Escalators	Months 17.5 - 23	18
Drywall and Interior Finishes	Months 17 - 24	32
Commissioning / Project Closeout	Months 12 - 25	16
Gatehouse Retail Building		20 weeks
Structure	Month 21	4
Enclosure	Month 22 – 22.5	6
Service Loop	Months 22.5 – 23.5	4
Drywall and Interior Finishes	Months 23.5 – 24.5	4
Commissioning / Project Closeout	Month 25	4

TABLE 3-5 (Continued)
PRELIMINARY PROJECT CONSTRUCTION SCHEDULE

Location	Construction Period	Duration (weeks)
Northeast Retail Building		20 weeks
Structure	Month 18	16
Enclosure	Month 19 – 19.5	6
Service Loop	Months 19.5 – 20.5	4
Drywall and Interior Finishes	Months 20.5 – 21.5	4
Commissioning / Project Closeout	Month 22	4
Site Improvements		20 weeks
Site Improvements	Months 21 - 25	20
Total	**26 months**	**104 weeks**

SOURCE: Golden State Warriors, 2014

the deep foundation. It is estimated that approximately 1,400 2-foot diameter piles, at a depth of 110 feet, would be installed at the project site. Augercast pile installation would occur over approximately 60 work days.

Construction dewatering is expected to last approximately nine months. The three potential construction dewatering discharge options are: (1) directly discharging to the City's combined sewer system; (2) installing an on-site dewatering treatment system and discharging the treated water to the Bay if the capacity of the Mariposa Pump Station would be exceeded with the discharge; and (3) a combination of the first two options. (Please see Section 5.9, Hydrology and Water Quality, for additional detail.)

The sponsor is also considering multiple approaches to address potential groundwater infiltration to proposed below-grade facilities and potential localized flooding, including a permanent waterproofing design and implementation of adaptive management strategies (see Section 5.9, Hydrology and Water Quality for additional detail). The project design includes a soil-cement cut-off walls as part of the perimeter shoring and dewatering system for the site, which would support the excavation during construction and allow for excavation to occur.[22] The walls would be about 30 to 36 inches thick. Estimated average depths of the walls around the perimeter of the project site would be 35, 37, 54, and 37 feet along South Street, Terry A. Francois Boulevard, 16th Street, and Third Street, respectively. The sponsor indicates the proposed design would preclude the need to conduct any long-term dewatering of the project site during project operation.

22 A Cement Deep Soil Mixing (CDSM) wall would serve as the soil-cement cut off wall, and would be created by using drilled shallow-stem shafts with a cutting tool and mixing paddles to mix cementitious materials into the soil. H-Beams would be installed at an off-set designed by the engineer. After beams are installed and the wall is cured, the soil-cement wall creates a barrier to the surrounding horizontal groundwater flow. The wall would extend vertically into the underlying bay mud or bedrock depending on the thickness of bay mud where the wall is installed. The bay mud soil layer would act as secondary groundwater control.

The majority of the construction is proposed to occur Monday through Friday, although some construction activities would occur on nights and weekends. A typical work day shift would be between 7:00 a.m. and 6:00 p.m., and a typical second shift (i.e., for below-grade and interior work within buildings) would be between 4:00 p.m. and 12:30 a.m. There would also be the potential for overnight deliveries of materials and/or equipment.

All construction activities are proposed to be conducted within allowable construction requirements permitted by City code. The project would also be subject to the Mission Bay Good Neighbor Construction Noise Policy, which limits extreme noise-generating activities in Mission Bay to Monday to Friday from 8:00 a.m. to 5:00 p.m.[23]

Construction Staging

The proposed construction staging area for the majority of the project construction would take place between the existing alignment of Terry A. Francois Boulevard and the west face of the proposed event center. This staging area would be used until such time the planned realignment of Terry A. Francois Boulevard occurs. Any potential deliveries of materials that could not be accommodated within the above-described staging area would be staged on Terry A. Francois Boulevard between Piers 48 and 50. All construction equipment is proposed to be staged on-site. Tower cranes would be sized and used as appropriate in consideration of UCSF emergency helicopter flight paths. The construction contractor would be responsible for complying with all federal code, rules, and regulations, including those related to operation of the tower cranes in the vicinity of helicopter flight paths (please see Section 5.2, Transportation and Circulation, for additional information).

During construction, the southern-most eastbound lane on South Street adjacent to the project site; and the westbound curb lane on 16th Street between Third and Illinois Street adjacent to the project site would be temporarily closed. It is also anticipated that the sidewalk on Third Street adjacent to the project site would be temporarily closed during the building steel erection phase of work.

Terry A. Francois Boulevard would be the primary point of vehicular ingress/egress to/from the project site during construction. Third Street, Illinois Street, and Terry A. Francois Boulevard are the primary streets in the immediate project vicinity that are proposed to be used to connect to routes leading to/from Interstate 280, Interstate 80 and U.S. Highway 101 during construction. Truck access driveways at the project site would be from multiple locations on South Street (three driveways), Terry A. Francois Boulevard (two driveways), and 16th Street (two driveways). The location of the midblock driveway on South Street between Third Street and Bridgeview Way would shift as construction proceeds (i.e., the driveway would be closer to Third Street for the first three months of construction, and closer to Bridgeview Way for the remainder of the

[23] The Mission Bay Good Neighbor Policy specifies that pile driving or other noise generating activity (80 dBA at a distance of 100 feet) shall be limited to 8:00 am to 5:00 pm, Monday through Friday. No pile driving or other extreme noise generating activity is permitted on Saturday, Sundays and holidays.

construction period). The number of driveways that would be in use at any one time would depend on the construction phase.

Construction workers not utilizing available public transit options are expected to either carpool and/or use public parking in the project site vicinity.

Construction Employment

Table 3-6 summarizes the estimated project construction jobs. The number of construction workers present on-site daily would vary, depending on the specific construction activities being performed and overlap between construction phases. During peak overlapping construction periods, there would be between approximately 330 and 700 construction workers at the project site.

TABLE 3-6
PROJECT CONSTRUCTION EMPLOYMENT

Construction Work	Average / Peak Number of Workers
Entire Site	
Demolition	10 / 12
Excavation and Shoring	25 / 30
Event Center	
Foundation and Below-Grade Construction	100 / 125
Base Building	200 / 250
Exterior Finishing	50 / 75
Interior Finishing	150 / 300
Garage / Podium	
Foundation and Below-Grade Construction	50 / 75
Base Building	50 / 75
Northwest Tower	
Base Building	40 / 60
Exterior Finishing	10 / 15
Interior Finishing	100 / 150
Southwest Tower	
Base Building	40 / 60
Exterior Finishing	10 / 15
Interior Finishing	100 / 150
Entire Site	
Street Improvements	40 / 50

SOURCE: Mortenson Clark Joint Venture, 2014

Construction Equipment

It is expected that track-mounted cranes and track-mounted drill rigs would be used at the project site for drilling the soil-cement cut off wall, and for augercast pile installation for the deep foundations. Tower cranes, track-mounted cranes and tire-mounted mobile cranes would be used for building construction, including but not limited to, steel erection, precast erection, and building façades. Other mobile equipment such as backhoes, front-end loaders, dump trucks, and forklifts would be used at the project site for a range of other construction tasks on the project site, including excavation, site clearing and grading, building construction, and/or hardscape and landscape materials installation. Project construction would generate off-site truck trips for deliveries of concrete and other building materials, transportation of construction equipment to and from the site, hauling soils and debris from the site, and street sweepers. A variety of other smaller mechanical equipment would also be used at the project site during the construction period, such as saw cutters, chopping saws, tile saws, stud impact guns, impact drills, torque wrenches, welding machines, and concrete boom pumps.

3.7 Graphic Exhibits of Proposed Project

A number of graphic exhibits depicting the proposed project development are presented in **Figures 3-16** to **3-23** for informational purposes.

3.8 Intended Uses of this SEIR and Approvals Required

This is a project-specific SEIR, intended to provide information about the environmental consequences of the proposed project in accordance with the requirements of CEQA. In addition to describing the proposed project and required approvals, this SEIR analyzes potential environmental impacts of the proposed project, identifies feasible mitigation measures where those impacts are significant, addresses cumulative adverse impacts to which the proposed project could make a substantial contribution, and evaluates alternatives to the project that could avoid or substantially reduce significant impacts while still meeting most of the project's basic objectives. See Chapter 2, Introduction, for a more detailed description of CEQA requirements.

Approvals or permits from the following agencies for project construction and/or long-term operation are anticipated at this time:

- Certification of the Final SEIR by the OCII Commission
- Action by the Board of Supervisors on any appeals of the OCII Commission's certification of the FSEIR
- Approval by the OCII Executive Director of secondary use findings of consistency for the proposed event center
- Approval by the OCII Commission of a new Major Phase for Blocks 29-32, and related conditions of approval

- Approval by the OCII Commission of Combined Basic Concept and Schematic Designs (Schematic Designs) for the project
- Approval by the OCII Commission (and any other City departments as required under the Mission Bay South Plan, OPA, Interagency Corporation Agreement, and associated documents) of: amendments to the Mission Bay South Design for Development, and modifications to the Mission Bay South Signage Master Plan and Mission Bay South Streetscape Plan, and conditions of approval.
- Approval by Mayor, Department of Public Works Executive Director and OCII Executive Director of any non-material changes to Mission Bay South Infrastructure Plan
- Entertainment Commission approval of applicable entertainment permits, including, but not limited to, a Place of Entertainment permit
- Planning Commission approval of office building Schematic Designs related to Proposition M allocation
- Port of San Francisco staff approval of changes to waterfront infrastructure, including roadway striping
- San Francisco MTA/Department of Public Works approval for reconfiguration of adjacent streets
- San Francisco Department of Public Works and Board of Supervisors approval of subdivision maps, including street vacations, acceptance of public improvements and right-of-way dedications, and encroachment permits to the extent required
- Termination or relocation of existing City-reserved easements by applicable City departments, including the San Francisco Public Utilities Commission, to the extent required
- San Francisco Department of Building Inspection approval of a building/site permit, and related approvals from other City departments including the SFPUC for utility connections
- Approval from the University of California to terminate a view easement extending 100 feet within the project site along the Campus Way axis (Please see Chapter 8, Third Street Plaza Project Variant for a description and analysis of a project variant where no structural development would be proposed within this view easement.)

SOURCE: Pfau Long Architecture, 2015

Note: Rendering also conceptually shows certain planned off-site cumulative development in project vicinity, including an illustrative design for Bayfront Park (placeholder only)

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 3-16

Aerial Rendering of Proposed Project from the Northwest

SOURCE: Pfau Long Architecture, 2015

Note: Rendering also conceptually shows certain planned off-site cumulative development in project vicinity, including an illustrative design for Bayfront Park (placeholder only)

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 3-17
Aerial Rendering of Proposed Project from the East

SOURCE: Pfau Long Architecture, 2015

Note: Rendering also conceptually shows certain planned off-site cumulative development in project vicinity.

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E: Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 3-18

Street-level Rendering of Proposed Project from the Northwest (Third Street at South Street)

SOURCE: Pfau Long Architecture, 2015

Note: Rendering also conceptually shows certain planned off-site cumulative development in project vicinity.

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 3-19
Street-level Rendering of Proposed Project
from the Southwest (Third Street at 16th Street)

For informational purposes/reference only

SOURCE: Pfau Long Architecture, 2015

Note: Rendering also conceptually shows certain planned off-site cumulative development in project vicinity.

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 3-20
Street-level Rendering of Proposed Project from the North (South Street)

SOURCE: Pfau Long Architecture, 2015

Note: Rendering also conceptually shows certain planned off-site cumulative development in project vicinity.

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 3-21
Street-level Rendering of Proposed Project from the South (16th Street)

For informational purposes/reference only

SOURCE: Manica Architecture, 2015

Note: Rendering also conceptually shows certain planned off-site cumulative development in project vicinity, including an illustrative design for Bayfront Park (placeholder only)

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 3-22
Street-level Rendering of Proposed Project from the East (Bayfront Park)

SOURCE: Manica Architecture, 2015

Note: Rendering also conceptually shows certain planned off-site cumulative development in project vicinity.

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 3-23

Street-level Rendering of Proposed Project from the Southeast
(on planned realigned Terry A. Francois Boulevard at 16th Street)

For informational purposes/reference only

CHAPTER 4
Plans and Policies

4.1 Introduction and Overview

In accordance with CEQA Guidelines Section 15125(d), this chapter provides a summary of the plans and policies of the City and County of San Francisco Office of Community Investment and Infrastructure (OCII), City and County of San Francisco (CCSF), and regional, state, and federal agencies that have policy and regulatory control over the project site. Although some of the plans and policies relate to regulations under the jurisdiction of these agencies, the primary discussion of regulations pertinent to the proposed project and its environmental effects is included in Chapter 5, Environmental Setting, Impacts, and Mitigation Measures, under the regulatory framework subsection of each environmental topic.

Development of the project is subject to approvals by the primary agency with jurisdiction over the project site, which is OCII. Other agencies with plans and policies applicable to the project site include the Metropolitan Transportation Commission (MTC), San Francisco Bay Regional Water Quality Control Board (RWQCB), Bay Area Air Quality Management District (BAAQMD), and Association of Bay Area Governments (ABAG).

Policy conflicts do not, in and of themselves, indicate a significant environmental effect within the context of CEQA environmental review, in that the intent of CEQA is to determine physical environmental effects associated with a project. Many of the plans of OCII, CCSF, and the other relevant jurisdictions contain policies that address multiple goals pertaining to different resource areas. To the extent that physical environmental impacts of a proposed project may conflict with one of the goals related to a specific resource topic, such impacts are analyzed in this SEIR in that respective topical section in Chapter 5, such as Section 5.2 (Transportation and Circulation), Section 5.4 (Air Quality), Section 5.4 (Greenhouse Gas Emissions), and Section 5.9 (Hydrology and Water Quality).

4.2 San Francisco Plans and Policies

4.2.1 San Francisco General Plan

The *San Francisco General Plan* (*General Plan*) provides general policies and objectives to guide land use decisions. The General Plan contains 10 elements (Commerce and Industry, Recreation and Open Space, Housing, Community Facilities, Urban Design, Environmental Protection, Transportation, Air Quality, Community Safety, and Arts) that set forth goals, policies, and objectives for the physical development of the City.

On September 17, 1998, by Resolution No. 14702, the Planning Commission determined that the Mission Bay South Redevelopment Plan provides for a type, intensity, and location of development that is consistent with the overall goals, objectives, and policies of the *General Plan*. Therefore, the project's consistency with the Mission Bay South Redevelopment Plan (discussed below) would ensure that the project would not obviously or substantially conflict with *General Plan* goals, policies, or objectives. The *General Plan* elements that relate to the unique characteristics and considerations of the proposed project are discussed below.

Commerce and Industry Element. According to the *General Plan*, "the *Commerce and Industry Element* sets forth objectives and policies that address the broad range of economic activities, facilities and support systems that constitute San Francisco's employment and service base." The element calls for managing economic growth to ensure enhancement of the total city environment, maintaining a diverse economic base, and providing employment opportunities for city residents. Objective 8 specifically states that the City shall enhance its position as a national center for visitor trade because visitor trade employs, directly, and indirectly, more residents than any other economic sector. The proposed project would not obviously conflict with the Commerce and Industry Element.

Transportation Element. The Transportation Element comprises sections relating to General Transportation, Regional Transportation, Congestion Management, Vehicle Circulation, Transit, Pedestrians, Bicycles, Citywide Parking and Goods Movement. Each section consists of objectives and policies regarding a particular segment of the master transportation system and related maps which describe key physical aspects. The element specifically calls for the City to provide for a balanced, multi-modal transportation system that is consistent with planned land use. It states that the City shall encourage development that efficiently coordinates land use with transit service, establish frequent and convenient transit service for large sporting facilities and event centers, and provide bicycle parking for such centers. The proposed project would not obviously conflict with the Transportation Element.

Recreation and Open Space Element. The Recreation and Open Space Element (ROSE) indicates that the area surrounding the project site and vicinity has a "lesser need" for open space acquisition and renovation. This is due to the inclusion of proposed open spaces in the Mission Bay area, as well as the relatively low residential population compared to other areas of the City. The element specifically delineates Bayfront Park, east of the project site, as a "proposed open space," and it designates Terry A. François Boulevard as a "green connection." The proposed project would not obviously conflict with the ROSE.

Urban Design Element. As described in the *General Plan*, the Urban Design Element relates to the physical character and order of the city, and the relationship between people and their environment. The element specifically calls for centers of activity and major destination points to be made more prominent through design of street features and other means (Policies 1.6 and 1.8), and for local centers for shopping or congregations of people to stand out in their areas (Policy 4.6). The element also states that the City shall recognize the special urban design issues posed in development of larger properties (Policy 3.6).

The Urban Design Element also specifically addresses protection of major views in the City (Policy 1.1), and moderation of new development to complement the city pattern (Objective 3) by avoiding extreme contrasts in color, shape, and other characteristics (Policy 3.2). Under this objective, the element states that low buildings along the waterfront contribute to the gradual tapering of height from the hills to the water that is characteristic of the City. Larger building with civic importance, providing places of assembly and recreation, may be appropriate along the waterfront at important locations. The element states that building height should relate to the important attributes of the city pattern and to the height and character of existing development (Policy 3.5), and the bulk of buildings should not overwhelm or dominate in appearance (Policy 3.6). The proposed project heights would be within the maximum heights called for in the Mission Bay South Redevelopment Plan and Design for Development documents (discussed below). However, the project's event center would exceed the 90-foot height limit on Blocks 30 and 32 set forth in the Design for Development, which would be addressed through an amendment to the Design for Development. The proposed project would not obviously conflict with the Urban Design Element.

4.2.2 San Francisco Planning Code

As stated in Chapter 3, Project Description, the Mission Bay South Redevelopment Plan and Design for Development for Mission Bay South Project Area, together, constitute the regulatory land use framework for the project site, and they supersede the City's *Planning Code*, except as otherwise specifically provided for in those documents and associated documents for implementing the Mission Bay South Redevelopment Plan. The project would not require variances from or changes to the Planning Code or Zoning Map.

Planning Code Section 321

Section 321 implements the City's annual limit on office construction, which is set at 950,000 square feet per calendar year, with a subset of 75,000 square feet reserved for buildings smaller than 50,000 square feet. The limit applies to all office space of a certain size citywide, not just downtown. Buildings smaller than 25,000 square feet are excepted; however, OCII projects are included, as are projects within San Francisco that are under the jurisdiction of the State of California and federal agencies, including the Presidio Trust and National Park Service. Square footage not allocated during any given year is added to the overall allocation for succeeding years. The Mission Bay South Redevelopment Plan, described below, states that no office development shall be approved that would cause the applicable annual limitation to be exceeded. As of November 14, 2014, the Planning Department's inventory of office space showed 3.02 million square feet of space available for large projects (those 50,000 square feet and larger), with an additional 1.27 million square feet available for smaller projects (25,000 to 49,999 square feet).[1]

1 San Francisco Planning Department, "Office Development Annual Limitation (Annual Limit) Program Update November 14, 2014. Allocations in square feet of gross floor area, as defined in *Planning Code* Sec. 102.9 Available at: http://www.sf-planning.org/Modules/ShowDocument.aspx?documentID=9276; reviewed December 15, 2014.

As described further below under "Mission Bay South Redevelopment Plan," the Planning Commission adopted findings that the office development contemplated by the plan promotes public welfare, convenience and necessity. No office development contemplated under the plan may be disapproved for inconsistency with Planning Code Sections 320 – 325, provided that the annual office space limitation contained in Planning Code Section 321 is not exceeded.

In 2008, the Planning Commission established the Alexandria Mission Bay Life Sciences and Technology Development District (Alexandria District), with a pooled allocation of 1.12 million gross square feet (later modified to 1.35 million square feet) of office space to be used both by previously allocated office projects and future allocations at designated parcels in the district, in accordance with Planning Code Section 321. The Alexandria District generally includes properties along the east side of Third Street between Mission Bay Boulevard and Mariposa Street (Blocks 26, 27, 29–32, 33, and 34) as well as properties west of Owens Street (Blocks 41–43). Blocks 29–32 currently have an allocation of 677,020 square feet of office space, none of which has been built.[2,3] The proposed project's approximately 605,000 square feet of office space would be accommodated within this total.

The Accountable Planning Initiative

In November 1986, the voters of San Francisco approved Proposition M, the *Accountable Planning Initiative*, which added Section 101.1 to the *Planning Code* to establish the following eight priority policies:

- Preservation and enhancement of neighborhood-serving retail uses;
- Protection of neighborhood character (discussed in Appendix NOP-IS, Section E.1, Land Use and Land Use Planning, Question 1c);
- Preservation and enhancement of affordable housing (discussed in Appendix NOP-IS, Section E.3, Population and Housing, Question 3b, with regard to housing supply and displacement issues);
- Discouragement of commuter automobiles (discussed in Chapter 5, Section 5.2, Transportation and Circulation);
- Protection of industrial and service land uses from commercial office development and enhancement of resident employment and business ownership (discussed in Appendix NOP-IS, Section E.1, Land Use and Land Use Planning, Question 1c);
- Maximization of earthquake preparedness (discussed in Appendix NOP-IS, Section E.14, Geology and Soils, Questions 14a through 14d);
- Landmark and historic building preservation (discussed in Appendix NOP-IS, Section E.4, Cultural and Paleontological Resources, Question 4a); and

2 *Ibid*.
3 San Francisco Planning Department, "Letter RE: Property Transfers within the Alexandria Life Sciences & Technology District," March 21, 2011.

- Protection of open space (discussed in Chapter 5, Section 5.6, Wind and Shadow,; and in Appendix NOP-IS, Section E.10, Recreation, Questions 10a and 10c).

Through adoption of Resolution No 14702 in 1998, the Planning Commission determined that the Mission Bay South Redevelopment Plan provides for a type, intensity, and location of development that is consistent with these priority policies. Therefore, the proposed project's consistency with the Mission Bay South Redevelopment Plan (below) would ensure that the proposed project would not obviously conflict with the Accountable Planning Initiative.

4.2.3 Mission Bay South Redevelopment Plan

The Mission Bay South Redevelopment Plan (South Plan) establishes the basic land use controls for the Mission Bay South Plan Area. The major objectives of the South Plan are to eliminate blighting influences and correct environmental deficiencies; retain and promote academic and research activities associated with the University of California San Francisco (UCSF), Mission Bay campus; assemble land into parcels suitable for modern, integrated development; re-plan, redesign, and develop undeveloped and underdeveloped areas; provide flexibility to respond to market conditions; provide opportunities for participation by owners in redevelopment of their properties; strengthen the community's supply of housing; strengthen the economic base of the Plan Area; facilitate emerging commercial-industrial sectors; facilitate public transit opportunities; provide land for publicly accessible uses; and achieve the objectives expeditiously.

The South Plan includes the Redevelopment Land Use Map, which illustrates the location of Plan Area boundaries and proposed land uses to be permitted, generally consistent with the land uses presented in the 1990 Mission Bay Plan. See Figure 3-3, Land Uses in the Mission Bay Redevelopment Plan, in Chapter 3, Project Description. Pursuant to South Plan Section 302.4, the Commercial Industrial/Retail land use district that encompasses Blocks 29-32 principally permits office and retail uses, among other uses. Secondary assembly and entertainment uses are also permitted if the use generally conforms with redevelopment objectives and planning and design controls, as well as if the use is determined to make a positive contribution to the character of the Plan Area, based on a finding by the Executive Director of OCII that the use will provide a development that is necessary or desirable for, and compatible with, the neighborhood or community.

Regarding commercial industrial floor area controls, the South Plan limits floor area ratio (FAR) for commercial industrial and commercial industrial/retail to a maximum of 2.9 to 1, averaged over the entire area of those land use districts combined. The South Plan permits a maximum of 5 million square feet of leasable[4] mixed use office, research and development, and light industrial use space is permitted in "Zone A," which comprises Blocks 26–34, 36, and 38–43, (see Chapter 3, Figure 3-3). There are approximately 1,050,000 leasable square feet remaining after accounting for the approved and anticipated projects in Zone A. Using the calculation of leasable square feet

[4] The South Plan defines "leasable floor area" as the floor rentable area, as defined and calculated in the 1996 Building Owners and Managers Association International (BOMA) publication "Standard Method of Measuring Floor Area in Office Buildings."

required in the South Plan, the proposed project would entail construction of 1,010,400 leasable square feet, which would be accommodated within Zone A's remaining total permitted leasable square footage.

The South Plan also limits the total neighborhood-serving and city-serving retail space[5] to be developed in Zone A and sites designated Commercial or Mission Bay South Residential. Up to 180,000 leasable square feet of neighborhood-serving retail and city-serving retail is permitted in Zone A, of which 50,464 square feet remains. The project's proposed 29,732 leasable square feet of neighborhood-serving retail would be accommodated within this remaining total square footage. Zone A is permitted 20,700 leasable square feet of city-serving retail, none of which has been built or allocated. The project's 20,700 leasable square feet of city-serving retail would be accommodated within this remaining total square footage.

As stated above under "San Francisco Planning Code," the South Plan indicates that no office development in the South Plan shall be approved if it would cause the annual limitation on office space contained in Planning Code Section 321 to be exceeded. Blocks 29–32 currently have an allocation of 677,020 square feet of office space, none of which has been built.[6,7] The proposed project's approximately 605,000 square feet of office space would be accommodated within this total. Further, Mission Bay South Redevelopment Plan Section 304.11 states that no project may be disapproved for inconsistency with Planning Code Sections 320–325, provided that the annual office space limitation is not exceeded and that the Planning Commission considers the design of the particular office development project to confirm that it is consistent with the Commission's findings contained in Resolution 14702.

The South Plan indicates that the maximum height within the Plan Area is 160 feet. Within that height limit, OCII is authorized to establish height limits of buildings, land coverage, density, setbacks, design and sign standards, and other criteria, as set forth in the Design for Development document (discussed below).

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5 The South Plan defines "local-serving business" as a "business provides goods and/or services which are needed by residents and workers in the immediately surrounding neighborhood to satisfy basic personal and household needs on a frequent and recurring basis, and which if not available would require trips outside of the neighborhood. Also referred to as 'neighborhood-serving' business." The South Plan does not specifically define "City-serving retail," but it is generally understood to include retail spaces patronized by customers from both inside and outside the neighborhood.

6 San Francisco Planning Department, "Office Development Annual Limitation (Annual Limit) Program Update, November 14, 2014. Allocations in square feet of gross floor area, as defined in *Planning Code* Sec. 102.9 Available at: http://www.sf-planning.org/Modules/ShowDocument.aspx?documentID=9276; reviewed December 15 2014.

7 San Francisco Planning Department, "Letter RE: Property Transfers within the Alexandria Life Sciences & Technology District," March 21, 2011.

4.2.4 Design for Development for the Mission Bay South Project Area

The Design for Development for Mission Bay South Project Area (South Design for Development) is the companion document to the South Plan. It contains design standards and design guidelines through establishment of height zones. Blocks 29-32 fall within Height Zone 5, which encompasses the area bounded by Mission Bay Boulevard to the north, Third Street to the west, Mariposa Street to the south, and the San Francisco Bay to the east. The proposed project would be generally consistent with the major development standards for Height Zone 5, including maximum tower height and developable area.

As described in Chapter 3, Project Description, due to the unique nature of the event center component of the project, amendments to the Design for Development are required to bring the proposed project into compliance. To the extent that such amendments would lead to physical environmental impacts related to a specific resource topic, such impacts are analyzed in this SEIR in that respective topical section in Chapter 5, such as Section 5.2, Transportation and Circulation, Section 5.4, Air Quality, Section 5.5, Greenhouse Gas Emissions, and Section 5.9, Hydrology and Water Quality. As noted in the Introduction (Section 2.8), the proposed project meets the criteria of Senate Bill 743 for which aesthetics and parking are no longer to be considered in determining if a project has the potential to result in significant environmental effects.

The proposed project would include amendments to the Design for Development that would define Arena, Arena Building, Arena Project, and the Blocks 29–32 Arena Overlay Zone (Overlay Zone), with associated design standards and guidelines. The discussion below describes the primary existing Design for Development standards and guidelines, and where applicable, proposed amendment to the standards to create the Blocks 29–32 Arena Overlay Zone that would be required to bring the proposed project into compliance with the Design for Development.

Height

Height Zone 5 has a maximum base height of 90 feet and a maximum tower height of 160 feet, and commercial/industrial uses must be one of those two heights. Further, towers (buildings taller than 90 feet) are not permitted on Blocks 30 and 32. The proposed event center would exceed 90 feet in height, and therefore would not meet this requirement. The proposed amendment would allow an Arena Building not to exceed 135 feet in height within the Overlay Zone. The existing limitations on base height, midrise height, and tower height would not apply to the Arena Building.

Towers

A maximum of three towers are permitted with a maximum height and bulk within Height Zone 5; towers must be separated by at least 100 feet when located on the same block, and tower widths on Third Street cannot exceed 160 feet. In addition, no intersection can have more than two towers within 50 feet of the corner.

To accommodate the proposed project, the Design for Development would be amended to allow an Arena Building in the Overlay Zone. The proposed amendment would allow an additional tower (for a maximum of four towers plus the Arena Building within Height Zone 5). The amendment would also clarify the tower separation requirements to accommodate the proposed distances between the towers and the Arena Building. The amendment would increase to three the number of towers allowed within 50 feet of the intersection of South Street and Third Street.

Bulk

Commercial/industrial buildings have a permitted maximum floor plate of 20,000 square feet, and a maximum length of 200 feet, for all floors above 90 feet. The proposed amendment would create a bulk allowance for the Arena Building.

Streetwalls and Setbacks

In Height Zone 5, a minimum of 70 percent of the block length frontage is required along Third and 16th Streets. A 5-foot setback is required along Third Street, and a 20-foot setback is required on 16th Street. Streetwalls must be at least 15 feet tall, and no more than 90 feet tall. The amendment would indicate that the minimum length, minimum height and maximum height streetwall standards shall not apply to the Arena Project, subject to findings by the OCII Commission that the Arena Project is, on balance, consistent with Overlay Zone Design Guidelines. The amendments would further state that the 5-foot setback requirement on the east side of Third Street would not be applied to the office tower at the northwest corner of Block 29, and the Arena Building, including minor landscape features, would be permitted to occupy a portion of the 20-foot required setback on the north side of 16th Street.

Other Amendment Provisions

Other proposed amendments to the South Design for Development may be required to accommodate final project design. Such amendments may include the following:

i. Allowing parking within 600 feet of the Arena Project entrance to qualify as off-site parking for an Arena Project;

ii. Allowing shared parking among Arena Project uses (for example, parking spaces provided for daytime office use may be used by the Arena Building on nights and weekends);

iii. Basing parking calculations within the Overlay Zone upon the total aggregate square footage by applicable structure (and in the case of the Arena, total number of seats) rather than applied to any single tenant;[8]

iv. The minimum and maximum number of parking spaces for the Arena Building will be established based on number of seats; and

v. Modifying the required loading requirements to accommodate the number and configuration of off-street loading spaces proposed by the project.

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[8] Note that this is consistent with the existing Design for Development, but the amendment includes the reference to the calculation of Arena Building requirements based on number of Arena seats.

See Chapter 5, Section 5.2, Transportation and Circulation, for a discussion of the traffic and parking provisions.

4.3 Regional Plans and Policies

The *Plan Bay Area*, which includes the region's Sustainable Communities Strategy (SCS), is a collaboration led by the ABAG and the MTC, in partnership with the BAAQMD and the San Francisco Bay Conservation and Development Commission (BCDC). *Plan Bay Area*, adopted by ABAG and MTC in July 2013, is the region's first integrated land use and transportation plan, combining elements of ABAG's former *Projections* series of housing and employment growth forecasts and MTC's former stand-alone *Regional Transportation Plan*. The Plan calls for concentrating housing and job growth around transit corridors, particularly within areas identified by local jurisdictions as Priority Development Areas (PDAs). *Plan Bay Area* also specifies strategies and investments to maintain, manage, and improve the region's multi-modal transportation network and proposes transportation projects and programs to be implemented with reasonably anticipated revenue. The Plan will be updated every four years. The project site, like much of eastern San Francisco, is within a PDA, where growth is anticipated and planned for in proximity to transit (see also the discussion on Population and Housing, in Appendix NOP-IS, Initial Study, Section E.3). The proposed project would not conflict with any projects in the regional transportation plan. Therefore, the proposed project would be consistent with *Plan Bay Area*.

Other regional plans pertinent to the proposed project include:

- BAAQMD's *2010 Clean Air Plan* (2010 CAP) demonstrates how the San Francisco Bay Area will reduce emissions and decrease ambient concentrations of harmful pollutants, achieve compliance with the state ozone standards, and reduce the transport of ozone and ozone precursors to neighboring air basins. The proposed project would include appropriate transportation, energy, and sustainability measures to reduce automobile trips, energy usage, and associated emissions and would not disrupt or hinder implementation of control measures identified in the 2010 CAP. Furthermore, the project sponsor has agreed to implement mitigation measures that would reduce pollutant emissions, including offsetting emissions generated by construction and operations of the project. Therefore, as described in detail in Section 5.4, Air Quality, the project would not conflict with the 2010 CAP.
- The San Francisco RWQCB's *Water Quality Control Plan for the San Francisco Bay Basin* (commonly referred to as the *Basin Plan*) guides water quality control planning in the San Francisco Bay Basin. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes implementation programs to achieve water quality objectives. As described further in Chapter 5, Section 5.9, Hydrology and Water Quality, as well as Section E.14 of the Initial Study, the proposed project would not result in substantial water quality effects; thus the project would not conflict with the Basin Plan.

The project would not obviously or substantially conflict with any environmental plan or policy adopted for the purpose of avoiding an environmental effect.

CHAPTER 5
Environmental Setting, Impacts, and Mitigation Measures

5.1 Impact Overview

This chapter describes the environmental setting, assesses impacts, and identifies measures that would avoid or lessen the severity of impacts of the proposed multi-purpose event center and mixed-use development at Blocks 29-32 in the Mission Bay South Redevelopment Plan Area of San Francisco. The chapter focuses on those topics that were identified in the Initial Study (see Appendix NOP-IS) with the potential to have either new significant effects or substantially more severe significant impacts than were previously identified in the *Mission Bay Final Subsequent Environmental Impact Report* (Mission Bay FSEIR) due to implementation of the currently proposed project. Topics for which no new or more significant impacts were identified in the Initial Study are not analyzed in this chapter.

This Impact Overview section outlines the issues analyzed in this chapter, describes the overall approach to the impact analysis, explains the significance determinations and terminology used in the impact analysis, and provides the basis for the cumulative impact analysis.

5.1.1 Scope of Analysis, Issues Scoped Out in the Initial Study

The Initial Study (see Appendix NOP-IS) for the proposed project at Blocks 29–32 was prepared in accordance with the CEQA Guidelines Section 15063, which provides for preparation of an initial study to determine if a project may have a significant effect on the environment. The Initial Study determined that the following topics were adequately analyzed in the Mission Bay FSEIR such that the proposed project would have no new significant impacts or no substantially more severe significant impacts than those previously found significant on these resources: Land Use; Population and Housing; Cultural and Paleontological Resources; Recreation; Air Quality (odors); Utilities and Services Systems (water supply and solid waste); Public Services (schools, parks, and other services); Biological Resources; Geology and Soils; Hydrology and Water Quality (construction water quality, groundwater, drainage, flooding, and inundation); Hazards and Hazardous Materials; Mineral and Energy Resources; and Agricultural and Forest Resources.[1] In

[1] As described in Chapter 2, Introduction, and in the Initial Study, impacts related to Aesthetics are not analyzed in the Initial Study or this SEIR because under CEQA (Public Resources Code Section 21099), aesthetics impacts of a mixed-use or employment center project on an infill site located within a transit priority area are not to be considered significant impacts, and therefore, no impact analysis is required.

some cases, the Initial Study identified mitigation measures in these topic areas that would reduce potentially significant impacts to a less-than-significant level to support the determination that under these resource areas, the proposed project would have no new significant impacts or no substantially more severe significant impacts than those previously identified in the Mission Bay FSEIR. Therefore, none of the topics addressed in the Initial Study are analyzed in this chapter of the SEIR.

Chapter 5 is organized as follows and focuses on the environmental resource topics listed below:

- Section 5.1, Impact Overview
- Section 5.2, Transportation and Circulation
- Section 5.3, Noise and Vibration
- Section 5.4, Air Quality (air quality planning, criteria pollutant emissions, and health risk)
- Section 5.5, Greenhouse Gas Emissions
- Section 5.6, Wind and Shadow
- Section 5.7, Utilities and Service Systems (wastewater and stormwater systems)
- Section 5.8, Public Services (police and fire services)
- Section 5.9, Hydrology and Water Quality (wastewater, stormwater, and sea level rise).

5.1.2 Overall Approach to Impact Analysis

The impact analysis for all resource topics is based on the detailed, project-specific information presented in Chapter 3, Project Description. In general, the impact analysis is divided into two main groups: construction-related impacts and operational impacts. The first group covers impacts attributable to construction-related activities, all of which would be confined within the duration of the construction period; the second group, operational impacts, covers the long-term effects associated with the full use of the project structures and features following completion of construction. Further breakdown under these main groups varies for each resource topic, with the intent of focusing the impact analysis on those aspects of the project that would result in adverse physical effects on the environment.

As described in Chapter 2, Introduction, this SEIR is a project-level EIR that is tiered from a previously certified program-level EIR, namely the Mission Bay FSEIR. As a project-level EIR and consistent with CEQA Guidelines Section 15125(a), the impact analysis is generally based on potential physical effects of the project compared to existing or baseline conditions of the physical environment at the project site at the time of publication of the Notice of Preparation (NOP), which was in November 2014. In a few instances, the baseline conditions are extended to acknowledge projects or activities that were in progress at the time of publication of the NOP but expected to be completed prior to the scheduled start date of the proposed project. For example, the baseline conditions for the project setting assumes the operation of Phase 1 of the UCSF Medical Center at Mission Bay, which opened on February 1, 2015.

As required for a project-level EIR, the impact analysis addresses construction and operation of the proposed development at Mission Bay Blocks 29–32, and none of the other aspects of the Mission

Bay South Redevelopment program. For example, although development of the project site would trigger realignment of Terry A. Francois Boulevard as well as construction of Bayfront Park east of the project site, this chapter does not analyze the construction- or operational-related environmental effects of the street realignment or the park development (other than with respect to cumulative construction impacts) because the environmental impacts of these activities were analyzed in the Mission Bay FSEIR.

As a Subsequent EIR (SEIR) to the Mission Bay FSEIR certified in 1998, this SEIR identifies and considers all mitigation measures that were identified in the 1998 Mission Bay FSEIR and determines their applicability to the currently proposed project. In some cases, mitigation measures have already been implemented, either in their entirety or in part, in which case those measures are considered part of the existing conditions. Otherwise, the impact analysis in this SEIR does not assume that mitigation measures from the Mission Bay FSEIR would be implemented as part of the proposed project. Instead, the SEIR impact analysis determines if the mitigation measures from the Mission Bay FSEIR would apply to the proposed project and would still be considered appropriate, in which case those Mission Bay FSEIR mitigation measures are re-iterated as project-level mitigation measures for the proposed project. Appendix MIT of this SEIR lists all of the mitigation measures from the Mission Bay FSEIR and indicates which measures are applicable to the proposed project.

In addition, because this SEIR is also a subsequent EIR to the Mission Bay FSEIR, the impact analysis also considers: whether the proposed project includes substantial changes from what was analyzed in the Mission Bay FSEIR; whether substantial changes have occurred with respect to the circumstances under which the project is undertaken compared to what was assumed in the Mission Bay FSEIR; or whether new information of substantial importance, which was not known and could not have been known at the time of certification of the Mission Bay FSEIR, would affect the impact analysis. Thus, the project impacts are also analyzed with regard to the potential for the proposed project to contribute to *new* significant impacts or substantially *more severe* significant impacts than those identified as significant in the Mission Bay FSEIR.

5.1.3 Organization of the Impact Analyses

Each topical section of this chapter is organized with the following elements:

- **Introduction.** This subsection summarizes the applicable topic analysis and its relevance to the proposed project.
- **Summary of Mission Bay FSEIR Section.** This section summarizes how the topic was addressed in the Mission Bay FSEIR as it related to Blocks 29-32, including identifying any applicable mitigation measures from the Mission Bay FSEIR and conclusions reached regarding significance of effects.
- **Setting.** This subsection describes the existing physical environmental conditions or the baseline condition in the project area with respect to each resource topic at an appropriate level of detail to allow the reader to understand the impact analysis.

- **Regulatory Framework.** This subsection, where applicable, describes the relevant laws and regulations that apply to protecting the environmental resources within the project area and the governmental agencies responsible for enforcing those laws and regulations.

- **Impacts and Mitigation Measures.** This subsection evaluates the potential for the proposed project to result in adverse effects on the physical environment described in the setting. It identifies the significance of each impact (see definitions below) based on topic-specific significance criteria and thresholds. For impacts determined to be significant, the impact analysis identifies feasible mitigation measures that would avoid or reduce the severity of the identified impact. The analysis describes all mitigation measures applicable to the proposed project, whether they are the same as those specified in the Mission Bay FSEIR, are updated measures, or new mitigation measures. The project sponsor— GSW Arena LLC (GSW)—has reviewed the identified mitigation measures and has agreed to implement them if the project is approved.

  In some cases, when an impact is determined to be less than significant, the analysis identifies *improvement* measures. Similar to mitigation measures, improvement measures would reduce the severity of identified impacts. Unlike mitigation measures, however, improvement measures are not required under CEQA, but this SEIR identifies improvement measures as feasible ways to ameliorate less-than-significant impacts. All improvement measures identified in this SEIR would be incorporated into conditions of project approval by OCII (see Chapter 3, Project Description, Approvals Required), and the project sponsor has agreed to implement them if the project is approved.

  The Impacts and Mitigation Measures subsection is further subdivided into the following:

  - ***Significance Thresholds*** for evaluating the environmental impacts are defined at the beginning of each impact analysis section and are specific to each environmental resource topic. The impact significance criteria used in this SEIR are based on San Francisco Planning Department protocol and CEQA Guidelines Appendix G. Significance criteria used in the Initial Study to focus out certain issues are not included; but the reader is referred to the Initial Study in Appendix NOP-IS for those criteria and associated impact analyses.

  - ***Approach to Analysis*** describes the general approach and methodology used to apply the significance thresholds in evaluating the impacts of the project. The methodology for applying significance thresholds provides the basis for the impact analysis, which could be either qualitative or quantitative, depending on the specific impact. The methodology identifies use of applicable regulatory guidelines, thresholds, standards, or accepted professional practices or protocols used to assess the nature and severity of environmental impacts. This section also explains the approach to the analysis of cumulative impacts under this impact section.

  - ***Impact Evaluation*** presents the project-specific analyses of impacts of the proposed project, with specific impact areas discussed under individually numbered impact statements. Each of the numbered impact statements is followed by a discussion and analysis of the various components of the proposed project with potential for physical environmental effects. The conclusion of each impact analysis is expressed in terms of the impact significance, which is discussed below. For significant or potentially significant impacts, the impact discussion identifies feasible mitigation measures, numbered corresponding to the impact number. In some cases, for impacts determined to be less than significant, *improvement* measures are recommended to reduce or avoid impacts. Unlike mitigation measures, implementation of improvement measures is not required under CEQA because they only apply to impacts determined to be less than significant. However, as stated above, all improvement measures identified in this SEIR would be incorporated into conditions of approval if the project is approved. The numbering of the mitigation and improvement measures corresponds with the number of the impact statement to which the measure applies, with a prefix of "M" or "I" for mitigation and improvement measures, respectively.

Following the impact evaluation, there is a qualitative comparison of the impact conclusions in this SEIR with the comparable impact conclusion from the Mission Bay FSEIR.

– ***Cumulative Impacts*** considers the effects of the proposed project together with potential effects of other past, present, or reasonably foreseeable future projects within the same geographic scope as the project's impacts. The analysis of cumulative impacts under each resource topic is based on the same setting, regulatory framework, and significance thresholds as the direct impacts. Additional mitigation measures are identified if the analysis determines that the project's contribution to a cumulative, adverse impact would be considerable (i.e., significant). The overall assumptions to the cumulative impact analysis for all topics are described in Section 5.1.5, below.

5.1.4 Significance Determinations

One of the main purposes of an EIR is to identify the *significant* effects on the environment of a project and to indicate the manner in which those significant effects can be mitigated or avoided.[2] Mitigation measures are not required for effects that are not found to be significant.[3] As defined by CEQA Guidelines section 15382, "significant effect on the environment" means a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including the land, air, water, or ambient noise at or near the project site. The significance criteria and thresholds identified under each resource topic, based on San Francisco Planning Department protocol and CEQA Guidelines Appendix G, are used to determine whether or not an effect would be substantial or potentially substantial. In accordance with CEQA, an economic or social change by itself is not considered a significant effect on the environment, although a social or economic change related to a physical change may be considered in determining whether the physical change is significant.

The conclusion of each impact analysis provides a significance determination to indicate if mitigation measures are warranted. The categories used to designate impact significance are as follows:

- **No Impact (NI).** An impact is considered not applicable (no impact) if there is no potential for impacts, or if the environmental resource does not occur within the project area or the

2 Public Resources Code section 21002.1(a)
3 California Code of Regulations section 15126.4(3)

area of potential effect. For example, there would be no impacts related to residential uses if there are no residential uses at or near the proposed project site.

- **Less-than-Significant Impact (LS).** This determination applies if there is a potential for some limited adverse impact, but not a substantial adverse effect that qualifies under the significance thresholds as significant. No mitigation is required for impacts determined to be LS.

- **Less-than-Significant Impact with Mitigation (LSM).** This determination applies if the project would or could result in a significant or potentially significant adverse effect when evaluated with respect to one or more significance thresholds, but feasible mitigation is available that would effectively reduce the impact to a less-than-significant level.

- **Significant Unavoidable Impact with Mitigation (SUM).** This determination applies if the project would result in a significant adverse effect when evaluated with respect to one or more significance thresholds, and there is feasible mitigation that could reduce the severity of the impact. However, for any of a number of reasons, the mitigation would not reduce the impact to a less-than-significant level, so the impact is considered significant and unavoidable even with mitigation. For example, there might be a feasible mitigation measure that would lessen the severity of an impact, but the residual effect after implementation of the measure would remain above the significance threshold. Another example would be a feasible mitigation measure with an unknown level of effectiveness.

- **Significant Unavoidable Impact (SU).** This determination applies if the project would result in a significant adverse effect when evaluated with respect to one or more significance thresholds, but no feasible mitigation is available, or implementation of the mitigation measure is not within the control of the project sponsor. Therefore, the impact is considered significant and unavoidable.

5.1.5 Approach to Cumulative Impact Analysis

5.1.5.1 CEQA Requirements for Cumulative Impact Analysis

Cumulative impacts, as defined in Section 15355 of the CEQA Guidelines, refer to two or more individual effects that, when taken together, are "considerable" or that compound or increase other environmental impacts. A cumulative impact from several projects is the change in the environment that would result from the incremental impact of the project added to the impacts of other closely related past, present, or reasonably foreseeable future projects. Pertinent guidance for cumulative impact analysis is provided in Section 15130 of the CEQA Guidelines:

- An EIR shall discuss cumulative impacts of a project when the project's incremental effect is "cumulatively considerable" (e.g., the incremental effects of an individual project are considerable when viewed in connection with the effects of past, current, and probable future projects, including those outside the control of the lead agency, if necessary).

- An EIR should not discuss impacts that do not result in part from the project evaluated in the EIR.

- A project's contribution is less than cumulatively considerable, and thus not significant, if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact.

- The discussion of impact severity and likelihood of occurrence need not be as detailed as for effects attributable to the project alone.

- The focus of analysis should be on the cumulative impact to which the identified other projects contribute, rather than on attributes of the other projects that do not contribute to the cumulative impact.

The cumulative impact analysis for each individual resource topic is described in each subsection of this chapter, immediately following the description of the direct project impacts and identified mitigation measures. Cumulative impacts are numbered sequentially, starting with the number '1' and preceded by "C-" (such as "Impact C-TR-1" for the first cumulative transportation impact).

Similar to the project impacts, cumulative impacts are also analyzed with regard to the potential for the proposed project to contribute to *new* significant cumulative impacts or substantially *more severe* cumulative impacts than those identified as significant in the Mission Bay FSEIR. The Mission Bay FSEIR used the year 2015 for the analysis of the full buildout of the Mission Bay Redevelopment Plan as well as for the cumulative impacts analysis, and cumulative impacts were assessed on the basis of regional population and employment projections for the year 2015 as determined by the Association of Bay Area Governments.

Two approaches to a cumulative impact analysis are provided in CEQA Guidelines Section 15130(b)(1): (a) the analysis can be based on a list of past, present, and probable future projects producing related or cumulative impacts; or (b) a summary of projections contained in a general plan or related planning document can be used to determine cumulative impacts. The projections model includes individual projects and applies a quantitative growth factor to account for other growth that may occur in the area.

The analyses in this SEIR employ both the list-based approach and a projections-based approach, depending on which approach best suits the individual resource topic being analyzed. For instance, the Wind analysis considers individual projects that are anticipated in the project site vicinity that may alter wind conditions in public spaces. By comparison, the Transportation and Circulation analysis relies on a citywide growth projection model that also encompasses many individual projects anticipated in and surrounding the project site vicinity, which is the typical methodology the San Francisco Planning Department applies to analysis of transportation impacts.

For the list-based approach, projects or plans that are relevant to the cumulative analysis include those that could contribute incremental effects on the same environmental resources and would have similar environmental impacts as those discussed in this SEIR. The following factors were used to determine an appropriate list of projects to be considered in the near-term cumulative impact analysis:

- **Similar Environmental Impacts.** A relevant project contributes to effects on resources that are also affected by the proposed project. A relevant future project or plan is defined as one that is "reasonably foreseeable," such as a proposed project for which an application has been filed with the approving agency or has approved funding, or an approved plan that amended the land use controls applicable to an adjacent neighborhood.

- **Geographic Scope and Location.** A relevant project is located within the defined geographic scope for the cumulative effect.

- **Timing and Duration of Implementation.** Effects associated with activities for a relevant project (e.g., short-term construction or demolition, or long-term operations) would likely coincide in timing with the effects of the proposed project.

5.1.5.2 Cumulative Projects for Operational Impacts

For topics using the list approach, in addition to those projects considered in the Mission Bay FSEIR cumulative analysis, the projects/programs listed below were not anticipated in the Mission Bay FSEIR and are considered in the cumulative analysis for operational impacts in this SEIR.

- **University of California at San Francisco (UCSF), 2014 Long Range Development Plan (LRDP), Mission Bay Campus.** UCSF recently updated its LRDP to guide future campus growth and development over the next 20 years. The 2014 LRDP updates information that was assumed in the Mission Bay FSEIR. The existing 60.2-acre UCSF Mission Bay campus site is located adjacent to Blocks 29-32, generally bounded by Mission Bay Boulevard South to the north, Owens Street to the west, Mariposa Street to the south, and Illinois and Third Streets to the east. Under the 2014 LRDP, the development capacity for the North Campus (see Figure 3-3, UCSF areas north of 16th Street) increases from 2,650,000 to 3,641,800 gsf. The 2014 LRDP would increase the square footage of the North Campus by 1,450,300 gsf, which includes 458,500 gsf of existing remaining entitlement from the 1996 LRDP, plus 991,800 gsf of new entitlement. On the South Campus (see Figure 3-3, UCSF areas south of 16th Street and west of Third Street), construction of a 170,000-gsf cancer outpatient building is anticipated by 2019, which will complete Phase 1 of the UCSF Medical Center at Mission Bay. This will bring the total space for Phase 1 to 993,500 gsf. Phase 2 facilities will be located on the west side of the South Campus, across the Fourth Street Public Plaza. Phase 2 of the Medical Center at Mission Bay is planned for after 2035 as a 261-bed hospital with additional outpatient space, totaling 793,500 gsf. Development of the East Campus (see Figure 3-3, UCSF areas east of Third Street) would accommodate 500,000 gsf. As a result, the total anticipated development through 2035 with the proposed expansion of the Mission Bay campus site (North, South, and East campuses) would be 5,928,800 gsf. The Board of Regents of the University of California certified the Final EIR on the UCSF LRDP in November 2014.

- **Eastern Neighborhoods Program.** The Eastern Neighborhoods Program included changes in zoning controls and General Plan amendments for an approximately 2,200-acre area on the eastern side of the City. It is intended to encourage new housing while preserving sufficient land for light industrial and service industry (referred to collectively as "Production, Distribution, and Repair," or "PDR," uses) in four neighborhoods: the Mission, Showplace Square/Potrero Hill, the Central Waterfront, and the eastern portion of the South of Market ("East SoMa"). In conjunction with the rezoning, the General Plan was amended to include Area Plans for the neighborhoods (including revisions to the existing Central Waterfront and

South of Market Area Plans). A key goal of the rezoning process was to encourage the creation of cohesive neighborhoods, particularly where new housing is being encouraged. The plans also propose public benefits and other implementation programs, particularly the creation of affordable housing. The program introduced new zoning districts, including districts that permit at least some PDR uses in combination with commercial uses, districts mixing residential and commercial uses, and areas where only PDR uses would be permitted, with residential use prohibited to alleviate development pressure on PDR uses. The Showplace Square/Potrero Hill Area Plan is located immediately to the west of the Mission Bay Plan (across Interstate 280), the Central Waterfront Area Plan is located immediately to the south of the Mission Bay plan area (south of Mariposa Street), and the East SoMa Area Plan is located immediately to the north (across China Basin and east of Fourth Street). The Final EIR on the Eastern Neighborhoods Program was certified in August 2008. Projects pursuant to the Eastern Neighborhoods Program are currently under construction, including several residential and mixed-used developments south of Mariposa Street.

- **Seawall Lot 337 and Pier 48 Mixed-Use Project (Mission Rock).** This possible future project is located about one-third of a mile north of Blocks 29-32 adjacent to the northeast side of the Mission Bay South Plan area. The project would include a mixed-use, multi-phase waterfront development on Seawall Lot 337, rehabilitation and reuse of Pier 48, and construction of approximately 5.4 acres of net new open space, for a total of 8 acres of open space on the site. Overall, the project would involve construction of up to approximately 3.7 million gsf of residential, commercial, and retail uses, and a public parking garage on the project site. Both Seawall Lot 337 and Pier 48 are owned by the Port of San Francisco. This project is currently in the environmental review phase.

- **Pier 70 Mixed-Use Development**: This possible future project is located less than a half mile south of Blocks 29-32, on 35 acres located south of 20th Street and east of Illinois Street. This project includes up to approximately 3,040,000 gsf (excluding parking) of above-grade construction in new buildings, and improvements to historic buildings. The project allows for a flexible land use program, including a maximum residential-use and maximum commercial-use scenarios for the Pier 70 Special Use District. Option 1 - maximum residential scenario, would consist of approximately 2,000 dwelling units within 1,605,000 gsf, including up to 904,000 gsf of commercial and office space, plus up to 365,700 gsf of manufacturing, local retail, creative uses and arts that is designated as an “Innovative Industries Zone.” Option 2 - maximum office scenario, would consist of approximately 1,052 dwelling units within approximately 903,616 gsf, including up to approximately 1,810,000 gsf of commercial and office space, plus up to 327,700 gsf of manufacturing, local retail, creative uses and arts that is designated as an “Innovative Industries Zone.” This project is currently in the environmental review phase.

- **400-600 20th Street, Pier 70 (20th Street Historic Core)**: This project is located along the northern and southern portions of 20th Street between Illinois and Louisiana Streets, about a half mile south of Blocks 29-32, within the greater Pier 70 area. The project site includes four parcels containing ten buildings, referred to as the “20th Street Historic Core.” The 20th Street Historic Core currently contains approximately 270,000 gsf of largely vacant industrial and office space. The project would include: 1) historic renovations to satisfy current seismic, structural, and code requirements; 2) remediation of hazardous materials; 3) reuse of the buildings as primarily light industrial and commercial uses; 4) the addition of approximately 69,000 gsf of new building space, primarily in interior mezzanines; 5) removal of approximately 5,000 gsf of previous additions to two of the buildings;

6) creation of an outdoor publically accessible plaza, and 7) roadway, sidewalk, and parking lot improvements. In total, the project would include approximately 334,000 gsf of existing and new building space. The Community Plan Exemption was published in May 2014, and the project has a 24-month construction schedule.

It should be noted that the reasonably foreseeable future projects are subject to independent environmental review and consideration by approving agencies. Consequently, it is possible that some of the projects will not be approved or will be modified prior to approval (e.g., as a result of the CEQA alternatives process). For the purposes of assessing worst-case cumulative impacts, however, the cumulative impact analysis assumes approval and construction of the identified projects.

5.1.5.3 Cumulative Construction Projects

The cumulative impact analysis also considers the combined effects of multiple construction projects occurring within the project vicinity during the same timeframe as the proposed construction schedule. Even though all of these projects were considered in the overall impact analysis in the Mission Bay FSEIR, the specific timing and location of construction of individual developments were unknown at that time. They are included in this SEIR only as part of the project-level impact analysis of the proposed project with respect to the potential to contribute to cumulative construction-related impacts. Construction projects in the vicinity of Blocks 29-32 anticipated to occur between 2015 and 2017 include the following (see Chapter 3, Figure 3-3 for location of Mission Bay block numbers):

- **Uber/ARE Project, Mission Bay Blocks 26/27.** Located directly north of the project site across South Street, this project consists of 423,000 gsf of office space. Construction is estimated to start by the end of 2015, and continue for 18 to 24 months.

- **UCSF Research Building, Block 23A**. Located directly west of the project site across Third Street, this project consists of about 307,000 gsf and is expected to be under construction before 2017.

- **Cancer Outpatient Building on Medical Center site**. Located at the southwest corner of Third and 16th Street, directly kitty corner from the project site, this project consists of about 170,000 gsf and is expected to be under construction before 2017.

- **UCSF East Campus, Blocks 33/34**. Located directly south of the project site across 16th Street, the project consists of 500,000 gsf of office space. The project will be built in two phases, with the first phase on Block 33, about 340,000 gsf, to begin construction in 2016 and continue for about 18 to 24 months. Block 34 construction would occur in the 2020 to 2025 timeframe.

- **Realignment of Terry A Francois Boulevard and Mission Bay Park P22**. P22 is located directly east of the project site, across from the realigned Terry A. Francois Boulevard, and construction of both is estimated to be completed by 2018. It is likely that Terry A. Francois Boulevard will need to be constructed first, requiring about 12 months, followed by 12 months for construction of Bayfront Park at P22.

- **Mission Bay Parks, Blocks P23, and P24**. P23, directly south of the project site across 16th Street, and P24, about 750 feet south of the project site, are planned to begin construction in 2015 with preliminary work underway for some of the stormwater infrastructure within the park. Construction should be completed by the end of 2016.

- **The Exchange, Mission Bay Block 40**. Located approximately 1,200 feet southwest of the project site, the project consists of 664,00 gsf of office and 15,000 gsf of retail. Construction is estimated to start by late summer/fall 2015 and continue for 18 to 24 months.

- **Family House, Block 7 East**. Located approximately 1,300 feet northwest of the project site, the project consists of 80 guest suites for families receiving treatment at UCSF and other San Francisco medical facilities. Construction is currently underway and is expected to continue after November 2015.

- **Affordable Housing, Blocks 3, 6 and 7**. Located approximately 1,700, 1,300, and 1,000 feet, respectively, northwest of the project site, the Blocks 3, 6 and 7 project consists of 958 affordable housing units. Block 7 West is expected to start construction in summer 2015, Block 6 east to start construction in 2016, and Block 3 East starting late 2016/early 2017.

- **Block 1, Residential and Hotel Sites**. Located approximately 2,400 feet northwest of the project site, the project consists of 350 market rate units, 25,000 leasable square feet of retail, and a 250-room hotel. Construction is anticipated to start in 2015 and continue for about 18 to 24 months.

- **Block N4P3, 360 Berry Street**. About 3,000 feet north west of the project site, construction of 129 residential units at this site is expected to start in 2015 and continue for about 18 to 24 months.

5.1.6 Impacts of Mitigation Measures

CEQA Guidelines Section 15126.4 states that "if a mitigation measure would cause one or more significant effect in addition to those that would be caused by the project as proposed, the effects of the mitigation measure shall be discussed but in less detail than the significant effects of the project as proposed."

Chapter 5 identifies mitigation measures for all potentially significant and significant impacts where feasible. In most cases, implementation of the mitigation measure would reduce or avoid the magnitude, duration, and/or overall severity of the identified impact with no additional secondary effects. However, in a few cases, implementation of a mitigation measure could result in other environmental impacts in addition to those that would be caused by the project, and further explanation is provided to explain how the additional significant effects caused by the mitigation measure would or would not change the overall impact conclusion(s). In most cases, implementation of the full suite of project mitigation measures would reduce or avoid impacts of mitigation measures.

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5.2 Transportation and Circulation

5.2.1 Introduction

This section analyzes the potential project-level and cumulative impacts on transportation and circulation during construction and operation of the proposed project. Transportation-related issues of study include transit, vehicle traffic on local and regional roadways, bicycles, pedestrians, loading, emergency vehicle access, parking, and construction-related transportation activities. This section provides a summary of the Mission Bay FSEIR transportation section, an overview of existing transportation conditions, a description of the applicable transportation regulations and policies, methodologies and assumptions used in the impact analysis, and impact assessment and mitigation measures. Information and analysis related to project impacts on UCSF helipad operations is presented in its entirely in Section 5.2.6, Project Impacts on UCSF Helipad Operations. Supporting detailed technical information is included in **Appendix TR**.

5.2.2 Summary of Mission Bay FSEIR Transportation Section

5.2.2.1 Mission Bay FSEIR Setting

The transportation and circulation setting section of the Mission Bay FSEIR provided information on the transportation facilities and system serving the Mission Bay North and South Redevelopment Plan areas at that time, using data collected in 1995 and 1996, and reflecting 1997 conditions. The transportation network included the system of local streets, ramps and freeways, local and regional bus and rail lines, ferry service, bicycle and pedestrian facilities, parking areas, and truck loading areas, and described the freeway and local circulation patterns in 1997, as they had changed substantially in the SoMa/Mission Bay area following the 1989 Loma Prieta earthquake.

5.2.2.2 Mission Bay FSEIR Impacts and Mitigation Measures

Transportation and circulation impacts assessed in the Mission Bay FSEIR included Mission Bay Blocks 29-32 as part of numerous other blocks analyzed in the Mission Bay South Redevelopment Plan. The Mission Bay FSEIR identified 28 transportation mitigation measures that were also included in the Plan's project description and assumed in the impact analysis (FSEIR Mitigation Measures E.1 through E.28). These measures included transportation infrastructure improvements, including new or upgraded traffic signals and/or lane reconfigurations at 20 study intersections, construction of six new street segments, and rerouting of the 22 Fillmore and 30 Stockton or 45 Union-Stockton Muni bus routes into the Mission Bay South Plan area.

The transportation impact analysis identified significant traffic impacts at 11 of the 41 study intersections for the overall Plan area. Traffic impacts were identified as less than significant with mitigation at four intersections (Brannan/Seventh, Townsend/Seventh, Townsend/Eight, 16th/Vermont), and as significant and unavoidable traffic impacts at seven intersections adjacent to I-80 freeway ramps (Brannan/Sixth/I-280 ramps, Bryant/Second, Bryant/Fifth/I-80 eastbound on-ramp, Harrison/First, Harrison/Second, Harrison/Fremont/I-80 westbound off-ramp, and

Harrison/Essex). The Mission Bay FSEIR found the impacts related to regional and local transit capacity utilization, pedestrians and bicycle circulation, loading conditions, rail, and transportation-related construction impacts to be less than significant.

The cumulative impact analysis addressed future year 2015 plus project conditions (2015 being assumed as the project build-out year), and indicated that 17 of the 41 study intersections would operate at LOS E or LOS F conditions. In addition, cumulative development would result in a lengthening of the p.m. peak commute period, and the Mission Bay project would contribute considerably to this cumulative impact. The additional project-related transit trips were found to result in a significant contribution to cumulative impacts on Alameda-Contra Costa Transit District (AC Transit), on the Northeast screenline of the Muni downtown screenlines[1], and on light rail service on King Street and on The Embarcadero. The Mission Bay FSEIR found cumulative impacts related to pedestrian and bicycle circulation, loading conditions, rail, and transportation-related construction impacts to be less than significant.

The Mission Bay FSEIR identified 22 additional mitigation measures beyond those incorporated into the project description (i.e., FSEIR Mitigation Measures E.29 through E.50). These measures included ten additional intersection improvements and improvements on four street segments (FSEIR Mitigation Measure E.29 through E.42), encouraging increasing Bay Bridge tolls for single-occupant vehicles during commute hours (FSEIR Mitigation Measure E.43), encouraging AC Transit to expand service to downtown San Francisco (FSEIR Mitigation Measure E.44), and providing additional light rail capacity to serve the Mariposa Street stop from downtown (FSEIR Mitigation Measure E.45). In addition, five Transportation System Management measures were identified, including establishing a Transportation Management Organization (FSEIR Mitigation Measure E.46)[2], developing and implementing a Transportation System Management Plan (FSEIR Mitigation Measure E.47), constraining parking within the University of California San Francisco (UCSF) campus (FSEIR Mitigation Measure E.48), encouraging ferry service (FSEIR Mitigation Measure E.49), and providing flexible work hours/telecommuting (FSEIR Mitigation Measure E.50). FSEIR Mitigation Measures E.20, E.37, E.39, E.40 related to intersection improvements, and FSEIR Mitigation Measure E.48 related to constraining parking within the UCSF campus, were rejected by the Board of Supervisors and are not part of the 1998 Mission Bay Mitigation Monitoring and Reporting Program. The measures, their current status, and their applicability to the proposed project are described in **Appendix TR** and **Appendix MIT**.

At 10 of the 17 study intersections that would operate at LOS E or LOS F conditions, Mission Bay FSEIR Mitigation Measures E. 29 through E.42 were found to reduce the Plan-level cumulative impacts to less than significant levels. However, even with implementation of the transportation mitigation measures, the project traffic was found to contribute to significant cumulative impacts

[1] The concept of screenlines is used to describe the magnitude of travel to or from the greater downtown area, and to compare estimated transit ridership to available capacities. Screenlines are hypothetical lines that would be crossed by persons traveling between downtown and its vicinity (i.e. the Northeast, Northwest, Southeast, and Southwest screenlines) and other parts of San Francisco and the region (i.e., the East Bay, North Bay, and South Bay screenlines).

[2] The Mission Bay Transportation Management Association (Mission Bay TMA) is the non-profit organization that was formed to meet the requirements of the Mission Bay FSEIR Mitigation Measure E.46: Transportation Management Organization.

at seven intersections at or near freeway ramps (Brannan/Sixth/I-280 ramps, Bryant/Second, Bryant/Fifth/I-80 eastbound on-ramp, Harrison/First, Harrison/Second, Harrison/Fremont/I-80 Westbound Off-ramp, and Harrison/Essex), and on the Bay Bridge and its approaches during the p.m. peak hour. Mission Bay FSEIR Mitigation Measure E.44 to encourage AC Transit to expand service and Mission Bay FSEIR Mitigation Measure E.45 to provide additional T Third light rail to the Mariposa Street stop were found to reduce Plan-level cumulative transit impacts to less than significant levels.

5.2.3 Setting

5.2.3.1 Regional and Local Roadways

Regional Access

Interstate 280 (I-280) provides the primary regional access to the Mission Bay area from southwestern San Francisco, the Peninsula and the South Bay. I-280 has an interchange with U.S. 101 south of the Mission Bay. Nearby northbound and southbound on- and off-ramps are located at Mariposa Street (northbound off-ramp and southbound on-ramp) and at 18th Street (southbound off-ramp and northbound on-ramp). The northern terminus of I-280 is on King Street at Fifth Street.

Interstate 80 (I-80) and **U.S. Highway 101 (U.S. 101)** provide regional access to the Mission Bay area. U.S. 101 serves San Francisco and the Peninsula/South Bay, and extends north via the Golden Gate Bridge to the North Bay. Van Ness Avenue serves as U.S. 101 between Market Street and Lombard Street. I-80 connects San Francisco to the East Bay and points east via the San Francisco-Oakland Bay Bridge. U.S. 101 and I-80 merge west of the project site. Northbound access is provided via an off-ramp at Mariposa Street (at Vermont Street), on-ramps at Cesar Chavez Street, and on-ramps and off-ramps at Bryant and Harrison Streets.

Local Access

Terry A. Francois Boulevard is a two-way, north-south roadway to the east of Third Street, extending between Third Street and Mariposa Street (at Illinois Street). The roadway generally has two travel lanes each way, with on-street parking on both sides of the street. As part of the Mission Bay Plan, Terry A. Francois Boulevard will be realigned to the west to be adjacent to the east side of Blocks 30 and 32, and a buffered two-way cycle track (Class II)[3] will be provided as part of the San Francisco Bay Trail on the east side of the street. A bicycle lane (Class II facility) currently runs on each side of Terry A. Francois Boulevard between Illinois Street and Third Street.

[3] Class I bikeways are bike paths with exclusive right-of-way for use by bicyclists. Class II bikeways are bike lanes striped within the paved areas of roadways and established for the preferential use of bicycles. Class III bikeways are signed bike routes that allow bicycles to share the travel lane with vehicles. A cycle track is a Class II bikeway, and is an exclusive bicycle facility that is separated from vehicle traffic and parked cars by a buffer zone. Cycle tracks offer safer and calmer cycling conditions for a much wider range of cyclists and cycling purposes, especially on street with greater traffic volumes traveling at relatively high speeds.

Bridgeview Way is a two-way, north-south public street, privately maintained, that extends between Mission Bay Boulevard South and South Street. The roadway has one travel lane each way with on-street parking on both sides of the street.

Illinois Street is a two-way, north-south roadway to the east of Third Street that extends between 16th Street and Cargo Way. The roadway primarily has one lane each way with on-street parking on both sides of the street. Bicycle Route 5 runs both ways along Illinois Street, with bicycle lanes between Cesar Chavez and 16th Streets (Class II).

Third Street is the principal north-south arterial in the southeast part of San Francisco, extending from its interchange with U.S. 101 and Bayshore Boulevard, to its intersection with Market Street. In the Mission Bay area, Third Street has two travel lanes each way. In the *San Francisco General Plan*, Third Street is designated as a Major Arterial in the Congestion Management Program (CMP) network, a Metropolitan Transportation System (MTS) Street, a Primary Transit Preferential Street (Transit Important Street between Market and Townsend Streets, and between Mission Rock Street and Bayshore Boulevard), a Citywide Pedestrian Network Street and Trail (between 24th Street and Yosemite Avenue), and a Neighborhood Commercial Pedestrian Street. South of China Basin, the T Third light rail operates in a semi-exclusive center median right-of-way, with the exception of the segment between Kirkwood Avenue and Thomas Avenue, where the light rail runs within a mixed-flow lane. Third Street between China Basin and Townsend Street is also part of Bicycle Route 536 (Class III).

Fourth Street is a principal north-south arterial between Market and Mariposa Streets. Between Market and King Streets, Fourth Street runs southbound and has four southbound travel lanes. From King Street to Berry Street, Fourth Street has two lanes each way. Between Berry and 16th Streets, Fourth Street is two-way and has one travel lanes each way. South of 16th Street, Fourth Street provides local access to the UCSF Medical Center; there is no through motor-vehicle access between 16th and Mariposa Streets. Fourth Street is classified as a Congestion Management Network Major Arterial and a part of the Metropolitan Transportation System. Fourth Street is designated as a Primary Transit Important Preferential Street; is a part of the Citywide Pedestrian Network from Market Street to Folsom Street; is part of the Bay Trail between King and Mission Streets; and is designated as a Neighborhood Commercial Pedestrian Street. The T Third Street light rail line runs northbound on Fourth Street within mixed-flow lanes between Channel and Berry Streets, and in a semi-exclusive center median right-of-way between Berry and King Streets. Fourth Street has bicycle lanes (Class II) both ways between Channel and 16th Streets.

Owens Street is currently a two-way north-south Local Street with one lane each way that extends between 16th Street and the Mission Bay Circle on the western edge of Mission Bay. On-street parking is prohibited on both sides of the street. Owens Street will be extended between 16th and Mariposa Streets and restriped to two lanes each way as part of the Mission Bay Plan.

Seventh Street is a north-south roadway that extends between Market and 16th Streets. In the vicinity of the Mission Bay area, Seventh Street has one lane each way; on-street parking is provided on both sides of the street between Irwin and 16th Streets. Seventh Street has Class II bike lanes (Route 23) between Brannan and 16th Streets.

Mississippi Street is a north-south roadway that runs discontinuously between 16th/Seventh and Cesar Chavez Streets. In the vicinity of the Mission Bay area, Mississippi Street has one travel lane each way and on-street parking is provided on both sides of the street. Bicycle Route 23 runs on Mississippi Street (Class II) between 16th and Mariposa Streets.

King Street is a four-lane east-west roadway with a semi-exclusive center median for light rail operations. King Street connects the I-280 northern terminus on- and off-ramps at Fifth Street with The Embarcadero. Bicycle Route 5 (Class II and Class III) runs on King Street east of Third Street with a bicycle lane (Class II) on the north side of the street between The Embarcadero and Fourth Street, and on the south side of the street between Fourth and Fifth Streets. King Street is designated in the Transportation Element of the *San Francisco General Plan* as a Major Arterial in the CMP Network (between Second Street and Fourth Street), a MTS Street (between Second Street and Fourth Street), a Primary Transit Preferential Street (Transit Important Street), and a Neighborhood Pedestrian Network Connection Street. Muni lines N Judah and T Third operate along the median along King Street east of Fourth Street. Bicycle Route 5 (Class II and Class III) runs on King Street east of Third Street.

Channel Street is an east-west roadway that currently starts at Third Street and dead-ends west of Fourth Street. Channel Street has two travel lanes each way, and on-street parking is prohibited on both sides of the street between Third and Fourth Streets. West of Fourth Street, Channel Street has one lane each way and parking is permitted on both sides. The T Third Street light rail line operates in a semi-exclusive center median right-of-way on Channel Street between Third and Fourth Streets. Channel Street is planned to be extended to the Mission Bay Circle in the future as a two-lane roadway with on-street parking permitted on the north side, as part of the Mission Bay Plan.

Mission Rock Street is a two-lane east-west roadway that extends between Terry A. Francois Boulevard and Fourth Street. It has one travel lane each way; on-street parking is provided on both sides of the street.

Mission Bay Drive is a east-west roadway that runs between Mission Bay Circle and Seventh Street (under I-280 and across the Caltrain railroad tracks). Two travel lanes and a bicycle lane (Class II) are provided each way, separated by a landscaped median. On-street parking is prohibited on both sides of the street.

South Street is an east-west roadway that runs for two blocks between Third Street and Terry A. Francois Boulevard. Two travel lanes are currently provided each way, and on-street parking is prohibited on both sides of the street. A sidewalk is not currently provided on the south side of the street (i.e., adjacent to the undeveloped project site blocks).

Sixteenth (16th) Street is an east-west arterial that runs between Illinois and Castro Streets. In the Mission Bay area, 16th Street has two travel lanes each way, and on-street parking is prohibited on both sides of the street; dedicated left turn lanes are provided at all intersections. Sixteenth

Street is classified as a Primary Transit Oriented Preferential Street between De Haro and Church Streets and a Neighborhood Commercial Pedestrian Street between Bryant and Church Streets. As part of the Mission Bay Plan, 16th Street will be extended east of Illinois Street to connect with Terry A. Francois Boulevard. Bicycle Route 40 runs between Illinois and Kansas Streets with bicycle lanes (Class II) on both sides of the street.

Part of the 22 Fillmore Transit Priority Project[4] extends along 16th Street between Third and Church Street. In the segment between Third and Seventh Streets, side-running transit-only lanes will be implemented on 16th Street by converting a mixed-flow lane to a transit-only lane. West of Seventh Street, two options are still under consideration – either side-running or center-running transit-only lanes will be provided by converting a mixed-flow lane to a transit-only lane. The 22 Fillmore Transit Priority Project will also include corridor-wide transit network improvements such as transit bulbs, new traffic signals, pedestrian signals, sidewalk widening, and upgrading of the bicycle infrastructure on 17th Street between Church and Seventh Streets to provide a parallel, contiguous, and safe bicycle route for traveling in the east-west direction. The implementation of the side-running transit-only lanes is assumed in the intersection analysis of 2015 conditions.

Mariposa Street is an east-west roadway that runs between Illinois and Harrison Streets. The I-280 northbound off-ramp and southbound on-ramp are located immediately east of the intersection of Mariposa/Pennsylvania. In the Mission Bay area, Mariposa Street currently has one to two lanes each way and on-street parking is provided on Mariposa Street west of Tennessee Street. Bicycle Routes 23 and 7 run both ways on Mariposa Street with sharrows (Class III) between Illinois and Mississippi Streets. Mariposa Street is planned to be widened in the future to a five-lane roadway (two-lanes each way with exclusive center left-turn lanes at major intersections) as part of the Mission Bay Plan.

The following roadway infrastructure improvements are being implemented by the Mission Bay Development Group (i.e., MBDG, the infrastructure master developer) as part of the opening of Phase One of the UCSF Medical Center at Mission Bay, consistent with the 1998 Mission Bay South Area Plan, and are assumed in the intersection analyses of 2015 conditions:

- Owens Street is being extended between 16th and Mariposa Streets, to connect with the I-280 on- and off-ramps and to create a new intersection at Mariposa Street. The existing

[4] The 22 Fillmore Transit Priority Project is part of the TEP – Transit Effectiveness Project. The TEP included two alternatives for a Travel Time Reduction Proposal (TTRP) along 16th Street (of which one or a combination of the two could be implemented), to make the 22 Fillmore more frequent, reliable, and effective along 16th Street. The TTRP treatments are referred to as the Moderate and Expanded Alternatives. The Moderate Alternative includes a number of physical changes to the portion of the rerouted 22 Fillmore in the vicinity of Mission Bay, including, but not limited to, new transit stops, relocated transit stops, and transit bulbs, as well as new traffic signals. The Expanded Alternative includes most of the same features as the Moderate Alternative, as well as the conversion of a mixed-flow lane to a transit-only lane on both sides of 16th Street between Church and Third Streets, as well as the prohibition of left turns at Bryant, Potrero, Utah, San Bruno, Kansas, Rhode Island, De Haro, Carolina, Wisconsin, Arkansas, Connecticut, and Missouri Streets. The 22 Fillmore Transit Priority Project reflects a combination of the two proposals. (Available online at http://www.sfmta.com/projects-planning/projects/tep-transit-effectiveness-project. Accessed April 7, 2015.)

signal at the intersection of Mariposa Street and the I-280 northbound off-ramp is being upgraded to accommodate the new Owens Street approach.

- Mariposa Street is being widened on the north side by approximately 15 feet, and left turn lanes striped at major intersections. The Mariposa Street Bridge over the Caltrain tracks is being restriped to provide two exclusive westbound left turn lanes for a total of three lanes, and create a new signalized intersection with Owens Street.
- The northbound I-280 off-ramp is being widened to the east to provide an additional lane and better align with Owens Street. Mariposa Street between the I-280 southbound on-ramp and Pennsylvania Avenue is being re-striped to accommodate the lane configurations described above.
- The existing stop-controlled intersection of Mariposa Street and the I-280 southbound on-ramp (with the eastbound approach stop-controlled) is being signalized.
- The existing side-street stop-controlled intersection of Mariposa Street and Minnesota Street/Fourth Street is being signalized.

Intersection Operations

Existing conditions at 21 study intersections were analyzed for the following analysis hours:

- Weekday p.m. peak hour - generally 5:00 to 6:00 p.m. which coincides with the existing evening commute,
- Weekday evening peak hour - generally 6:00 to 7:00 p.m. which coincides with arrivals for weekday evening events,
- Weekday late p.m. peak hour - generally 10:00 to 11:00 p.m. which coincides with departures for weekday evening events, and
- Saturday evening peak hour – generally 7:00 to 8:00 p.m. which coincides with arrivals for Saturday evening events.

The 21 study intersections were selected either because they represent access points to the regional highway system (e.g., King Street, Cesar Chavez Street, freeway ramp touchdown locations), are located along major street corridors serving the Mission Bay Area (e.g., Third Street, Fourth Street, Seventh Street, 16th Street, Owens Street, Mariposa Street), or are located in the immediate vicinity of the project site (e.g., South Street, Terry A. Francois Boulevard, Illinois Street), and because they are the intersections most likely to be potentially impacted by traffic generated by the proposed project. In general, many of the same intersections were also evaluated as part of previous environmental studies that include the Mission Bay Area such as the Mission Bay SEIR (1998), UCSF Medical Center at Mission Bay EIR (2008), SFMTA Transit Effectiveness Project EIR (2014), and UCSF 2014 LRDP EIR (2014).[5]

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[5] Mission Bay SEIR A copy of this document is available for review at the San Francisco Planning Department, 1650 Mission Street, Suite 400, as part of Case File No. 96.771E. The Final EIR for UCSF Medical Center at Mission Bay is available online at http://campusplanning.ucsf.edu/physical/RFEIRHospital.php. Final EIR for the 2014 UCSF Long Range Development Plan is available online at http://www.ucsf.edu/content/lrdp-environmental-impact-report-downloads.

Intersection traffic volume counts were conducted for conditions without and with a SF Giants evening game at AT&T Park. Transportation conditions with a SF Giants evening game at AT&T Park are presented in Section 5.2.3.8.

Intersection turning movement counts were collected at the study intersections on multiple midweek days (Tuesday, Wednesday, or Thursday) and on Saturdays in October, November, December 2013, June and July 2013, and May and June 2014, both with and without a San Francisco Giants (SF Giants) game at AT&T Park (on King Street, between Second and Third Streets). Existing turning movement volume summaries tables and figures are included in **Appendix TR**. Traffic volumes are highest during the weekday p.m. peak hour, and the weekday evening peak hour volumes are approximately 10 percent lower than the p.m. peak hour. The weekday late evening peak hour is about 40 percent of the weekday p.m. peak hour. Traffic volumes at the study intersections are about half as much on Saturdays as on weekdays.

During 2013 and 2014, when the intersection counts were being conducted, the UCSF Medical Center Phase 1 and Public Safety Building were under construction. Both facilities opened in early 2015. The vehicular travel demand associated with these uses was added to the counts conducted in 2013 and 2014 to reflect full occupancy and operation of these facilities. The travel demand associated with these uses was based on the travel demand for the weekday p.m. peak hour identified in the UCSF 2014 LRDP EIR, as well as information on existing weekday and Saturday parking occupancy (a proxy for level of activity at UCSF facilities) at other UCSF parking facilities in order to estimate the vehicle trips for the weekday evening, weekday late evening, and Saturday evening peak hours.[6] Vehicle trips associated with the Public Safety Building were based on travel demand estimates conducted as part of that project.[7] Thus, the travel demand for UCSF includes the UCSF facilities and the Public Safety Building in Mission Bay open by spring of 2015.

In addition, a portion of the UCSF Mission Bay campus traffic as well as existing traffic accessing the Mission Bay campus was rerouted as appropriate to use the new Owens Street extension between 16th and Mariposa streets. Furthermore, minor adjustments were made to the traffic counts to balance intersection inbound and outbound traffic flows between intersections, where necessary.

Weekday peak hour traffic volume counts were conducted during the p.m., evening and late evening peak hours at the intersections of Third/16th, Fourth/16th, and Fourth/Mariposa in April 2015, and compared to the corresponding 2013/2014 traffic volumes adjusted to reflect the UCSF Medical Center Phase 1 and Public Safety Building used in the intersection analysis. These spot-check counts were performed in order to confirm that the results of traffic analyses accurately predicted traffic volumes and patterns associated with these newly opened facilities. The April 2015 data indicated that the actual counts were similar to the adjusted 2013/2014 volumes, and no additional adjustments were made. In general, the adjusted volumes used in the analysis are

6 UCSF 2014 LRDP EIR Source; UCSF 2014 parking occupancy data for Parnassus and Mt Zion campus sites.
7 Mission Bay Public Safety Building Transportation Assessment-Final Report, prepared for the City and County of San Francisco Department of Public Works by Adavant Consulting January 6, 2010.

higher than those collected in the field in April 2015. Some counts collected in the field along Mariposa Street, as well as the turns in and out of the UCSF Medical Center via Fourth Street, were higher than those estimated for the analysis, but this is attributed to the fact that the main vehicular entrance to the UCSF Medical Center via the new extension of Owens Street between Mariposa Street and 16th Street has not yet been built (it is expected to open in the fall 2015), and current access to the facility is only via Fourth Street. Once the Owens Street extension is opened, most of the traffic accessing the Medical Center garage and parking lot will shift from Fourth Street to Owens Street, as it is a more direct and convenient route.

The roadway segments and intersection configurations for the study intersections reflect the build out of the roadway network within Mission Bay as development proceeds, such as the extension of Channel Street and Mission Bay Boulevard from the Mission Bay Circle to Fourth Street, and implementation of Mission Bay FSEIR mitigation measures that were adopted by the City as part of the Mission Bay Plan. These include Mission Bay FSEIR Mitigation Measures E.1 through E.18, E.21 through E.24, and partial implementation of Mission Bay FSEIR Mitigation Measure E.25 (Channel Street) and Mission Bay FSEIR Mitigation Measure E.26 (North and South Mission Bay Boulevard and Mission Bay Drive). In addition, Mission Bay FSEIR Mitigation Measures E.29 to E.34 and Mission Bay FSEIR Mitigation Measures E.36 to E.41 related to intersections and roadways have been implemented.

Traffic conditions at the study intersections were evaluated using level of service (LOS), and were evaluated using the *Highway Capacity Manual* 2000 *(HCM 2000)* methodology for signalized and unsignalized intersection conditions.[8] Level of service is a qualitative description of operating conditions ranging from LOS A (i.e., free-flow conditions with little or no delay) to LOS F (i.e., jammed conditions with excessive delays). Section 5.2.5.3, under "Approach to Impact Analysis Methodology," presents the analysis methodology and the LOS definitions for signalized and unsignalized intersections; it defines each of the levels of service and shows the correlation between average control delay and LOS.

Existing levels of service at the study intersections are presented in **Table 5.2-1** for the weekday p.m., weekday evening, weekday late evening, and the Saturday evening peak hours. **Figure 5.2-1** presents the existing LOS conditions at the study intersections for the weekday p.m. peak hour, **Figure 5.2-2** presents the intersection LOS conditions for the weekday evening peak hour, **Figure 5.2-3** presents the intersection LOS conditions for the weekday late evening peak hour, and **Figure 5.2-4** presents the intersection LOS conditions for the Saturday evening peak hour. The figures present the intersection LOS for a day without a SF Giants game at AT&T Park, and for a day with a SF Giants evening game at AT&T Park. A description of transportation conditions on days with a SF Giants evening game at AT&T Park is presented in Section 5.2.3.8.

8 Transportation Research Board, National Research Council, *Highway Capacity Manual*, Washington D.C., 2000.

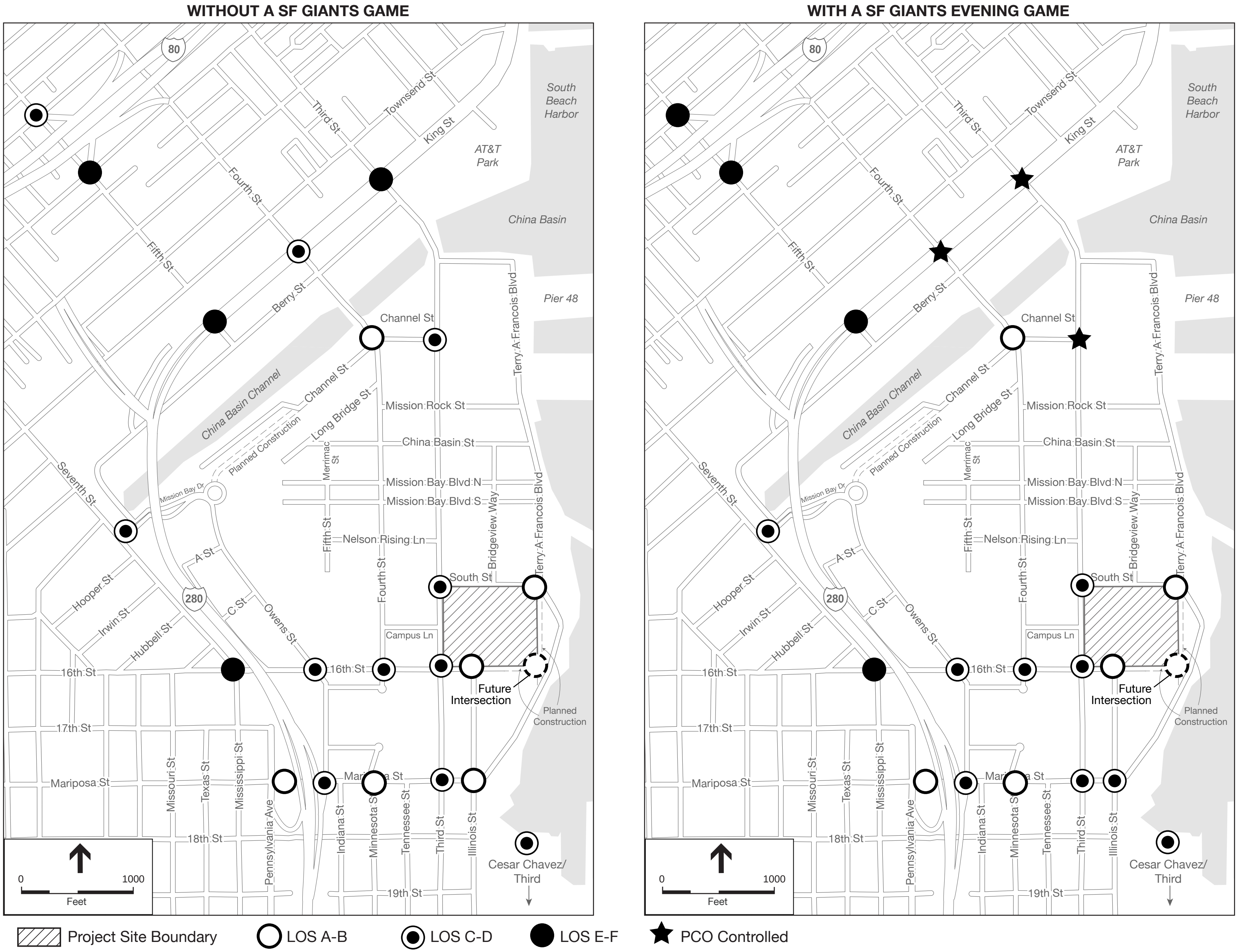
TABLE 5.2-1
INTERSECTION LEVEL OF SERVICE
EXISTING CONDITIONS – WITHOUT A SF GIANTS GAME
WEEKDAY PM, EVENING, LATE EVENING, AND SATURDAY EVENING PEAK HOURS

			Weekday Conditions						Saturday Evening[d]	
			PM[a]		Evening[b]		Late Evening[c]			
#	Intersection Location		Delay[e]	LOS[f]	Delay	LOS	Delay	LOS	Delay	LOS
1	King Street	Third Street	**72.7**	**E**	**58.3**	**E**	19.0	B	26.6	C
2	King Street	Fourth Street	51.9	D	47.9	D	24.1	C	22.6	C
3	King St/Fifth St	I-280 ramps	**59.2**	**E**	**57.2**	**E**	10.8	B	< 10	A
4	Fifth St/Harrison St	I-80 WB off-ramp	48.4	D	49.8	D	22.1	C	29.2	C
5	Fifth St/Bryant St	I-80 EB on-ramp	**>80**	**F**	**>80**	**F**	24.2	C	27.0	C
6	Third Street	Channel Street	38.0	D	33.1	C	< 10	A	< 10	A
7	Fourth Street	Channel Street	< 10	A	< 10	A	10.6	B	13.6	B
8	Seventh Street	Mission Bay Drive	23.1	C	19.5	B	12.0	B	12.4	B
9	Terry Francois Blvd	South Street[g]	10.8 (eb)	B	10.3 (eb)	B	< 10 (eb)	A	< 10 (eb)	A
10	Third Street	South Street	24.9	C	24.7	C	< 10	A	< 10	A
11	Terry Francois Blvd	16th Street[h]	--	--	--	--	--	--	--	--
12	Illinois Street	16th Street[g]	12.6 (nb)	B	< 10 (nb)	A	< 10 (nb)	A	< 10 (nb)	A
13	Third Street	16th Street[j]	29.3	C	27.8	C	10.6	B	10.7	B
14	Fourth Street	16th Street[j]	21.5	C	20.6	C	15.3	B	14.3	B
15	Owens Street	16th Street[j]	35.5	D	21.0	C	12.2	B	< 10	A
16	Seventh/Mississippi	16th Street[j]	**68.6**	**E**	**60.1**	**E**	15.9	B	18.4	B
17	Illinois Street	Mariposa Street[g]	10.6 (eb)	B	< 10 (eb)	A	< 10 (eb)	A	< 10 (eb)	A
18	Third Street	Mariposa Street	36.2	D	34.8	C	16.2	B	16.6	B
19	Fourth Street	Mariposa Street	13.2	B	10.8	B	< 10	A	< 10	A
20	Mariposa Street	I-280 NB off-ramp	25.8	C	20.0	B	15.9	B	16.1	B
21	Mariposa Street	I-280 SB on-ramp[i]	11.9	B	< 10	A	< 10	A	< 10	A
22	Third Street	Cesar Chavez St	43.0	D	32.9	C	21.1	C	18.4	B

NOTES:

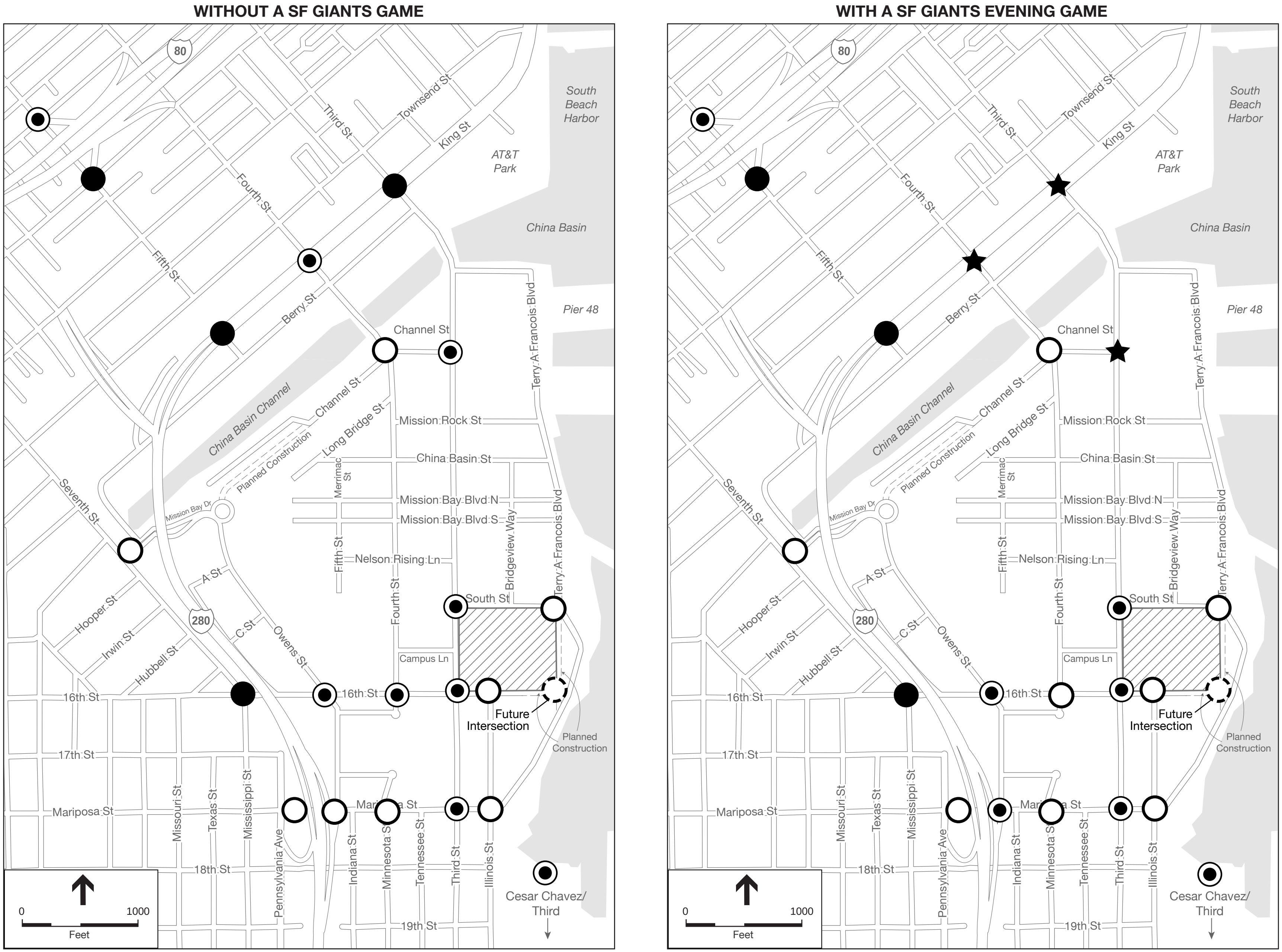
[a] Weekday p.m. peak hour of 4 to 6 p.m. peak period.
[b] Weekday evening peak hour of 6 to 8 p.m. peak period.
[c] Weekday late evening peak hour of 9 to 11 p.m. peak period.
[d] Saturday evening peak hour of 6 to 9 p.m. peak period.
[e] Delay presented in seconds per vehicle. For unsignalized intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
[f] Intersections operating at LOS E or LOS F conditions highlighted in **bold**.
[g] All-way stop-controlled or side-street stop-controlled intersection.
[h] Future analysis location. 16th Street not currently a through street between Illinois Street and Terry A. Francois Boulevard.
[i] The traffic signal at the intersection of Mariposa/I-280 southbound on-ramp is part of the roadway improvements on Mariposa Street between the I-280 northbound off-ramp and I-280 southbound on-ramp and the extension of Owens Street between 16th and Mariposa Streets, and is currently planned to be operational by fall 2015.
[j] Assumes implementation of the 22 Fillmore Transit Priority Project, which includes converting one mixed-flow lane in each direction to a side-running transit-only lane.

SOURCE: Adavant Consulting/LCW Consulting, 2015.



SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

Figure 5.2-1
Existing Intersection LOS-Weekday PM Peak Hour



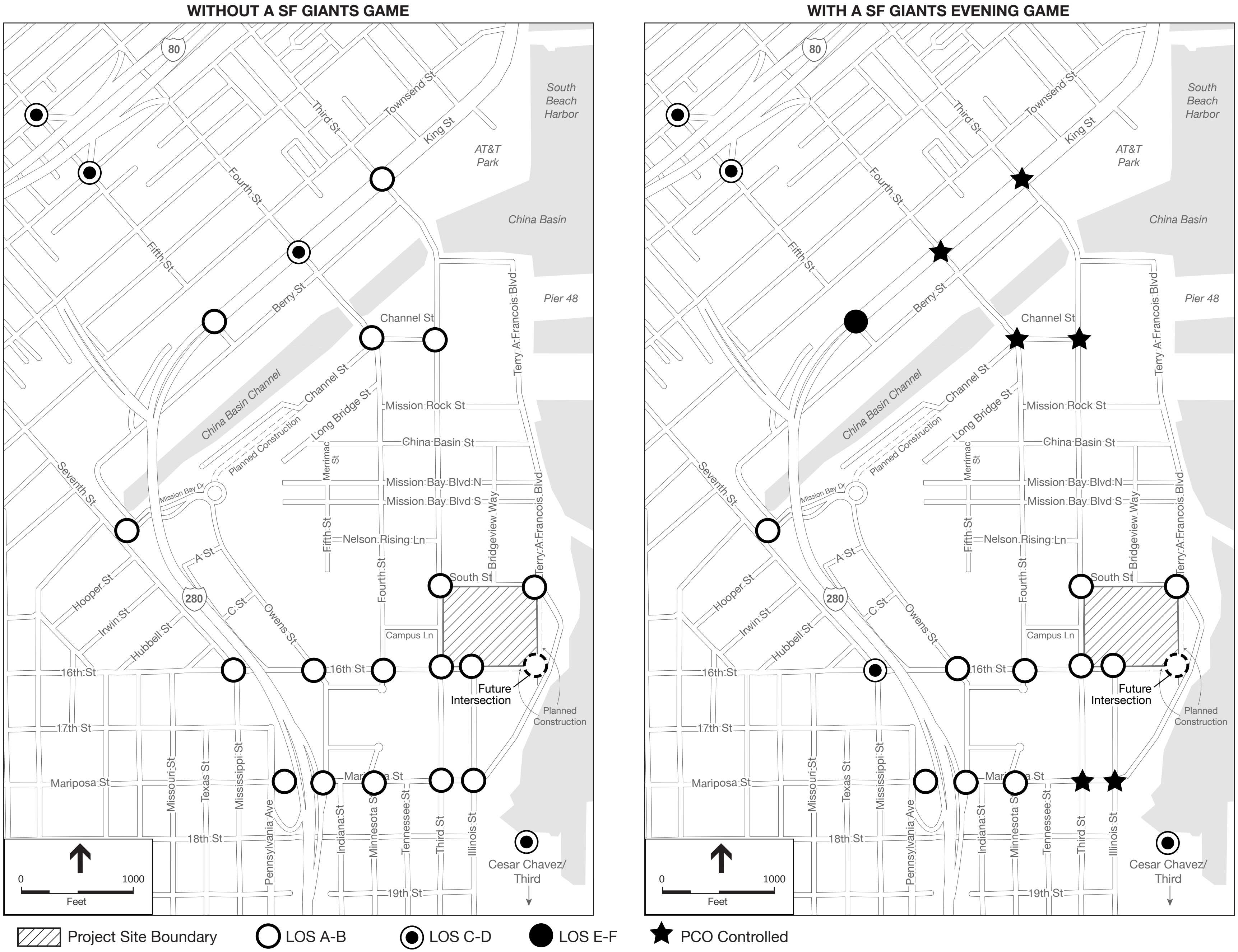
Project Site Boundary LOS A-B LOS C-D LOS E-F PCO Controlled

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-2

Existing Intersection LOS-Weekday Evening Peak Hour



SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

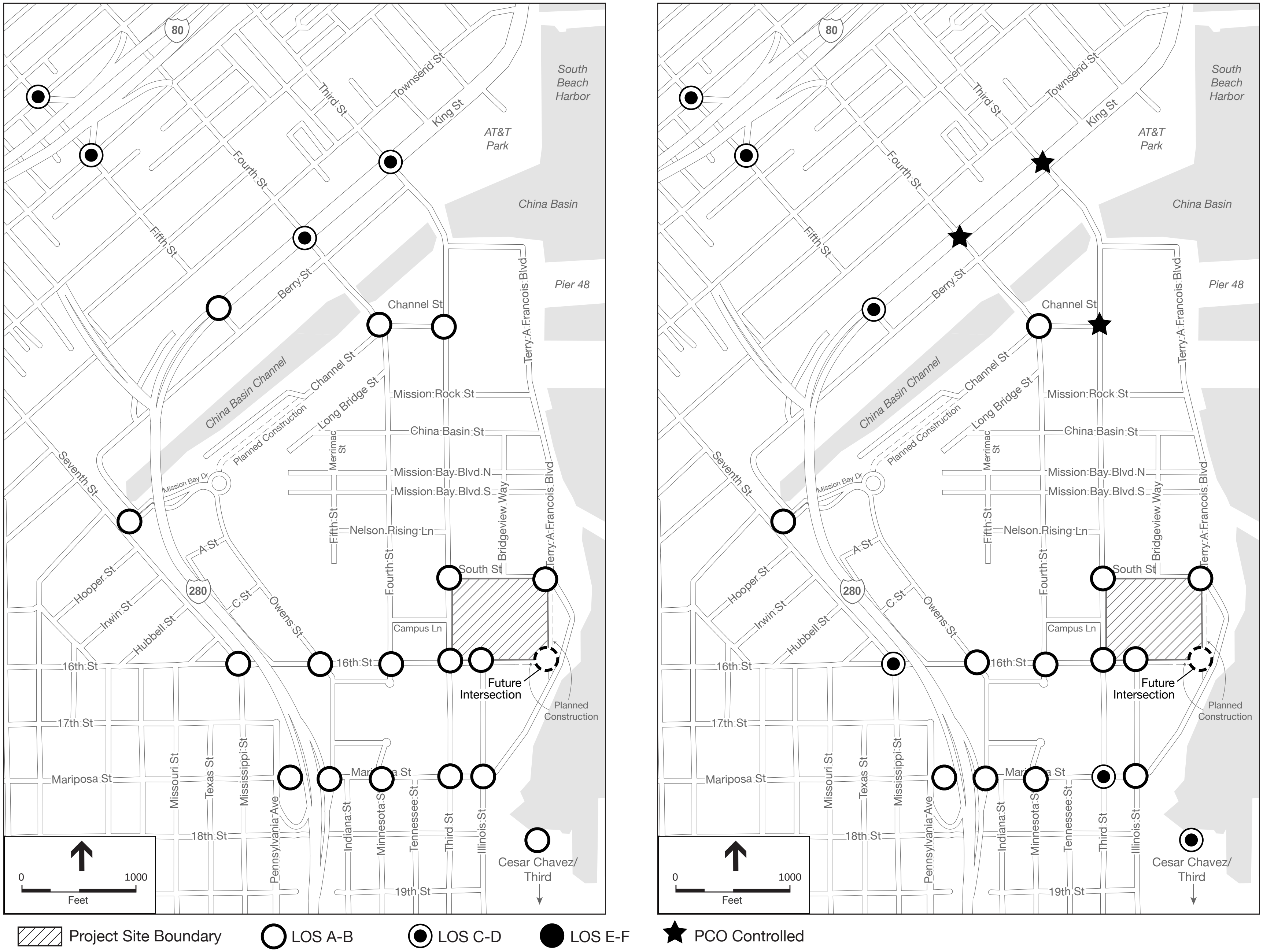
OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-3

Existing Intersection LOS-Weekday Late Evening Peak Hour

WITHOUT A SF GIANTS GAME

WITH A SF GIANTS EVENING GAME



SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-4
Existing Intersection LOS-Saturday Evening Peak Hour

As indicated in **Table 5.2-1**, during the analysis hours, most study intersections currently operate at LOS D or better. The exceptions are the intersections of King/Third and King/Fifth/I-280 ramp that operate at LOS E during the weekday p.m. and weekday evening peak hours, and the intersection of Fifth/Bryant/I-80 eastbound on-ramp that operates at LOS F during the weekday p.m. and weekday evening peak hours. The poor operating conditions at these intersections are a result of high volumes destined to I-80 and I-280. In addition, with implementation of the transit-only lane on 16th Street (i.e., as part of the 22 Fillmore Transit Priority Project), the intersection of Seventh/Mississippi/16th operates at LOS E during the weekday p.m. and weekday evening peak hours.

Level of service conditions at the study intersections are generally less congested during the weekday evening peak hour than during the weekday p.m. peak hour, although intersection LOS designations are similar at the intersections at the approaches to the I-80 and I-280 ramps. During the weekday late evening and Saturday evening peak hours, traffic volumes decrease substantially from weekday p.m. peak hour conditions and all intersections operate at LOS C or better. Intersection conditions in Mission Bay are affected by traffic associated with special events and during baseball season when the SF Giants have home games at AT&T Park. Transportation impacts associated with game day conditions are most severe prior to games and after the conclusion of games. The greatest impact occurs after weekday afternoon sellout events, during the 3:30 to 4:40 p.m. period when traffic, transit, and pedestrian flows exiting the ballpark (and game-day street closures near the park) coincide with the evening commute traffic already on the transportation network. As a result, on days when the SF Giants play home games at AT&T Park, existing service levels at the study intersections would generally be worse than those presented in **Table 5.2-1**. Intersection LOS at the study intersections for conditions with a SF Giants evening game at AT&T Park are presented in Section 5.2.3.8.

Ramp Operations

Ramp operations were analyzed for three ramps serving I-80 and three ramps serving I-280 for the same analysis hours presented above for intersection conditions (four on-ramps and two off-ramps in total). These freeway ramps were selected for analysis as they represent the regional highway facility most likely to be impacted by traffic generated by the proposed project. Traffic volumes used for the ramps analyses were obtained from turning movement counts where the ramps touch down to the local street network (conducted in 2013 and 2014, as described above), and freeway mainline volumes were obtained from Caltrans PeMS data.

Similar to intersections, the operating characteristics of freeway ramps are evaluated using the concept of LOS, and were evaluated using the *HCM 2000* methodology for ramp merge and diverge conditions. Freeway ramp LOS is based on vehicle density (passenger cars per lane-mile), and in San Francisco, LOS A through D is considered acceptable; LOS E and LOS F are considered unsatisfactory service levels. Section 5.2.5.3, under "Approach to Impact Analysis Methodology," presents the analysis methodology and the LOS definitions for the freeway ramp junctions (i.e., ramp merges and diverges). The results of the ramp analysis for the four analysis hours are presented in **Table 5.2-2**.

TABLE 5.2-2
FREEWAY RAMP LEVEL OF SERVICE
EXISTING CONDITIONS – WITHOUT A SF GIANTS GAME
WEEKDAY PM, EVENING, LATE PM, AND SATURDAY EVENING PEAK HOURS

		Weekday Conditions						Saturday Evening[d]	
		PM[a]		Evening[b]		Late Evening[c]			
#	Ramp Location	Density[f]	LOS	Density	LOS	Density	LOS	Density	LOS
1	I-80 Eastbound On-ramp at Sterling	**35**	**E**	38	C	20	B	22	C
2	I-80 Eastbound On-ramp at Fifth/Bryant	**--**	**F**	**--**	**F**	30	D	**35**	**E**
3	I-80 Westbound Off-ramp at Fifth/Harrison	30	D	28	D	27	C	25	C
4	I-280 Southbound On-ramp at Pennsylvania	**35**	**E**	27	C	15	B	13	B
5	I-280 Northbound Off-ramp at Mariposa	26	C	25	C	13	B	16	B
6	I-280 Southbound On-ramp at Mariposa	31	D	25	C	13	B	12	B

NOTES:

a Weekday p.m. peak hour.
b Weekday evening peak hour of 6 to 8 p.m. peak period.
c Weekday late p.m. peak hour of 9 to 11 p.m. peak period.
d Saturday evening peak hour of 6 to 9 p.m. peak hour.
e Density of vehicles per segment. Measured in passenger cars per mile per lane. Density value is not presented for segments where the demand volume exceeds the capacity, per *2000 Highway Capacity Manual*.
f Segments operating at LOS E or LOS F conditions highlighted in **bold**.

SOURCE: Adavant Consulting/LCW Consulting, 2015

During the analysis hours, all of the ramp merge and diverge sections currently operate at LOS D or better, except for the I-80 eastbound Sterling Street on-ramp which operates at LOS E during the weekday p.m. peak hour, and the I-80 eastbound Fifth/Bryant on-ramp which operates at LOS F during the weekday p.m. and evening peak hours, and LOS E during the Saturday evening peak hour. The LOS E and LOS F conditions at the I-80 ramps reflect the congestion associated with traffic attempting to leave downtown San Francisco that is constrained by the limited capacity of the Bay Bridge ramps onto the bridge, causing queues to form on surface streets leading to the bridge. The I-280 southbound on-ramp merge at Pennsylvania Street also experiences LOS E conditions due to the high volume of southbound vehicles on I-280 during the weekday p.m. peak hour.

5.2.3.2 Transit Service

Local service in San Francisco is provided by the San Francisco Municipal Railway (Muni), the transit division of the San Francisco Municipal Transportation Agency (SFMTA). Muni bus, cable car and light rail lines can be used to access regional transit operators. Service to and from the East Bay is provided by Bay Area Rapid Transit District (BART), AC Transit, and Water Emergency Transportation Authority (WETA) ferries; service to and from the North Bay is provided by Golden Gate Transit buses and ferries, as well as Blue & Gold, and WETA ferries;

and service to and from the Peninsula and the South Bay is provided by Caltrain, SamTrans, BART, and WETA ferries. **Figure 5.2-5** presents the existing transit route network in the project vicinity.

The project site is located approximately 2.0 miles southeast of the Ferry Building and the Embarcadero Muni Metro and BART station, about 1.6 miles southeast of the temporary Transbay Terminal, about 0.8 miles south of the Caltrain terminal at Fourth/King and 0.9 miles northeast of the Caltrain station at 22nd Street, and adjacent to the T Third UCSF/Mission Bay stop at South Street. The project site is about 1.7 miles east of the 16th Street BART station, and about 1.7 miles southeast of the Powell BART/Muni Metro station.

Local Muni Service

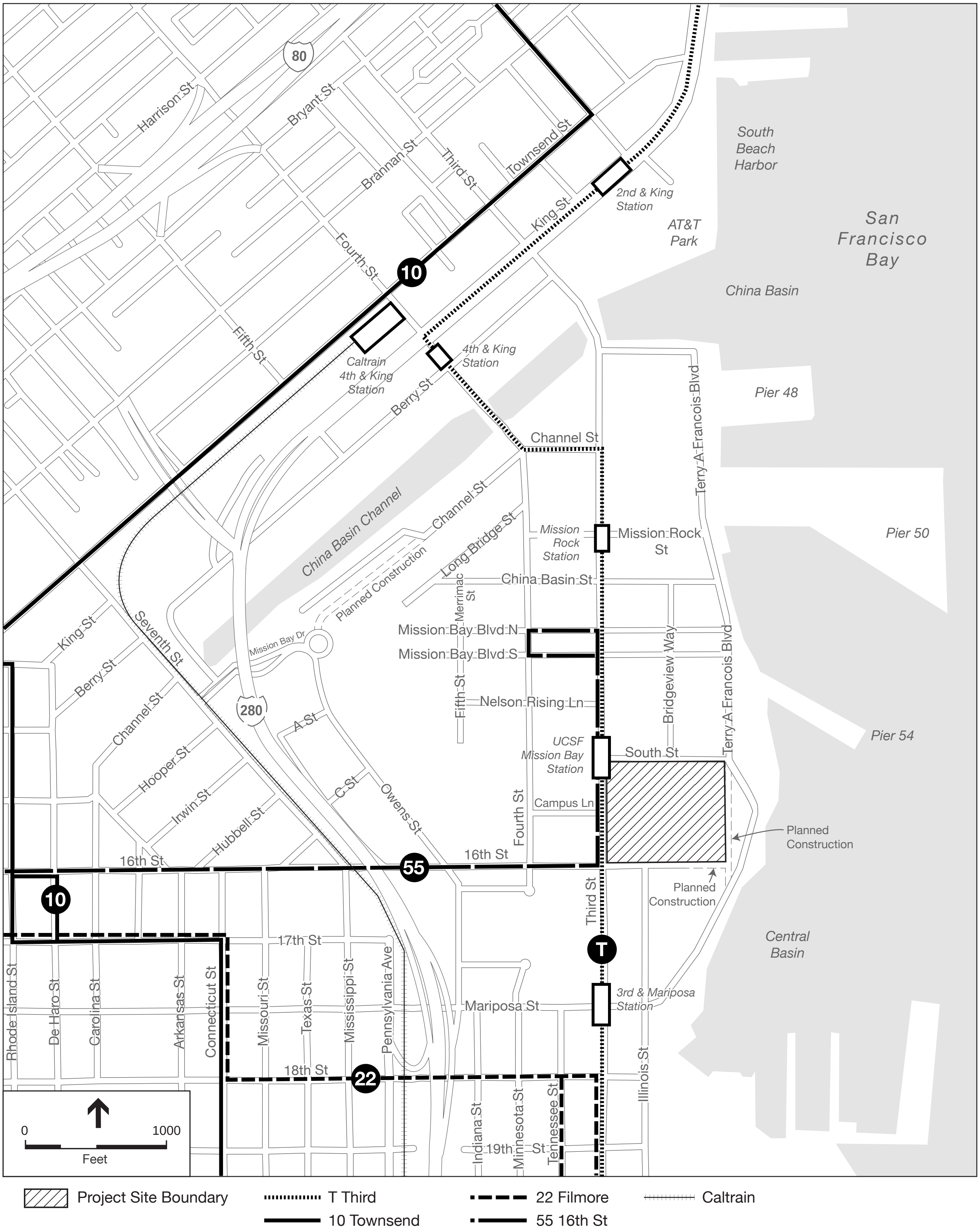
Muni service in the project vicinity includes the T Third light rail line that runs along Third Street with the closest stop at South Street (i.e., the UCSF/Mission Bay stop), as well as the 22 Fillmore route that runs east/west along 16th Street. **Table 5.2-3** presents the existing service frequency for the two routes.

TABLE 5.2-3
EXISTING MUNI ROUTES IN PROJECT VICINITY

	Headways						
	Weekday			Weekend			
Line/Route	PM (4 to 6 p.m.)	Evening (6 to 10 p.m.)	Late Evening (After 10 p.m.)	Evening (6 to 8 p.m.)	Late Evening (After 10 p.m.)	General Hours of Operation	Neighborhoods Served
T Third	9	15	20	20	20	4:00 to 1:00 a.m.	Downtown, Visitacion Valley
22 Fillmore	8	15	15	15	15	24 hours	Marina, Dogpatch

SOURCE: SFMTA, Adavant Consulting/Fehr & Peers/LCW Consulting, 2015.

In January 2015, the SFMTA implemented a temporary "55 16th Street" motor coach service to coincide with the opening of the Phase One Medical Center at Mission Bay between the campus site and the 16th Street BART Station until the 22 Fillmore trolley buses are extended into Mission Bay. The temporary 55 16th Street route and the extension of the 22 Fillmore (see description of the 22 Fillmore Transit Priority Project below) into Mission Bay will be implemented as part of Mission Bay FSEIR Mitigation Measure E.27. The 55 16th Street route runs on 16th Street between Valencia and Third Streets, and Third Street between 16th Street and Mission Bay Boulevard North, and a turnaround loop is provided via Mission Bay Boulevard North, Fourth Street, and Mission Bay Boulevard South. The new bus stops for this service in the vicinity of the project site are on 16th Street at Fourth Street (near side stop both ways), on Third Street northbound at South Street (near side stop), on Mission Bay Boulevard South eastbound between Fourth Third Streets (line terminal), and on Third Street southbound at Gene Friend Way.



SOURCE: SFMTA, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E: Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-5
Existing Transit Network

Planned changes to transit service in the project vicinity include the Central Subway project, which is currently under construction, and the Transit Effectiveness Project (renamed Muni Forward).

Central Subway Project. The Central Subway Project is the second phase of the Third Street light rail line (i.e., T Third), which opened in 2007. Construction is currently underway, and the Central Subway will extend the T Third light rail line northward from its current terminus at 4th and King Streets to a surface station south of Bryant Street and go underground at a portal under U.S. 101. From there it will continue north to stations at Moscone Center, Union Square—where it will provide passenger connections to other Muni light rail lines and BART at the Powell station —and in Chinatown, where the line will terminate at Stockton and Clay Streets. Construction of the Central Subway is scheduled to be completed in 2017, and revenue service is scheduled for 2019.

Muni Forward. The following changes are proposed by Muni Forward for routes in the proposed project vicinity.

- **T Third** – The number of light rail vehicles per train will increase from one to two, and headways between trains will be reduced from 9 to 8 minutes.
- **10 Townsend** – The 10 Townsend motor coach line will be renamed the 10 Sansome, with a new alignment within Mission Bay. Service would be rerouted off of Townsend down Fourth Street. From Fourth Street the route will extend through Mission Bay to new proposed street segments on Seventh Street between Mission Bay Boulevard and Irwin Street, on Irwin Street between Seventh and 16th Streets, on 16th Street between Irwin and Connecticut Streets, and on Connecticut Street between 16th and 17th Streets. Peak period headways will be reduced from 20 to 6 minutes. Midday headways will be reduced from 20 to 12 minutes. The 10 Townsend improvements represent an alternate improvement to extend transit service into Mission Bay, as required by Mission Bay FSEIR Mitigation Measure E.28.
- **22 Fillmore** – As part of the 22 Fillmore Transit Priority Project[9], the 22 Fillmore trolley bus line will be rerouted to continue along 16th Street east of Kansas Street, creating new connections to Mission Bay from the Mission neighborhood. The route change will add transit to 16th Street between Kansas and Third Streets, and to Third Street between 16th Street and Mission Bay Boulevard North. Muni Forward will change the a.m. peak period headway on the 22 Fillmore from 9 minutes to 6 minutes between buses. The service improvements will require upgrading and extending the overhead wire system on 16th Street between Potrero Avenue and Third Street. In addition to the service improvements, side-running transit-only lanes will be implemented on 16th Street between Seventh and Third Streets, and either side-running or center-running transit-only lanes will be implemented between Church and Seventh Streets by converting a mixed-flow lane to a transit-only lane. The 22 Fillmore Transit Priority Project will also include corridor-wide transit network improvements such as transit bulbs, new traffic signals, pedestrian signals,

9 The TEP included two alternatives for a Travel Time Reduction Proposal (TTRP) along 16th Street (of which one or a combination of the two could be implemented), to make the 22 Fillmore more frequent, reliable, and effective along 16th Street. The TTRP treatments are referred to as the Moderate and Expanded Alternatives. The Moderate Alternative includes a number of physical changes to the portion of the rerouted 22 Fillmore in the vicinity of Mission Bay, including, but not limited to, new transit stops, relocated transit stops, and transit bulbs, as well as new traffic signals. The Expanded Alternative includes most of the same features as the Moderate Alternative, as well as the conversion of a mixed-flow lane to a transit-only lane on both sides of 16th Street between Church and Third Streets, as well as the prohibition of left turns at Bryant, Potrero, Utah, San Bruno, Kansas, Rhode Island, De Haro, Carolina, Wisconsin, Arkansas, Connecticut, and Missouri Streets.

sidewalk widening, and upgrading of the bicycle infrastructure on 17th Street between Church and Seventh Streets to provide a parallel, contiguous, and safe bicycle route for traveling in the east-west direction.

- **33 Stanyan –** When the 22 Fillmore trolley bus service is extended into Mission Bay, the 33 Stanyan will be rerouted to follow the current alignment of the 22 Fillmore from Kansas Street to the route terminal on 20th Street at Third Street.

- **58 24th Street –** The 58 24th Street service will replace the alignment of the current 48 Quintara that terminates on 20th Street at Third Street when its service is realigned to serve Candlestick Point.

Regional Service Providers

East Bay: Transit service to and from the East Bay is provided by BART, AC Transit, and WETA. BART operates regional rail transit service between the East Bay (from Pittsburg/Bay Point, Richmond, Dublin/Pleasanton and Fremont) and San Francisco, and between San Mateo County (Millbrae and San Francisco Airport) and San Francisco. The nearest BART stations to the project site are the 16th Street and Powell stations, both about 1.7 miles east and northwest of the project site, respectively. AC Transit is the primary bus operator for the East Bay, including Alameda and western Contra Costa Counties. AC Transit operates 37 routes between the East Bay and San Francisco, all of which terminate at the (temporary) Transbay Terminal. WETA ferries provide service to between San Francisco and Alameda and between San Francisco and Oakland from the Ferry Building.

South Bay: Transit service to and from the South Bay is provided by BART, SamTrans, Caltrain, and WETA. SamTrans provides bus service between San Mateo County and San Francisco, including 14 bus lines that serve San Francisco (12 routes serve the downtown area). In general, SamTrans service to downtown San Francisco operates along South Van Ness Avenue, Potrero Avenue, and Mission Street to the Transbay Terminal. SamTrans cannot pick up northbound passengers at San Francisco stops. Similarly, passengers boarding in San Francisco (and destined to San Mateo) may not disembark in San Francisco. SamTrans routes stop at the eastbound and westbound bus stops on Mission Street at Fifth Street. WETA ferries provide service between South San Francisco and the San Francisco Ferry Building.

Caltrain provides commuter heavy-rail passenger service between Santa Clara County and San Francisco. Caltrain currently operates 38 trains each weekday, with a combination of express and local service. Two Caltrain stations are located approximately one mile from the project site, the 22nd Street station and the terminus at Fourth and King Streets; approximately 30 percent of all the weekday trains stop at the 22nd Street station.

North Bay: Transit service to and from the North Bay is provided by Golden Gate Transit buses and ferries, and WETA ferries. Between the North Bay (Marin and Sonoma Counties) and San Francisco, Golden Gate Transit operates 22 commute bus routes, nine basic bus routes and 16 ferry feeder bus routes, most of which serve the Van Ness Avenue corridor or the Financial District. In the vicinity of the project site, Golden Gate Transit bus service to downtown San Francisco operates along Mission, Howard and Folsom Streets. Golden Gate Transit routes stop at the westbound bus stop on Mission Street at Fifth Street. Golden Gate Transit also operates ferry service between the North Bay and San Francisco. During the morning and evening peak periods, ferries run between Larkspur and San Francisco and between Sausalito and San Francisco. WETA ferries provide service between Vallejo and San Francisco.

Mission Bay TMA Shuttle Service

The Mission Bay Transportation Management Association (Mission Bay TMA) provides two shuttle bus routes between Mission Bay and the Powell Muni/BART station, one shuttle bus route to Caltrain and the temporary Transbay Terminal, and a Mission Bay loop route. The shuttle service is free of charge and available for use by all employees, residents, and visitors to the Mission Bay area and the China Basin building at 185 Berry Street. The Powell Muni/BART shuttle routes operate every 15 minutes between 7:00 and 10:00 a.m. and 3:45 and 8:15 p.m. The Caltrain Transbay route operates between 6:50 and 9:00 a.m., and 3:45 and 6:40 p.m., and runs every 20 to 30 minutes. The Mission Bay loop route runs once between 6:23 and 7:05 a.m. **Figure 5.2-6** presents the existing routes serving Mission Bay. The Mission Bay TMA and shuttle service were implemented as part of Mission Bay FSEIR Mitigation Measures E.46 and E.47.

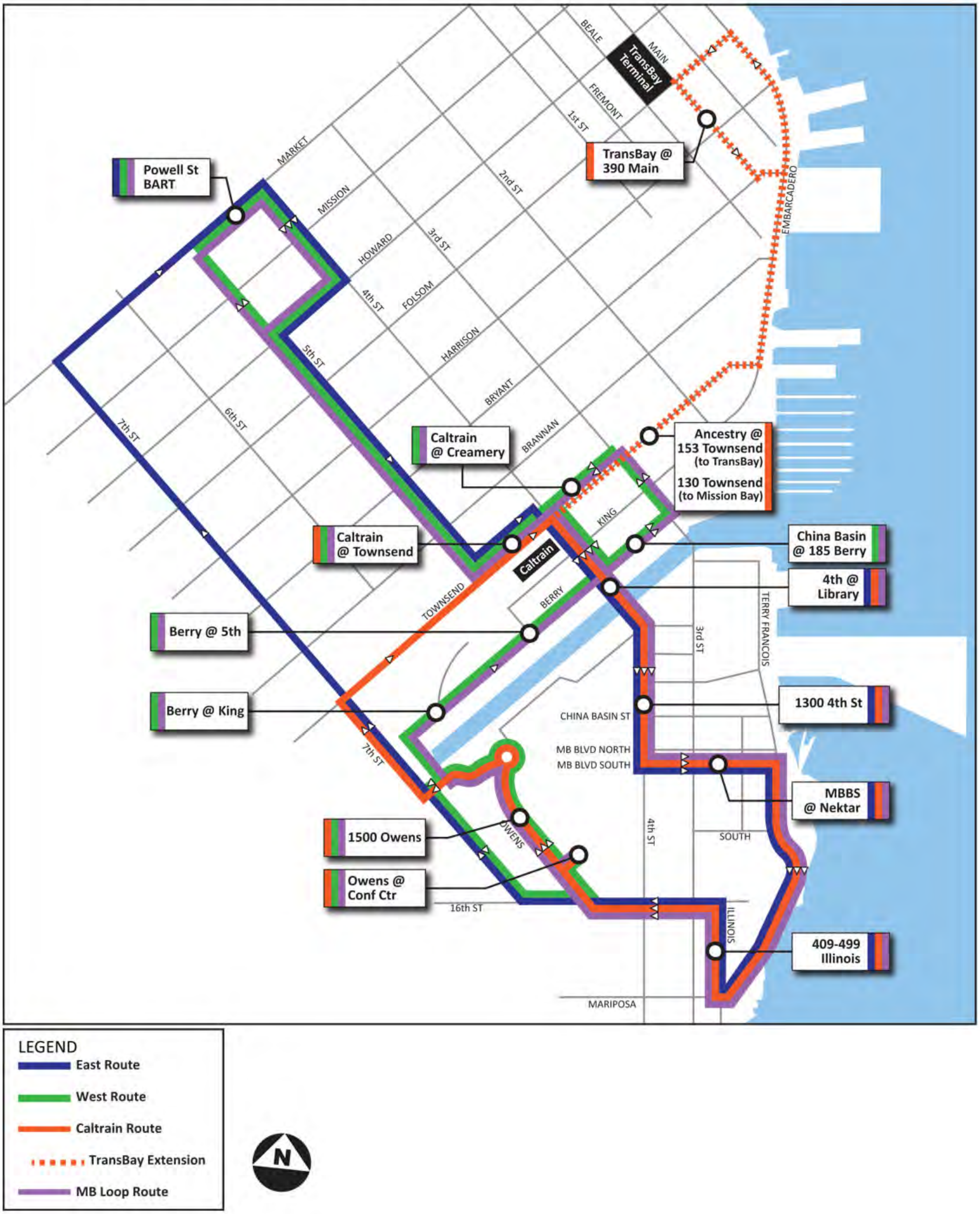
Local and Regional Transit Analysis

The assessments of existing and future transit conditions for proposed projects in San Francisco is typically performed through the analysis of local transit (Muni) and regional transit (BART, AC Transit, Golden Gate Transit, SamTrans, Caltrain, and ferry service) screenlines.[10] Each screenline is further subdivided into major transit corridors (Muni) or service provider (regional transit). Screenline values represent service capacity, ridership and utilization at the maximum load point according to the direction of travel for each of the lines that comprises the transit corridor.

Four screenlines have been established in San Francisco to analyze potential impacts of projects on Muni service: Northeast, Northwest, Southwest, and Southeast, with subcorridors within each screenline. Three regional screenlines have been established around San Francisco to analyze potential impacts on the regional transit agencies: East Bay (BART, AC Transit, ferries), North Bay (Golden Gate Transit buses and ferries), and the South Bay (BART, Caltrain, SamTrans).

Downtown screenlines examine the overall utilization of Muni transit capacity into and out of downtown San Francisco from the Northeast, Northwest, Southeast, and Southwest of San Francisco because transit travel into downtown San Francisco in the a.m. and out of downtown in the p.m., travel across the screenlines tends to be the most congested transit flow in the City. The Muni screenline analysis for the weekday p.m. peak hour focuses on transit trips in the outbound direction, i.e., trips from downtown San Francisco to other parts of the City and the region; this is because, as a major employment center, travel in downtown San Francisco during the weekday p.m. peak hour is heaviest in the outbound direction, as is the amount of transit service and capacity provided by Muni.

[10] The concept of screenlines is used to describe the magnitude of travel to or from the greater downtown area, and to compare estimated transit ridership to available capacities. Screenlines are hypothetical lines that would be crossed by persons traveling between downtown and its vicinity and other parts of San Francisco and the region.



SOURCE: Mission Bay TMA Effective March 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-6
Existing Mission Bay TMA Shuttle Routes

In addition, a capacity utilization analysis was also conducted for the two Muni routes that serve the project site: the T Third light rail line and the 22 Fillmore bus route. Because the Central Subway and 22 Fillmore Transit Priority Projects are approved, funded, and planned to be in place by 2020, the transportation impact analysis is based on the ridership projections for 2020, as well as the planned capacity assuming implementation of these projects.[11] The transit analysis is conducted by calculating the existing capacity utilization (riders as a percentage of capacity) at the maximum load point (the point of greatest demand). Muni has established a capacity utilization standard of 85 percent for weekday peak hour analyses. Section 5.2.5.3, under "Approach to Impact Analysis Methodology," presents the analysis methodology for the transit capacity utilization and screenline analysis.

For the purpose of this analysis, the ridership and capacity at the three regional screenlines represent the peak direction of travel and patronage loads, which correspond with the evening commute in the outbound direction from downtown San Francisco to the region. As a means to determine the amount of available space for each regional transit provider, capacity utilization is also used. For all regional transit operators, the capacity is based on the number of seated passengers per vehicle. All of the regional transit operators have a one-hour load factor standard of 100 percent, which would indicate that all seats are full.

Table 5.2-4 presents the ridership and capacity utilization at the maximum load point (MLP) for the T Third and 22 Fillmore routes serving the project site for the four analysis time periods. As indicated in **Table 5.2-4,** capacity utilization during the four analysis periods is less than Muni's established 85 percent capacity utilization standard.

Table 5.2-5 presents the Muni downtown and regional transit screenlines for weekday p.m. peak hour (outbound) conditions. Overall, all screenlines and corridors are currently operating below the 85 percent capacity utilization standard, and could accommodate additional passengers.

5.2.3.3 Pedestrian Network

The project site is currently undeveloped, except for two surface parking lots. There currently are no sidewalks on South Street, Terry A. Francois Boulevard, or 16th Street adjacent to the project. On Third Street between 16th and South Streets, a 12-foot wide sidewalk is provided. Pedestrian crosswalks and pedestrian countdown signals are provided at the intersections of Third/South and Third/16th. Pedestrian crosswalks are provided at the west and north legs of the unsignalized intersection of Terry A. Francois/South.

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[11] Focusing on the year 2020 is appropriate because it corresponds to the time frame within which the proposed project would become operational; it is therefore appropriate to consider improvements to the transit system that will be in place and operational as of that year. The Central Subway and 22 Fillmore Transit Priority Project are approved and funded, and will be in operation by the time the proposed project becomes operational.

TABLE 5.2-4
TRANSIT CAPACITY UTILIZATION - EXISTING CONDITIONS – WITHOUT A SF GIANTS GAME – WEEKDAY PM, EVENING, AND LATE EVENING AND SATURDAY EVENING PEAK HOURS

Route/Service Provider	WEEKDAY PM OUTBOUND			WEEKDAY EVENING INBOUND			WEEKDAY LATE EVENING OUTBOUND			SATURDAY EVENING INBOUND		
	Ridership	Capacity	Capacity Utilization[a]	Ridership	Capacity	Capacity Utilization	Ridership	Capacity	Capacity Utilization	Ridership	Capacity	Capacity Utilization
San Francisco[b]												
T Third	1,945	3,808	51.1%	1,880	2,285	82.3%	415	1,714	24.2%	336	1,714	19.6%
22 Fillmore	545	942	57.9%	249	628	39.6%	181	252	71.7%	230	378	60.9%
Total	2,490	4,750	52.4%	2,128	2,913	73.1%	595	1,966	71.7%	566	2,092	27.1%
East Bay												
BART	19,972	21,220	94.1%	4,184	15,870	26.4%	4,035	6,095	66.2%	2,364	8,740	27.0%
AC Transit	2,275	3,926	57.9%	149	520	28.7%	104	200	52.2%	51	200	25.4%
Ferries	805	1,615	49.8%	45	576	7.8%	0	0	0.0%	0	0	0.0%
Total	23,052	26,761	86.1%	4,378	16,966	25.8%	4,140	6,295	65.8%	2,415	8,940	27.0%
North Bay												
Buses	1,389	2,817	49.3%	81	120	67.2%	27	80	33.8%	80	137	58.4%
Ferries	968	1,959	49.4%	209	1,357	15.4%	463	637	75.8%	826	1,594	51.8%
Total	2,357	4,776	49.4%	290	1,477	19.6%	510	717	71.1%	906	1,731	52.3%
South Bay												
BART	8,698	16,693	52.1%	3,776	18,400	20.5%	1,951	5,290	36.9%	2,134	10,925	19.5%
Caltrain	2,405	3,100	77.6%	2,031	2,600	78.1%	185	650	28.4%	690	1,300	53.1%
SamTrans	146	320	45.9%	35	160	21.8%	21	40	53.2%	20	80	25.3%
Total	11,249	20,113	55.9%	5,842	21,160	27.6%	2,157	5,980	36.1%	2,844	12,305	23.1%

NOTES:
[a] For weekday p.m. peak hour conditions, capacity utilization exceeding 85 percent for Muni and 100 percent for regional transit highlighted in **bold.** Significant project impacts shaded.
[b] Ridership and capacity for the T Third and 22 Fillmore reflect implementation of the Central Subway and 22 Fillmore Transit Priority Project.
[c] Ridership and capacity for BART reflect average of all days in April 2015, including without and with SF Giants games.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

TABLE 5.2-5
MUNI DOWNTOWN TRANSIT SCREENLINES – EXISTING CONDITIONS
WEEKDAY P.M. PEAK HOUR

Screenline / Corridor / Transit Provider		Ridership	Capacity	Capacity Utilization
Muni Downtown Screenlines (Outbound from Downtown)				
Northeast	Kearny/Stockton	2,172	3,291	66.0%
	All Other Lines	570	1,078	52.9%
	Subtotal	*2,742*	*4,369*	*62.8%*
Northwest	Geary	1,821	2,528	72.0%
	California	1,371	1,686	81.3%
	Sutter/Clement	472	630	74.9%
	Fulton/Hayes	969	1,176	82.4%
	Balboa	640	925	68.8%
	Subtotal	*5,273*	*6,949*	*75.9%*
Southeast	Third Street	553	714	77.5%
	Mission Street	1,539	2,789	55.2%
	San Bruno/Bayshore	1,328	2,134	*62.2%*
	All Other Lines	1,040	1,712	60.8%
	Subtotal	*4,461*	*7,349*	*60.7%*
Southwest	Subway Lines	4,766	6,249	*75.7%*
	Haight/Noriega	1,109	1,651	67.2%
	All Other Lines	277	700	39.6%
	Subtotal	*6,152*	*8,645*	*71.2%*
	Total All Muni Screenlines	***18,628***	***27,312***	***68.2%***

SOURCE: San Francisco Planning Department Memorandum, Transit Data for Transportation Impact Studies, June 2013.

In the vicinity of the project site, existing pedestrian volumes are low throughout the day. Pedestrian conditions were quantitatively assessed for the crosswalks at the adjacent intersections of Third/South and Third/16th, and on the sidewalk on both sides of the street on Third Street between South and 16th Streets. Pedestrian counts were conducted in May and June 2014 (prior to the opening of the UCSF Medical Center Phase 1) for the weekday p.m., weekday evening, and Saturday evening peak hours. Due to the low pedestrian volumes in the area, weekday late evening pedestrian counts were not conducted, as they would be less than the weekday evening peak hour counts. The pedestrian volumes collected in the field were adjusted upwards to reflect the projected increase in pedestrians associated with the UCSF Medical Center Phase 1 and the Public Safety Building, similar to that described above for traffic volumes (weekday p.m. peak hour pedestrian volume counts at the crosswalks at Third/16th and on the sidewalk on Third Street between South and 16th Streets conducted in April 2015 indicated similar pedestrian volumes to the adjusted May/June 2014 volumes to reflect the UCSF Medical Center Phase 1 and Public Safety Building). For all analysis hours, pedestrian volumes are greater at the intersection of Third/South than Third/16th due to the T Third UCSF/Mission Bay light rail stop at South Street.

Existing pedestrian conditions were evaluated using LOS. Section 5.2.5.3, under "Approach to Impact Analysis Methodology," which presents the analysis methodology and the LOS definitions for crosswalks and sidewalks. **Table 5.2-6** presents the pedestrian volumes and LOS for the crosswalk and sidewalk locations for the analysis hours. Due to the low pedestrian volumes in the project vicinity, all study locations operate satisfactorily at LOS A conditions during all analysis hours.

TABLE 5.2-6
PEDESTRIAN LEVEL OF SERVICE
EXISTING CONDITIONS – WITHOUT A SF GIANTS GAME
WEEKDAY P.M. AND EVENING, AND SATURDAY EVENING PEAK HOURS

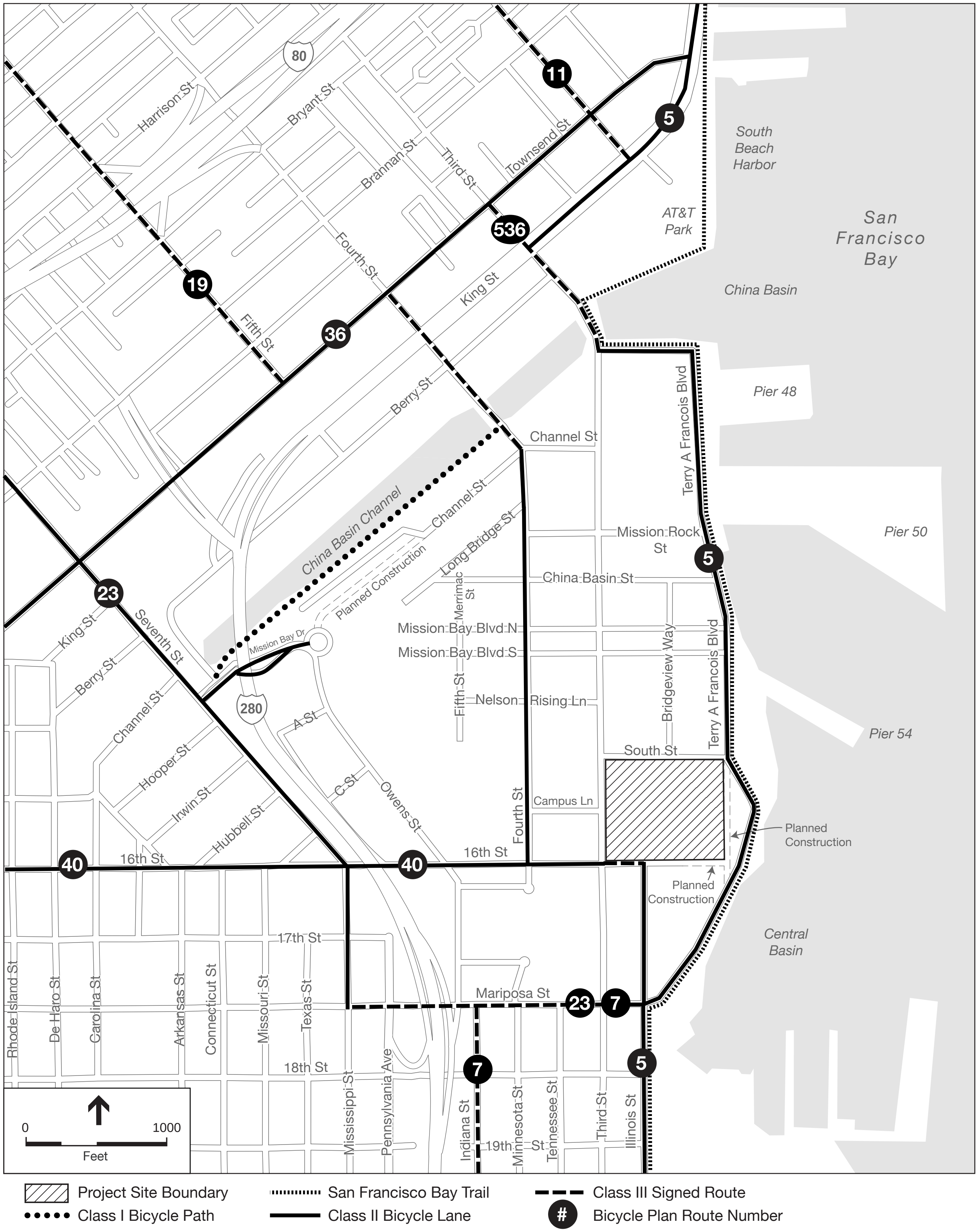
	Weekday Conditions						Saturday Evening		
	PM			Evening					
Analysis Location	**Peds/ Hour**	**MOE[a]**	**LOS**	**Peds/ Hour**	**MOE**	**LOS**	**Peds/ Hour**	**MOE**	**LOS**
Crosswalks									
Third St/South St									
North	42	472	A	25	793	A	17	1,285	A
South	91	216	A	63	313	A	25	875	A
East	66	1,093	A	31	2,333	A	10	1,909	A
Third St/16th Street									
North	30	868	A	23	1,131	A	11	2,024	A
South	60	432	A	42	618	A	25	896	A
East	31	1,338	A	19	2,180	A	8	3,078	A
West	89	424	A	67	564	A	17	1,424	A
Sidewalks									
Third St between South & 16th Streets									
East	56	0.2	A	41	0.1	A	19	0.1	A
West	70	0.2	A	52	0.2	A	17	0.1	A

NOTES:
[a] The measure of effectiveness for crosswalks is density – pedestrians per square foot. The measure of effectiveness for sidewalks and crosswalks is the flow rate – pedestrians per minute per foot.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015.

5.2.3.4 Bicycle Network

The majority of the Mission Bay area is flat, with minimal changes in grades, facilitating bicycling within and through the area. A number of existing bicycle routes are located in the project vicinity. These include City routes that are part of the San Francisco Bicycle Network, routes developed as part of the Mission Bay Plan, and regional routes that are part of the San Francisco Bay Trail system. **Figure 5.2-7** presents the bicycle routes and facilities within the study area, as identified in the *San Francisco Bike Map and Walking Guide*.



SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-7
Existing Bicycle Route Network

Bikeways are typically classified as Class I, Class II, or Class III facilities.[12] Class I bikeways are bike paths with exclusive right-of-way for use by bicyclists or pedestrians. Class II bikeways are bike lanes striped with the paved areas of roadways and established for the preferential use of bicycles, and include separate bicycle lanes. Separate bicycle lanes provide a striped, marked and signed bicycle lane buffered from vehicle traffic. These facilities are located on roadways and reserve four to five feet of space for exclusive bicycle traffic. Class III bikeways are signed bike routes that allow bicycles to share travel lanes with vehicles. Designated bicycle routes in the project vicinity include:

Bicycle Route 5 connects to the study area from the north at King/Third and runs north and south along Third Street, Terry A. Francois Boulevard, and Illinois Street as a Class II bicycle facility.

Bicycle Route 7 runs on Indiana Street between Cesar Chavez and Mariposa Streets as a route with a Class II facility. Bicycle Route 7 also runs along Mariposa Street between Mississippi and Third Streets as a Class III bicycle facility.

Bicycle Route 23 runs north along Seventh Street between Townsend and 16th Streets, and along Mississippi Street between 16th and Mariposa Streets as a Class II facility. Bicycle Route 23 also runs along Mariposa Street between Mississippi and Illinois Streets as a Class III bicycle facility.

Bicycle Route 40 runs east-west on 16th Street between Kansas and Third Streets as a Class II bicycle facility. As part of the Mission Bay South Infrastructure Plan, Class II bicycle lanes will be implemented on 16th Street between Third Street and Terry A. Francois Boulevard at the time when Terry A. Francois Boulevard is realigned to the west and 16th Street is extended from Illinois Street to Terry A. Francois Boulevard.

Figure 5.2-7 also presents the San Francisco Bay Trail. The San Francisco Bay Trail is designed to create recreational pathway links to the various commercial, industrial and residential neighborhoods that surround the San Francisco Bay. In addition, the trail connects points of historic, natural and cultural interest; recreational areas such as beaches, marinas, fishing piers, boat launches, and numerous parks and wildlife preserves. At various locations, the Bay Trail consists of paved multi-use paths, dirt trails, bike lanes, sidewalks or city streets signed as bicycle routes. In the project vicinity, an improved Bay Trail path follows the shoreline of San Francisco Bay, east of Terry A. Francois Boulevard within the area that will be developed as part of the Mission Bay Plan as the Bayfront Park.

Bicycle volume counts were conducted during the weekday p.m., weekday evening, and Saturday evening peak periods in May and June 2014 on Third Street and on 16th Street, and counts on Terry A. Francois Boulevard were conducted in October 2014 (weekday p.m. peak hour bicycle volume counts conducted on Third Street between South and 16th Streets in April 2015 indicated similar bicycle volumes to those conducted in October 2014). **Table 5.2-7** presents the existing hourly bicycle volumes. The highest bicycle volumes were observed on Terry A. Francois Boulevard during the weekday p.m. and evening peak hours, although a number of bicyclists

[12] Bicycle facilities are defined by the State of California in the California Streets and Highway Code Section, 890.4. Available online at http://ca.regstoday.com/law/shc/ca.regstoday.com/laws/shc/calaw-shc_DIVISION1_CHAPTER8.aspx. Accessed May 28, 2015.

were observed traveling within the mixed-flow lanes on Third Street. Bicycle volumes during the Saturday evening peak hour are substantially lower than during the weekday p.m. or weekday evening peak hours. Overall, on weekdays and weekends bicycle conditions were observed to be operating acceptably, with no conflicts between bicyclists, pedestrians and vehicles.

TABLE 5.2-7
BICYCLE VOLUMES – EXISTING CONDITIONS,
WEEKDAY PM AND EVENING, AND SATURDAY EVENING PEAK HOURS

Segment	Weekday Conditions		Saturday Evening Conditions
	PM	Evening	
Without a SF Giants Game			
Third St between South and 16th Streets[b]			
Northbound	11	9	5
Southbound	39	24	2
16th Street between Third and Fourth Streets			
Westbound	17	15	1
Eastbound	18	21	6
Terry A. Francois Blvd between South and 16th Streets			
Northbound	27	26	12
Southbound	51	49	13
With a SF Giants Evening Game			
Third St between South and 16th Streets[b]			
Northbound	15	27	7
Southbound	20	32	2
16th Street between Third and Fourth Streets			
Westbound	27	28	6
Eastbound	19	32	6
Terry A. Francois Blvd between South and 16th Streets			
Northbound	23	18	8
Southbound	21	27	10

NOTES:
[a] Bicycle counts on Third and 16th Streets conducted in May and June 2014, and bicycle counts on Terry A. Francois Boulevard conducted in September and October 2014.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015.

There are no on-street bicycle racks on Third Street adjacent to the project site, however, there are bicycle racks on the sidewalk on the north side of South Street and on the east sidewalk of Terry A. Francois Boulevard north of South Street, and west of the project site within the UCSF research campus; additional bicycle racks are provided at the recently opened UCSF Medical Center campus site. The closest Bay Area Bike Share stations in the project vicinity are on Townsend Street between Seventh and Eighth Streets (accommodating eight bicycles), and at the Caltrain station at King and Fourth Streets (accommodating 42 bicycles).

As part of the 22 Fillmore Transit Priority Project described above, the existing bicycle lanes on 16th Street (Bicycle Route 40) between Seventh and Kansas Streets, will be relocated to 17th Street between Seventh and Kansas Streets. On 17th Street at Kansas Street, the relocated bicycle lane will connect with the existing bicycle lane on the same street to the west, while at the east end, the bicycle lane will connect with the existing bicycle lane on Mississippi Street that runs between Mariposa and 16th Streets.

5.2.3.5 Loading Conditions

There are no on-street commercial loading spaces or passenger loading/unloading zones adjacent to, or in the vicinity of the project site. Some loading operations were observed to occur within the curb lane of South Street adjacent to the office building at 550 Terry A. Francois Boulevard (i.e., in the vicinity of its off-street loading facility).

5.2.3.6 Emergency Vehicle Access

The project site has frontages on four streets – South Street, Terry A. Francois Boulevard, 16th Street, and Third Street. Emergency vehicle access to the project site is primarily from Third Street, which has two travel lanes each way. The nearest fire stations to the project site are Station 8 at 36 Bluxome Street between Fourth and Fifth Streets (about one mile to the northwest of the project site), and Station 29 at 299 Vermont Street between 15th and 16th Streets (about 0.85 miles west of the project site). A new Public Safety Building located on Third Street at Mission Rock Street was completed in 2014, and became operational in early 2015. This new facility accommodates the headquarters of the San Francisco Police Department, the new Southern District police station, and a new fire station (i.e., Station 4). The fire station has access on Mission Rock Street between Third Street and Terry A. Francois Boulevard (less than half a mile north of the project site).

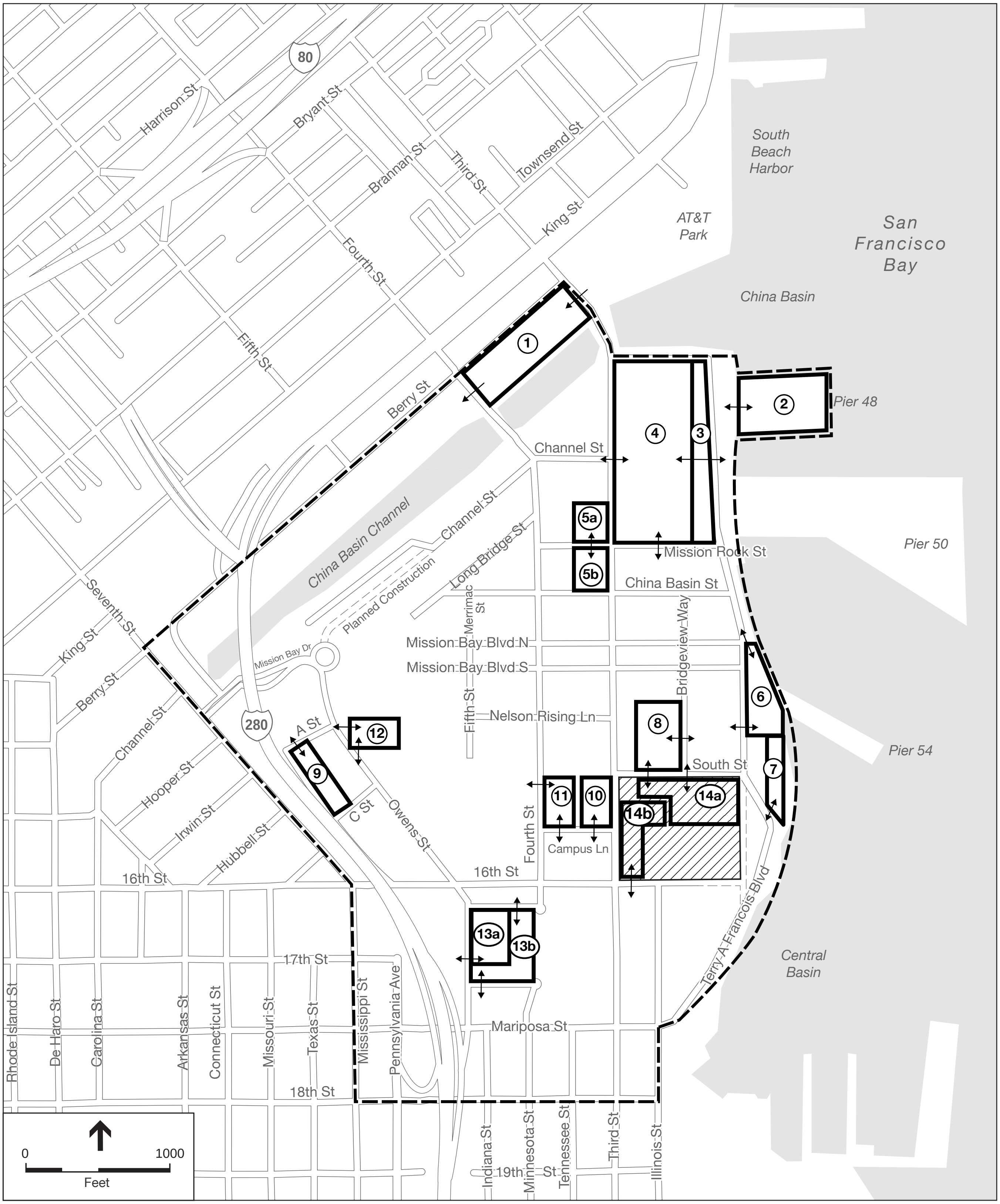
The UCSF Medical Center Phase 1 hospitals opened in February 2015. The Children's Hospital Emergency room and urgent care facility is located on Fourth Street at Mariposa Street. Emergency vehicle access to this facility is via Mariposa Street and via Owens Street and the South Connector Road. The San Francisco General Hospital (SFGH), located approximately 1.75 miles southeast of the project site (via 16th Street and Potrero Avenue), is the only designated trauma center in San Francisco.[13]

5.2.3.7 Parking Conditions

Off-street Parking

The existing parking conditions were examined within the parking study area, which is bounded by Townsend to the north, Seventh and Mississippi Streets to the west, 18th Street to the south, and San Francisco Bay to the east (see **Figure 5.2-8**). The parking study area was defined to include those off-street parking facilities located within a reasonable walking distance from the project site for an event, up to 0.5 miles, with easy access from the major street corridors that provide access to the Mission Bay Area.

13 A trauma center is a hospital equipped and staffed to provide comprehensive emergency medical services to patients suffering traumatic injuries.



Project Site Boundary — Parking Study Area — Driveway — (#) Keyed to Table 5.2-8

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-8
Existing Off-Street Public Parking Facilities

Existing off-street parking supply and utilization data were obtained from available studies conducted in Mission Bay for the UCSF LRDP EIR (with surveys conducted in March and September 2013), and supplemented with additional field surveys in March 2013 and September and October 2014. **Table 5.2-8** lists the public parking facilities within the study area, indicates whether the facility is a garage or a surface parking lot, and notates the days and hours of operation. **Figure 5.2-8** presents the location of each facility. As noted in **Table 5.2-8**, two surface parking lots currently operate in the west and north portions of the project site. Parking Lot E, accessed from 16th Street, contains 289 parking spaces; and Parking Lot B, accessed from South Street, contains 316 parking spaces, for a total of 605 parking spaces.

TABLE 5.2-8
EXISTING OFF-STREET PUBLIC PARKING FACILITIES WITHIN PARKING STUDY AREA

Parking Facility[a] (Keyed to Figure 5.2-8)	Facility	Spaces	Days/Hours/Terms of Operation
1. 185 Berry Street	Garage	270	M-F 6:30 a.m. to 7 p.m./extended during events
2. Pier 48 Sheds A and B	Shed	500	SF Giants game day only
3. West side of TF Blvd along Lot A	Lot	130	24 hours
4. 74 Mission Rock (Lot A)[b]	Lot	2,400	24 hours
5. Blocks 3E & 4E (Lot C)[c]	Lot	320	SF Giants game day only
6. 601 TFB/Pier 52 Boat Launch	Lot	57	24-hours (90 minute limit during special events)
7. East side of TF Blvd at South St.	Lot	78	24-hours
8. 450 South Street	Garage	1,400	M-F 7 a.m. to 7 p.m. (no event parking)
9. 1670 Owens Street	Garage	780	M-F 7 a.m. to 7 p.m.
10. UCSF 1650 Third Street	Garage	730	24 hours (permit parking only 6 p.m. to 7 a.m.)
11. UCSF Block 23	Lot	220	24 hours
12. UCSF 1625 Owens Street	Garage	590	24 hours
13. UCSF Medical Center Phase 1[d]	Garage/Lot	1,050	24 hours
14. 455 South & 1725 Third (project site)	Lot	610	M-F 6 a.m. to 9 p.m./extended during events
Total spaces [e]		**9,135**	

NOTES:
[a] Existing parking supply. See **Appendix TR** for additional details related to owner/operator.
[b] Reflects reduction in parking supply due to development associated with The Yard.
[c] Reflects closure of 1000 Third Street (Lot D) with 320 spaces, and Lot C – Block 7 with 300 spaces, and increase in capacity at Lot C Blocks 3E and 4E (increase of 160 spaces).
[d] New parking facilities associated with UCSF Medical Center Phase 1 operations.
[e] Assuming all facilities open at the same time.

SOURCE: Adavant Consulting/LCW Consulting, 2015

The parking supply and demand survey data from 2013 and 2014 were adjusted to reflect changes in the parking conditions since the surveys were conducted. Specifically, the parking supply includes the new garage and surface lot associated with the recently-opened UCSF Medical Center Phase 1 (a total of 1,050 parking spaces), and the elimination of 320 spaces in the surface parking lot at 1000 Third Street (referred to as Lot D on Block 1 through Block 4), elimination of 300 spaces in the surface parking lot at Lot C South (Block 7), and reduction of 100 spaces in Lot A where development projects are pending in early 2015, and an increase in parking supply on Lot C (physically two lots located at Blocks 3E and 4E) from 160 to 320 spaces. The weekday parking occupancy for the analysis hours for the new UCSF Medical Center Phase 1 garage and lot was based on the parking demand at full occupancy identified in the UCSF LRDP EIR as well as information on parking utilization at other UCSF parking facilities; this assumption was later confirmed by parking occupancy surveys conducted in April 2015. Because the UCSF LRDP EIR did not include an analysis of Saturday conditions, the Saturday parking occupancy for the analysis hours for the new UCSF Medical Center Phase 1 garage and lot was based on surveys of UCSF facilities conducted in April 2015. The parking demand associated with the eliminated parking spaces was redistributed to other nearby facilities. Detailed parking supply and occupancy information for the unadjusted and adjusted conditions are included in **Appendix TR**.

There are 15 off-street parking facilities that were observed for parking occupancies in the parking study area, containing a total of approximately 9,135 parking spaces, with the greatest number of spaces at Lot A (i.e., 2,400 spaces or 26 percent of the total supply). **Table 5.2-9** presents the parking occupancy for weekdays and Saturdays, for midday and evening conditions. Midday represents the period between 11:30 a.m. and 1:30 p.m., and the evening represents the period between 7:00 and 8:30 p.m.

TABLE 5.2-9
OFF-STREET PARKING SUPPLY AND OCCUPANCY
EXISTING CONDITIONS – WITHOUT A SF GIANTS GAME
WEEKDAY AND SATURDAY

	Occupancy[b]			
	Weekday		Saturday	
Parking Facility[a]	Midday	Evening	Midday	Evening
1. 185 Berry Street	100%	--	--	--
2. Pier 48 Sheds A and B	--	--	--	--
3. West side of TF Blvd along Lot A	0%	8%	8%	8%
4. 74 Mission Rock (Lot A)[b]	41%	27%	5%	5%
5. Blocks 3E & 4E (Lot C)[c]	--	--	--	--
6. 601 TFB/Pier 52 Boat Launch	88%	88%	35%	18%
7. East side of TF Blvd at South St.	38%	13%	0%	0%
8. 450 South Street	77%	--	--	--
9. 1670 Owens Street	41%	--	--	--
10. UCSF 1650 Third Street	97%	48%	21%	19%
11. UCSF Block 23	95%	68%	95%	68%
12. UCSF 1625 Owens Street	93%	30%	41%	14%
13. UCSF Medical Center Phase 1[d]	90%	54%	30%	35%
14. 455 South & 1725 Third (project site)	39%	3%	--	--
Total Supply	**8,345**	**5,865**	**5,255**	**5,255**
Average Utilization	**65%**	**36%**	**22%**	**38%**

NOTES:
[a] Existing parking supply. See **Appendix TR** for additional details related to owner/operator.
[b] Reflects reduction in parking supply due to development associated with The Yard (a temporary pop-up venue).
[c] Reflects closure of 1000 Third Street (Lot D) with 320 spaces, and Lot C – Block 7 with 300 spaces, and increase in capacity at Lot C Blocks 3E and 4E (increase of 160 spaces).
[d] New parking facilities associated with UCSF Medical Center Phase 1 operations.

SOURCE: Adavant Consulting/LCW Consulting, 2015

On weekdays without a SF Giants game at AT&T Park, off-street parking facilities during the weekday midday period range in occupancy between 40 percent and fully occupied, with an average of 52 percent occupancy. Parking demand in the study area is lower during the weekend midday peak period, with an average of 22 percent occupancy. Since many parking facilities in the study area serve the medical and office uses in the area, the occupancy of the off-street facilities is substantially lower during weekday evenings (about 36 percent occupied) and Saturday evenings (about 18 percent occupied). Parking occupancies on days with a SF Giants evening game at AT&T Park are presented in Section 5.2.3.8 below.

On-street Parking

Existing on-street parking conditions were qualitatively assessed during field observations, and from previously-collected data for streets within and in the vicinity of the UCSF Mission Bay campus from field surveys conducted as part of the UCSF LRDP EIR.

Adjacent to the project site, parking is prohibited on Third Street, as the northbound travel lane runs adjacent to the curb. Adjacent to the project site, on-street parking is currently not permitted on South and 16th Streets, while on Terry A. Francois Boulevard on-street parking is permitted, and is currently unrestricted.

Elsewhere in the project vicinity, on-street parking is primarily metered one-hour, four-hour and unlimited time restricted parking spaces. Exceptions include portions of Terry A. Francois Boulevard, Mission Bay Boulevard North, Mission Bay Boulevard South, 16th Street, and Mariposa Street. Parking is prohibited on 16th Street west of Third Street. Metered parking regulations are in effect Monday through Saturday between 9:00 a.m. and 10:00 p.m., and between 9:00 a.m. and 6:00 p.m. on Sundays. The SFMTA and the Port of San Francisco have established Mission Bay as a metered district, and installation of meters is ongoing, as street construction and parcel development is completed. In February 2012, the Port Commission reconfirmed its approval for parking meters in Mission Bay. These new meters will have no time limit, thereby removing the two-hour time limited parking restrictions currently in effect in much of Mission Bay. Thus, streets with unrestricted and unmetered parking spaces, such as Terry A. Francois Boulevard, South Street, and 16th Street adjacent to the project site, will be metered. Special event pricing is in effect for all parking meters within Mission Bay South; rates are higher for meters located closer to AT&T Park.

On-street parking is well utilized during the daytime hours, with higher occupancies near completed and occupied buildings. Midday occupancy on streets within the UCSF Mission Bay campus are about 90 percent occupied, as is Terry A. Francois Boulevard. Parking utilization during the evening (about 25 percent) and overnight hours is low due to the limited evening uses in the area. On-street parking during the evening hours increase on days with a SF Giants evening game at AT&T Park (about 60 percent). See Section 5.2.3.8 for information on conditions with a SF Giants evening game.

Residential Permit Parking (RPP) regulations generally restrict on-street parking to a time-limited period, but vary on the days of the week and time of day that the regulations are in effect.[14] South of the project site, there is an Area "X" RPP regulation that restricts on-street parking Monday through Friday, to a two- or four-hour period between the hours of 8:00 a.m. and 4:00 p.m. unless an RPP "X" permit is displayed, in which case there is no time limit enforced. East of I-280, Area "X" extends south of Mariposa Street between Indiana and Third Streets, and west of I-280 it extends south of 16th Street. Thus, within the parking study area, the streets between Mariposa and 18th Streets, between Indiana and Third Streets are subject to the RPP "X' regulation.

5.2.3.8 Conditions with a SF Giants Evening Game at AT&T Park

AT&T Park, which is home to the San Francisco Giants Major League Baseball team, is located south of King Street between Second and Third Streets, approximately 0.7 miles north of the project site. AT&T Park has a capacity of approximately 42,000 attendees. San Francisco Giants regular season baseball games occur generally from April through September, and there are about 81 regular season home games during the baseball season. There are typically two pre-season baseball games. Up to 12 post-season games are possible, generally in October. AT&T also hosts occasional non-baseball events such as concerts, soccer games, and private parties.

- AT&T Park provides a Transportation Management Center (TMC) that contains access to video cameras positioned at several key intersections north of the channel. A Parking Control Officer (PCO)[15] Supervisor is stationed at the TMC, and there are two PCO supervisors in the field (one for the area north of the channel, and one for the area south of the channel) that manage the 22 to 24 other PCOs that are typically assigned to a baseball game. The PCOs are deployed and relocated based on real-time information from video cameras and radio and telephone communications with PCOs. Flashing beacons and signs can also be activated from the TMC. These beacons are designed to notify motorists when there is an event at AT&T Park and direct them to alternate routes. There are flashing beacons facing southbound traffic on The Embarcadero between Folsom and Harrison Streets, facing eastbound traffic on 16th Street east of Seventh Street, and on northbound I-280 approaching the Mariposa Street exit.[16]

- Eastbound King Street between Third and Second Streets is closed to vehicular traffic starting at the seventh inning, and is reopened after traffic dissipates, typically about 45 minutes to an hour following the end of the game. However, weekday games can partially overlap with the evening peak commute period, which can extend the temporary eastbound road closure on King Street and associated post-game congestion. There are about 10 weekday baseball games per year.

[14] The preferential residential parking system (i.e., the Residential Permit Parking program) was established in 1976 to preserve neighborhood living within a major urban center. The main goal of the program is to provide more parking spaces for residents by discouraging long-term parking by people who do not live in the area. Local regulations regarding the establishment of permit areas and requirements for permits can be found in the San Francisco Transportation Code, Division II, Article 900. Available online at https://law.resource.org/pub/us/code/city/ca/SanFrancisco/0-snapshots/S-44/Transportation.html. Access May 28, 2015.

[15] In San Francisco, Parking Control Officers (PCOs), also known as Traffic Control Officers, are deployed to manage and direct vehicular, transit, bicycle, and pedestrian flows, in an effort to increase safety and reduce congestion.

[16] There is an existing flashing beacon on Third Street north of Mariposa Street. The permanent changeable message sign at this location installed by the SFMTA as part of SFgo will replace the beacon and associated signage, and the beacon and signage will be removed.

- The two easternmost travel lanes on Third Street between Terry A. Francois Boulevard and Berry Street are closed to vehicular traffic from approximately two hours prior to a game through about one hour after the end of the game to provide pedestrians additional walkway area. The three remaining lanes remain open to vehicular traffic; pre-game there are two southbound lanes and one northbound lane, while post-game there are two northbound lanes and one southbound lane.

- Fourth Street between Channel and Berry Streets is restricted to transit vehicles, taxis and bicycles only starting at the seventh inning, and is reopened after traffic dissipates.

- The northern portion of Terry A. Francois Boulevard is closed to vehicular traffic approximately two to three hours prior to a game, and is reopened when most vehicles have exited the parking lot (i.e., Lot A containing approximately 2,400 spaces).

- Vehicles exiting the parking facilities and traveling southbound on Terry A. Francois Boulevard are not permitted to turn right onto Mariposa Street westbound. Instead, drivers are directed south on Illinois Street. Tow-away regulations are in effect on game days on the west side of Illinois Street between Mariposa and 18th Streets to allow for two southbound lanes to continue on Illinois Street (i.e., Terry A. Francois Boulevard contains two southbound travel lanes, while Illinois Street contains one southbound travel lane, and without additional travel lane capacity this location would become a bottleneck). South of 18th Street one southbound travel lane is provided, as a substantial number of vehicles on Illinois Street turn right onto 18th Street westbound.

- Additional walking area for pedestrians is provided before and after games on the Lefty O'Doul (Third Street) Bridge, and on the closed portion of Terry A. Francois Boulevard. After games, pedestrians are permitted on the closed portion of King Street (i.e., the eastbound lanes) between Third and Second Streets. This area is used to stage Muni Metro riders in order to prevent the transit boarding island on King Street west of Second Street from getting overcrowded.

- At the intersection of Third Street/King Street, pedestrians are sometimes permitted to cross diagonally during the post-game surge. Otherwise, pedestrians are directed by PCOs to stay on the sidewalks and within crosswalks, crossing on the WALK indication, or when PCOs direct pedestrians to cross; in this fashion, pedestrians are prevented from shutting down the intersection to transit and traffic flow, and from obstructing Muni Metro tracks. Some sidewalks such as the east side of Third Street between King and Townsend Streets become very congested, and, as a result, some pedestrians walk in the traffic lanes on northbound Third Street. Right turns are prohibited during the post-game periods at several locations, such as northbound Third Street at Townsend Street, where conflicts between right turning traffic and pedestrians in the east crosswalk can cause delays to traffic on northbound Third Street.

- There are currently three taxi stands for AT&T Park on game days: west side of Second Street just south of Townsend Street, west side of Second Street north of Townsend Street (post-game period only), and west side of Third Street just north of King Street. Taxi operations work well before and during games. However, during the post-game period, taxis have difficulty leaving the ballpark area without getting stuck in post-game traffic congestion. Left turns are not allowed from southbound Second Street onto eastbound King Street/The Embarcadero because of conflicts with Muni Metro operations. Post-game traffic on westbound King Street between Second and Third Streets is typically very congested due to heavy traffic and pedestrian volumes at the intersection of Third/King. The post-game only taxi stand on the west side of Second Street north of Townsend Street is designed to allow taxis on southbound Second Street to exit the area by turning either left on right onto Townsend Street, which is generally not congested with post-game traffic. However, this zone is often illegally occupied by limousines or TNC vehicles, instead of taxis. PCOs are regularly dispatched to enforce the taxi-only restriction.[17]

- Attendees arriving by auto are directed to two parking facilities north of the channel (i.e., the Pier 30 lot and the Bayside lot at Seawall Lot 330 containing a total of about 1,300 spaces), and six surface parking lots south of the channel (Lot A, Lot B, Lot C North, Lot C South, and Lot D, as well as Pier 48, with the six lots containing a total of 4,250 parking space. Lot B is located on the project site). Parking in Lot A is mainly reserved for pre-paid and ADA parking only. Event parking is also provided in other publicly-accessible off-street parking facilities north and south of the ballpark.

- Special event pricing is in effect at on-street parking meters within the area generally bounded by Bryant Street to the north, Fifth and Seventh Streets to the west, Mariposa Street to the south, and the San Francisco Bay to the east. In addition, evening hours at meters are extended to 10:00 p.m. Monday through Sunday. Special event meter rates are generally $7 per hour north of the channel and south to Mission Bay Boulevard South, $5 per hour between Mission Bay Boulevard South and 16th Street, and $3 per hour between 16th and Mariposa Streets.[18]

- On game days, the SFMTA provides additional KT Ingleside-Third light rail service in order to increase light rail capacity. Two-car shuttle trains run continuously before and during the games between West Portal and the intersection of Fourth/King. Prior to the end of the game, the trains stage within the King Street median west of Fourth Street in order to facilitate loading of passengers and departure of trains from the ballpark area. The extra shuttle trains continue to run until all transit passengers leaving the ballpark are served.

- Special AT&T Ballpark ferry service is provided between the ballpark and Alameda, Marin and Solano Counties. The Golden Gate Bridge Highway and Transportation District provides service between AT&T Park and the Larkspur Ferry Terminal following a game. The Alameda/Oakland Ferry provides ferry service between the Oakland and Alameda ferry terminals and AT&T Park for most games. Vallejo Ferry provides service to and from the ballpark for all Saturday and Sunday games, and return service from the ballpark to Vallejo is also provided for select weeknight games Monday through Friday. In 2014, Caltrain provided regularly scheduled inbound trains on game day afternoons before the start of the game. Caltrain also provides two special trains departing San Francisco at the end of each game. These include an express train to San Carlos leaving approximately 15 minutes after the last out, or when full; this express train then makes all weekday local stops between San Carlos and the San Jose Diridon station. A second train departs San Francisco 25 minutes after the end of the game, or when full, serving all weekday local stops between San Francisco and San Jose Diridon.

[17] Transportation Network Company (TNC) is a company or organization that provides transportation services using an online-enabled platform to connect passengers with drivers using their personal vehicles (e.g., Lyft, SideCar, Uber).

[18] Parking meters also are in effect on Sundays at Fisherman's Wharf, The Embarcadero, five off-street parking facilities, and in the Special Event Zone if there is an event. Meters on Terry A. Francois Boulevard are subject to the Special Event Zone hours.

Intersection Operations. Table 5.2-10 presents the intersection LOS conditions at the study intersections for days with a SF Giants evening game at AT&T Park. **Figure 5.2-1** through **Figure 5.2-4** present a graphical comparison of the intersection LOS for the analysis hours for conditions without and with a SF Giants evening game at AT&T Park. As noted above, congestion in Mission Bay is affected by traffic associated with special events and during baseball season when the SF Giants have home games at AT&T Park. Transportation impacts associated with game day conditions are most severe prior to games and after the conclusion of games.

During the analysis hours, most study intersections currently operate at LOS D or better. The exceptions are the intersections of King/Third and King/Fifth/I-280 ramp that operate at LOS E during the weekday p.m. and weekday evening peak hours, and the intersection of Fifth/Bryant/I-80 eastbound on-ramp that operates at LOS F during the weekday p.m. and weekday evening peak hours. The poor operating conditions at these intersections are a result of high volumes destined to I-80 and I-280. In addition, with implementation of the transit-only lane on 16th Street as part of the 22 Fillmore Transit Priority Project, the intersection of Seventh/Mississippi/16th operates at LOS F during the weekday p.m. peak hour and LOS E during the weekday evening peak hour.

Intersection LOS cannot be calculated at the intersections where PCO's are currently deployed and direct traffic flow prior to or follow a SF Giants games (i.e., at the intersection of King/Third, King/Fourth, Third/Channel, Fourth/Channel, Illinois/Mariposa, and Third/Mariposa), and are therefore not presented in **Table 5.2-10**.[19]

Ramp Operations. Table 5.2-11 presents the ramp LOS conditions at the study locations for days with a SF Giants evening game at AT&T Park. During the analysis hours, all of the ramp merge and diverge sections currently operate at LOS D or better, except for the I-80 eastbound Sterling Street on-ramp which operates at LOS E during the weekday p.m. peak hour, and the I-80 eastbound Fifth/Bryant on-ramp which operates at LOS F during all the weekday p.m., weekday evening, and Saturday evening peak hours. The LOS E and LOS F conditions at the I-80 ramps reflect the congestion associated with traffic attempting to leave downtown San Francisco that is constrained by the limited capacity of the Bay Bridge ramps onto the bridge, causing queues to form on surface streets leading to the bridge. In addition, as for conditions without a SF Giants evening game, the I-280 southbound on-ramp merge at Pennsylvania Street also experiences LOS E conditions due to the high volume of southbound vehicles on I-280 during the weekday p.m. peak hour.

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19 The *HCM* methodology (see Section 5.2.5.3, under "Approach to Impact Analysis Methodology") used to calculate intersection LOS at signalized intersections is based on the peak 15-minute period of the one hour with the greatest traffic volume, and it assumes that during the analysis period, the traffic signal operation and traffic movements and flow would generally operate under a regular pattern. This is not the case at intersections managed by PCOs after events at AT&T Park. At those locations, the normal operation of the traffic signal is interrupted due to travel lane or roadway closures, PCOs providing longer crossing times for pedestrians, PCOs halting traffic flow temporarily to clear out the intersection or to allow transit to move, among other event-related transportation management strategies. For these reasons, an intersection LOS is not presented for those locations where PCOs actively manage intersection operations.

TABLE 5.2-10
INTERSECTION LEVEL OF SERVICE
EXISTING CONDITIONS – WITH A SF GIANTS EVENING GAME
WEEKDAY PM, EVENING, LATE EVENING, AND SATURDAY EVENING PEAK HOURS

			Weekday Conditions						**Saturday Evening[d]**	
			PM[a]		**Evening[b]**		**Late Evening[c]**			
#	**Intersection Location**		**Delay[e]**	**LOS[f]**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
1	King Street	Third Street	*PCO Controlled*							
2	King Street	Fourth Street	*PCO Controlled*							
3	King St/Fifth St	I-280 ramps	**60.7**	**E**	**77.1**	**E**	**> 80**	**F**	41.1	D
4	Fifth St/Harrison St	I-80 WB off-ramp	**62.4**	**E**	47.3	D	22.2	C	33.1	C
5	Fifth St/Bryant St	I-80 EB on-ramp	**>80**	**F**	**>80**	**F**	24.9	C	51.7	D
6	Third Street	Channel Street	*PCO Controlled*							
7	Fourth Street	Channel Street	11.5	B	< 10	A	*PCO Controlled*		< 10	A
8	Seventh Street	Mission Bay Drive	26.5	C	21.2	C	12.5	B	15.0	B
9	Terry Francois Blvd	South Street[g]	11.4 (eb)	B	11.5 (eb)	B	12.9 (eb)	B	10.4 (eb)	B
10	Third Street	South Street	25.1	C	21.8	C	11.5	B	< 10	A
11	Terry Francois Blvd	16th Street[h]	--	--	--	--	--	--	--	--
12	Illinois Street	16th Street[g]	14.1 (nb)	B	11.7 (nb)	B	< 10 (nb)	A	< 10 (nb)	A
13	Third Street	16th Street[j]	34.4	C	27.0	C	18.3	B	12.8	B
14	Fourth Street	16th Street[j]	28.7	C	19.7	B	15.1	B	14.0	B
15	Owens Street	16th Street[j]	49.2	D	22.0	C	11.5	B	10.1	B
16	Seventh/Mississippi	16th Street[j]	**> 80**	**F**	**75.6**	**E**	25.6	C	28.0	C
17	Illinois Street	Mariposa Street[g]	27.6 (eb)	D	15.1 (eb)	B	*PCO Controlled*		< 10 (eb)	A
18	Third Street	Mariposa Street	35.4	C	34.9	C	*PCO Controlled*		26.9	C
19	Fourth Street	Mariposa Street	14.4	B	12.0	B	< 10	A	< 10	A
20	Mariposa Street	I-280 NB off-ramp	21.6	C	20.2	C	17.2	B	16.2	B
21	Mariposa Street	I-280 SB on-ramp[g]	< 10	A	< 10	A	13.2	B	10.5	B
22	Third Street	Cesar Chavez St	44.6	D	32.2	C	35.3	D	32.3	C

NOTES:

a Weekday p.m. peak hour of 4 to 6 p.m. peak period.
b Weekday evening peak hour of 6 to 8 p.m. peak period.
c Weekday late evening peak hour of 9 to 11 p.m. peak period.
d Saturday evening peak hour of 6 to 9 p.m. peak period.
e Delay presented in seconds per vehicle. For unsignalized intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
f Intersections operating at LOS E or LOS F conditions highlighted in **bold**.
g All-way stop-controlled or side-street stop-controlled intersection.
h Future analysis location. 16th Street not currently a through street between Illinois Street and Terry A. Francois Boulevard.
i The traffic signal at the intersection of Mariposa/I-280 southbound on-ramp is part of the roadway improvements on Mariposa Street between the I-280 northbound off-ramp and I-280 southbound on-ramp and the extension of Owens Street between 16th and Mariposa Streets, and is currently planned to be operational by fall 2015.
j Assumes implementation of the 22 Fillmore Transit Priority Project, which includes converting one mixed-flow lane in each direction to a side-running transit-only lane.

SOURCE: Adavant Consulting/LCW Consulting, 2015

**TABLE 5.2-11
FREEWAY RAMP LEVEL OF SERVICE
EXISTING CONDITIONS – WITH A SF GIANTS EVENING GAME
WEEKDAY PM, EVENING, LATE PM, AND SATURDAY EVENING PEAK HOURS**

		Weekday Conditions						Saturday Evening[d]	
		PM[a]		Evening[b]		Late Evening[c]			
#	Ramp Location	Density[f]	LOS	Density	LOS	Density	LOS	Density	LOS
1	I-80 Eastbound On-ramp at Sterling	**35**	**E**	28	C	23	C	25	C
2	I-80 Eastbound On-ramp at Fifth/Bryant	**--**	**F**	**--**	**F**	32	D	**--**	**F**
3	I-80 Westbound Off-ramp at Fifth/Harrison	31	D	29	D	27	C	27	C
4	I-280 Southbound On-ramp at Pennsylvania	**36**	**E**	28	D	21	C	17	B
5	I-280 Northbound Off-ramp at Mariposa	29	C	30	D	13	B	18	B
6	I-280 Southbound On-ramp at Mariposa	31	D	26	C	18	B	14	B

NOTES:
a Weekday p.m. peak hour.
b Weekday evening peak hour of 6 to 8 p.m. peak period.
c Weekday late p.m. peak hour of 9 to 11 p.m. peak period.
d Saturday evening peak hour of 6 to 9 p.m. peak hour.
e Density of vehicles per segment. Measures in passenger cars per mile per lane. Density value is not presented for segments where the demand volume exceeds the capacity, per *2000 Highway Capacity Manual*.
f Segments operating at LOS E or LOS F conditions highlighted in **bold**.
SOURCE: Adavant Consulting/LCW Consulting, 2015

Transit Conditions. About 43 to 47 percent of SF Giants game attendees take transit to games on weekdays, and about 36 to 37 percent take transit on weekends.[20] As described above, on game days, SFMTA provides additional KT Ingleside-Third light rail service in order to increase light rail capacity. Two-car shuttle trains run continuously before and during the games between West Portal and the intersection of Fourth/King. Prior to the end of the game, the trains stage within the King Street median west of Fourth Street in order to facilitate loading of passengers and departure of trains from the ballpark area. The extra shuttle trains continue to run until all transit passengers leaving the ballpark are served. Additional regional ferry service is provided between the ballpark and Alameda, Marin and Solano Counties. In addition, Caltrain provides two outbound trains at the end of the game.

Pedestrian Conditions. Pedestrian volumes at the analysis locations on days with a SF Giants evening game are slightly higher, but similar to those on days without a SF Giants game. The higher pedestrian volumes in the project vicinity are associated with SF Giants game attendees parking on the existing surface lots on the project site and at other nearby UCSF parking garages. **Table 5.2-12** presents the hourly pedestrian volumes and LOS conditions for the crosswalk and sidewalk analysis locations. Similar to conditions without a SF Giants evening game at AT&T Park, all crosswalk and sidewalk analysis locations operate at LOS A conditions. On days with a SF Giants evening game, substantially heavier pedestrian flow conditions occur to the north, away from the project site, particularly on the section of Third Street north of Mission Rock Street

20 Surveys of game attendees at AT&T Park conducted by the SF Giants in 2012, supplemented with similar data collected in 2007. More detailed survey results are provided in **Appendix TR**.

and on the Third Street Bridge, which is used by SF Giants game attendees as they walk between parking Lot A and AT&T Park.

TABLE 5.2-12
PEDESTRIAN LEVEL OF SERVICE
EXISTING CONDITIONS – WITH A SF GIANTS EVENING GAME
WEEKDAY P.M. AND EVENING, AND SATURDAY EVENING PEAK HOURS

	Weekday Conditions								
	PM			Evening			Saturday Evening		
Analysis Location	**Peds/ Hour**	**MOE[a]**	**LOS**	**Peds/ Hour**	**MOE**	**LOS**	**Peds/Hour**	**MOE**	**LOS**
Crosswalks									
Third St/South St									
North	67	294	A	41	401	A	23	714	A
South	135	144	A	108	150	A	39	421	A
East	69	1,045	A	66	1,253	A	55	1,502	A
Third St/16th Street									
North	32	814	A	34	764	A	23	1,594	A
South	70	370	A	44	590	A	39	973	A
East	32	1,296	A	28	1,479	A	55	2,472	A
West	107	351	A	120	313	A	27	1,102	A
Sidewalk									
Third St between South and 16th Streets									
East	42	0.1	A	30	0.1	A	29	0.1	A
West	103	0.3	A	111	0.3	A	19	0.1	A

NOTES:
[a] The measure of effectiveness for crosswalks is density – pedestrians per square foot. The measure of effectiveness for sidewalks is the flow rate – pedestrians per minute per foot.

SOURCE: Adavant Consulting/LCW Consulting, 2015

Bicycle Conditions. Table 5.2-8 in Section 5.2.3.7 presents the hourly bicycle volumes for conditions without and with a SF Giants evening game at AT&T Park. Overall, bicycle volumes in the project vicinity on days with a SF Giants evening game are slightly higher, but similar to those on days without a SF Giants game. Overall, on weekdays and weekends bicycle conditions were observed to be operating acceptably, with no conflicts between bicyclists, pedestrians and vehicles.

Parking Conditions. Table 5.2-13 presents the parking occupancy at the study area off-street facilities for a day with a SF Giants evening game at AT&T Park. In general, on days with a SF Giants evening game, weekday midday parking occupancy is lower at many facilities than on days without a SF Giants game, likely due to increase parking rates on game days at many facilities resulting in drivers destined to the area to change travel modes from auto to transit, bicycle, and/or walk modes. On SF Giants game days, a number of existing facilities open for event parking. These include 185 Berry Street (weekday evenings only), Piers 48 Sheds A and B and 1050 Third Street/Mission Rock (on both weekday and weekend evenings). Even accounting for the additional capacity provided in these facilities (1,090 spaces on weekday evenings and 830 spaces on weekend evenings), the overall parking occupancy for the study area facilities increases from less than 40 percent on days without a SF Giants game to more than 70 percent on days with a SF Giants evening game. On days with a SF Giants game, there are lower weekday midday parking occupancy rates compared to typical weekdays, since facilities managed by SF Giants (Lot A, 455 South St, 1725 Third St, etc.) would charge higher game-day rates. It should be noted that additional facilities north of King Street accommodate parking demand associated with SF Giants games, including 1,000 spaces at the Pier 30 surface lot and 300 spaces on the Bayside surface lot across from Pier 30. In addition, numerous parking garages serving commercial uses accommodate game day parking.

TABLE 5.2-13
OFF-STREET PARKING SUPPLY AND OCCUPANCY
EXISTING CONDITIONS – WITH A SF GIANTS EVENING GAME
WEEKDAY AND SATURDAY

	Occupancy[b]			
	Weekday		**Saturday**	
Parking Facility[a]	**Midday**	**Evening**	**Midday**	**Evening**
1. 185 Berry Street	100%	89%	--	--
2. Pier 48 Sheds A and B	--	62%	--	98%
3. West side of TF Blvd along Lot A	15%	92%	8%	92%
4. 74 Mission Rock (Lot A)[b]	28%	100%	5%	95%
5. Blocks 3E & 4E (Lot C)[c]	--	98%	--	95%
6. 601 TFB/Pier 52 Boat Launch	70%	18%	53%	35%
7. East side of TF Blvd at South St.	26%	0%	13%	13%
8. 450 South Street	71%	--	--	--
9. 1670 Owens Street	44%	--	--	--
10. UCSF 1650 Third Street	93%	79%	21%	66%
11. UCSF Block 23	95%	50%	91%	86%
12. UCSF 1625 Owens Street	79%	29%	64%	20%
13. UCSF Medical Center Phase 1[d]	90%	54%	30%	35%
14. 455 South & 1725 Third (project site)	30%	34%	2%	95%
Total Supply	**8,345**	**6,955**	**5,865**	**6,685**
Average Occupancy	**58%**	**77%**	**23%**	**75%**

NOTES:
[a] Existing parking supply. See **Appendix TR** for additional details related to owner/operator.
[b] Reflects reduction in parking supply due to development associated with The Yard.
[c] Reflects closure of 1000 Third Street (Lot D) with 320 spaces, and Lot C – Block 7 with 300 spaces, and increase in capacity at Lot C Blocks 3E and 4E (increase of 160 spaces).
[d] New parking facilities associated with UCSF Medical Center Phase 1 operations.

SOURCE: Adavant Consulting/LCW Consulting, 2015

5.2.4 Regulatory Framework

This section provides a summary of the plans and policies of the City and County of San Francisco, and regional, state and federal agencies that have policy and regulatory control over the proposed project site.

5.2.4.1 Federal and State Regulations

There are no federal or state transportation regulations applicable to the proposed project.

5.2.4.2 Regional Regulations

Water Emergency Transportation Authority's Water Transportation System Management Plan

WETA is a regional agency authorized by the State to operate a comprehensive San Francisco Bay Area public water transit system. In 2009, the WETA adopted the Emergency Water Transportation System Management Plan, which complements and reinforces other transportation emergency plans that will enable the Bay Area to restore mobility after a regional disaster.

San Francisco Bay Trail Plan

The Association of Bay Area Governments (ABAG) administers the San Francisco Bay Trail Plan (Bay Trail Plan). The Bay Trail is a multi-purpose recreational trail that, when complete, would encircle San Francisco Bay and San Pablo Bay with a continuous 400-mile network of bicycling and hiking trails; to date, 338 miles of the alignment have been completed. The 2005 Gap Analysis Study, prepared by ABAG for the entire Bay Trail area, attempted to identify the remaining gaps in the Bay Trail system; classify the gaps by phase, county, and benefit ranking; develop cost estimates for individual gap completion; identify strategies and actions to overcome gaps; and present an overall cost and timeframe for completion of the Bay Trail system.

5.2.4.3 Local Regulations and Plans

Transit First Policy

In 1998, the San Francisco voters amended the City Charter (Charter Article 8A, Section 8A.115) to include a Transit-First Policy, which was first articulated as a City priority policy by the Board of Supervisors in 1973. The Transit-First Policy is a set of principles that underscore the City's commitment that travel by transit, bicycle, and foot be given priority over the private automobile. These principles are embodied in the policies and objectives of the Transportation Element of the San Francisco General Plan. All City boards, commissions, and departments are required, by law, to implement transit-first principles in conducting City affairs.

San Francisco General Plan

The Transportation Element of the San Francisco General Plan is composed of objectives and policies that relate to the eight aspects of the citywide transportation system: General Regional

Transportation, Congestion Management, Vehicle Circulation, Transit, Pedestrian, Bicycles, Citywide Parking, and Goods Management. The Transportation Element references San Francisco's Transit First Policy in its introduction, and contains objectives and policies that are directly pertinent to consideration of the proposed project, including objectives related to locating development near transit investments, encouraging transit use, and traffic signal timing to emphasize transit, pedestrian, and bicycle traffic as part of a balanced multimodal transportation system. The San Francisco General Plan also emphasizes alternative transportation through positioning of building entrances, making improvements to the pedestrian environment, and providing safe bicycle parking facilities.

San Francisco Bicycle Plan

The *San Francisco Bicycle Plan (Bicycle Plan)* describes a City program to provide the safe and attractive environment needed to promote bicycling as a transportation mode. The San Francisco *Bicycle Plan* identifies the citywide bicycle route network, and establishes the level of treatment (i.e., Class I, Class II or Class III facility) on each route. The *Bicycle Plan* also identifies near-term improvements that could be implemented within the next five years, as well as policy goals, objectives and actions to support these improvements. It also includes long-term improvements, and minor improvements that would be implemented to facilitate bicycling in San Francisco.

Better Streets Plan

The *San Francisco Better Streets Plan (Better Streets Plan)* focuses on creating a positive pedestrian environment through measures such as careful streetscape design and traffic calming measures to increase pedestrian safety. The *Better Streets Plan* includes guidelines for the pedestrian environment, which it defines as the areas of the street where people walk, sit, shop, play, or interact. Generally speaking, the guidelines are for design of sidewalks as crosswalks; however, in some cases, the *Better Streets Plan* includes guidelines for certain areas of the roadway, particular at intersections.

5.2.5 Impacts and Mitigation Measures

5.2.5.1 Significance Thresholds

The project would have a significant impact related to transportation and circulation if the project were to:

- Conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation, including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit;
- Conflict with an applicable congestion management program, including but not limited to level of service standards and travel demand measures, established by the county congestion management agency for designated roads or highways (unless it is practical to achieve the standard through increased use of alternative transportation modes);

- Result in a change in air traffic patterns, including either an increase in traffic levels, obstructions to flight, or a change in location, that causes substantial safety risks;
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses;
- Result in inadequate emergency access; or
- Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., conflict with policies promoting bus turnouts, bicycle racks, etc.) regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities, or cause a substantial increase in transit demand which cannot be accommodated by existing or proposed transit capacity or alternative travel modes.

Below is a list of significance criteria that the Office of Community Investment and Infrastructure (OCII), in consultation with the San Francisco Planning Department, uses to assess whether the proposed project would result in significant transportation impacts. These criteria are organized by mode to facilitate the transportation impact analysis; however, the transportation significance criteria are essentially the same as the ones presented above.

- The project would have a significant effect on the environment if it would cause a substantial increase in transit demand that could not be accommodated by adjacent transit capacity, resulting in unacceptable levels of transit service; or cause a substantial increase in delays or operating costs such that significant adverse impacts in transit service levels could result. With the Muni and regional transit screenline analyses, the project would have a significant effect on the transit provider if project-related transit trips would cause the capacity utilization standard to be exceeded during the peak hour;
- The operational impact on signalized intersections is considered significant when project-related traffic causes the intersection level of service to deteriorate from LOS D or better to LOS E or LOS F, or from LOS E to LOS F. The operational impacts on unsignalized intersections are considered potentially significant if project-related traffic causes the level of service at the worst approach to deteriorate from LOS D or better to LOS E or LOS F and peak hour signal warrants[21] would be met, or would cause peak hour signal warrants to be met when the worst approach is already operating at LOS E or LOS F. The project may result in significant adverse impacts at intersections that operate at LOS E or LOS F under existing conditions depending upon the magnitude of the project's contribution to the worsening of the average delay per vehicle. In addition, the project would have a significant adverse impact if it would cause major traffic hazards or contribute considerably to cumulative traffic increases that would cause deterioration in levels of service to unacceptable levels;

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[21] A signal warrant is a condition that an intersection must meet to justify a signal installation. There are different warrants, which examine factors such as the volume of vehicles, bicyclists, and pedestrian, the signal system, collision statistics, as well as the geometric/physical configuration of the intersection. Even if a signal warrant is not met under the strictest interpretation, the determination to signalize an intersection could be made based upon the city traffic engineer's professional judgment of intersection operations.

- The project would have a significant effect on the environment if it would result in substantial overcrowding on public sidewalks and crosswalks, create potentially hazardous conditions for pedestrians, or otherwise interfere with pedestrian accessibility to the site and adjoining areas;

- The project would have a significant effect on the environment if it would create potentially hazardous conditions for bicyclists or otherwise substantially interfere with bicycle accessibility to the site and adjoining areas;

- A project would have a significant effect on the environment if it would result in a loading demand during the peak hour of loading activities that could not be accommodated within proposed on-site loading facilities or within convenient on-street loading zones, and would create potentially hazardous conditions or significant delays affecting traffic, transit, bicycles, or pedestrians; or

- A project would have a significant effect on the environment if it would result in inadequate emergency access.

Construction-related impacts generally would not be considered significant due to their temporary and limited duration.

5.2.5.2 Project Transportation Improvements Assumptions

Chapter 3, Project Description, summarizes the elements of the project description related to transportation features (e.g., on-site vehicle and bicycle parking spaces and truck loading spaces)[22] and circulation improvements, including proposed vehicular access and on-site circulation, pedestrian and bicycle access, off-site streetscape improvements, changes to the Mission Bay shuttle service, and the project Transportation Management Plan (TMP); these elements are re-iterated and expanded upon in this section. The project TMP is included in its entirety in **Appendix TR**.

This section is organized as follows:

1. Roadway Network Improvements and Curb Regulations
2. Transit Network Improvements
3. Pedestrian Network Improvements
4. Bicycle Network Improvements
5. Mission Bay TMA Shuttle Program Improvements
6. Muni Special Event Transit Service Plan
7. Transportation Management Plan

[22] Because the project site is located within the *Mission Bay South Redevelopment Plan* Area, it is not subject to the *San Francisco Planning Code* requirements, unless specifically noted. Instead, the proposed project is subject to the *Mission Bay South Design for Development* requirements. **Appendix TR** includes a comparison of the proposed project elements to the *Mission Bay South Design for Development* requirements. Because the *Mission Bay South Design for Development* does not contemplate off-street parking and loading standards for a multipurpose event center, the proposed project includes amendments to the *Mission Bay South Design for Development* to accommodate revised requirements for this land use.

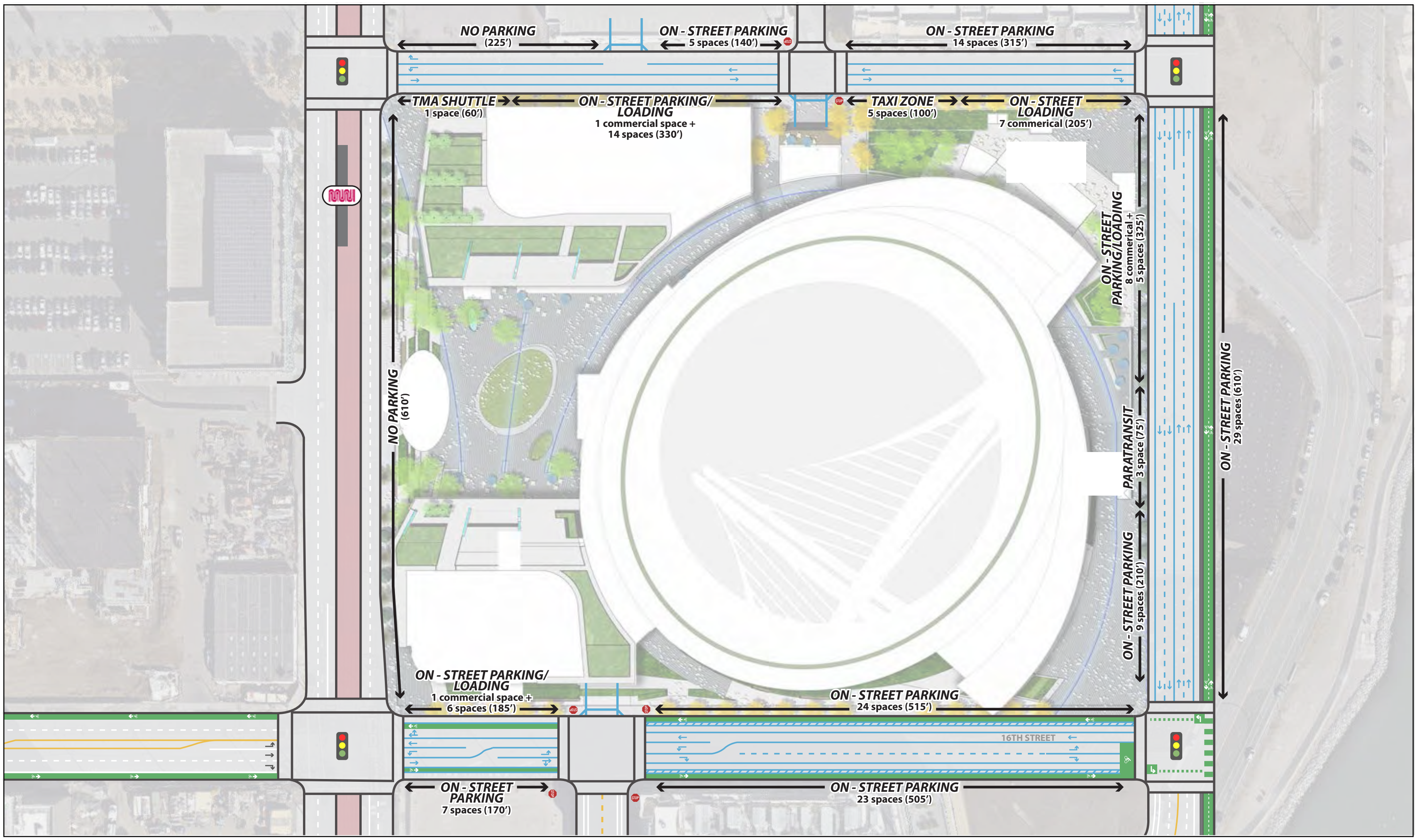
1. *Roadway Network Improvements and Curb Regulations*

The proposed project includes completion of the roadway network adjacent to the project site. **Figure 5.2-9** presents the travel lane striping for the streets adjacent to the project site, subject to SFMTA review and approval.

- Adjacent to the project site, the number of travel lanes on Third Street and Terry A. Francois Boulevard would not change from existing conditions (i.e., two lanes each way without dedicated left-turn lanes). As part of the Mission Bay South Infrastructure Plan, Terry A. Francois Boulevard between South and 16th Streets would be relocated to align with the eastern edge of Blocks 29 and 30 (i.e., to the west of its current alignment).
- South Street currently has two travel lanes each way, with no on-street parking. With implementation of the proposed project, South Street would have one lane each way and on-street parking permitted on both sides of the street. At the westbound approach to Third Street, on-street parking would be prohibited for about 225 feet to provide for an additional right-turn only lane.
- 16th Street is currently open between Third and Illinois Streets, and with implementation of the proposed project, 16th Street would be rebuilt and extended to connect with the realigned Terry A. Francois Boulevard. Between Third and Illinois Streets, 16th Street would have one eastbound lane and one left-turn only lane (80 feet in length) into the project garage. In order to accommodate the single eastbound lane on 16th Street east of Third Street, one of the two eastbound lanes on the west leg of the intersection of Third Street/16th Street would be restriped as an eastbound right-turn only lane. East of Illinois Street, 16th Street would have two eastbound lanes which would become separate left turn and right turn only lanes about 100 feet east of Terry A. Francois Boulevard. Westbound 16th Street between Terry A. Francois Boulevard and Illinois Street would have one through travel lane and one left-turn only lane (about 80 feet in length) at the intersections with Illinois and Third Streets. On both sides of 16th Street between Illinois Street and Terry A. Francois Boulevard, a 6-foot wide bicycle lane would be provided adjacent to the curb, and a 4-foot wide buffer would separate the bicycle lane from the adjacent 8-foot wide parking lane.

In addition to the changes in travel lanes, the following intersection controls would be implemented as part of the proposed project:

- The intersection of Terry A. Francois Boulevard/South Street is currently stop-controlled at the eastbound approach to the intersection. This intersection would be signalized.
- The intersection of Bridgeview Way/South Street is currently uncontrolled. This intersection would be made a side-street stop-controlled intersection with southbound vehicles on Bridgeview Way and cars exiting the project garage on South Street required to stop.
- The new intersection of Terry A. Francois Boulevard/16th Street would be signalized.
- The intersection of Illinois Street/16th Street is currently uncontrolled. This intersection would be made an all-way stop-controlled intersection with northbound vehicles on Illinois Street, east- and westbound vehicles on 16th Street, and vehicles exiting the project garage required to stop. Conditions at this intersection would be monitored, and if determined by the SFMTA that a traffic signal is warranted, the intersection would be signalized.
- The intersection of Illinois Street/Mariposa Street is currently all-way stop-controlled. This intersection would be signalized.



SOURCE: Final Transportation Management Plan for the Warriors San Francisco Event Center, April 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E: Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-9

Proposed Roadway Configuration and Curb Management

Figure 5.2-9 also presents the proposed curb regulations for the streets adjacent to the project site, subject to SFMTA and Port Commission review and approval. Overall, adjacent to the project site, the proposed project would provide 17 on-street commercial loading spaces and 58 parking spaces, as well as a TMA shuttle stop, a taxi zone, and a paratransit[23] stop. Curb regulations on days with events are described in subsequent sections.

- On South Street, a Mission Bay TMA shuttle stop approximately 60 feet in length would be provided directly east of Third Street, and a taxi zone approximately 100 feet in length would be provided east of the project garage entrance/exit. Seven metered commercial loading spaces would be provided directly west of Terry A. Francois Boulevard and one metered commercial loading space would be provided between the TMA shuttle stop and the project garage driveway. The remaining curb would be dedicated to 14 metered parking spaces.
- On Terry A. Francois Boulevard, approximately eight metered commercial loading spaces would be provided directly south of South Street and a 75-foot wide paratransit stop would be provided midblock. The remaining curb would be dedicated to 14 metered parking spaces.
- On 16th Street, one metered commercial loading space and 30 metered parking spaces would be provided. On the segment of 16th Street between Illinois Street and Terry A. Francois Boulevard, the parking spaces would be located to the south of the curbside bicycle lane. The parking would be separated from the bicycle lane by a 4-foot wide buffer. On the segment between Third and Illinois Streets, the parking spaces would be adjacent to the curb, and the proposed bicycle lane would be adjacent to the curb parking lane.
- On Third Street, parking is currently prohibited at all times. As part of the proposed project, signage would be placed on the east sidewalk prohibiting stopping at all times, including passenger loading/unloading at all times.

On-street metered parking would be provided on the curbs across from the project site as part of SFMTA's Mission Bay Parking Management plan, including those under the Port of San Francisco's jurisdiction.[24] These include installation of new metered spaces on the north side of South Street (19 spaces), on the east side of Terry A. Francois Boulevard (29 spaces), and on the south side of 16th Street (30 spaces).

2. *Transit Network Improvements*

As part of the proposed project, the elevated northbound passenger platform at the UCSF/Mission Bay light rail stop would be extended. The existing northbound platform located in the median of Third Street north of South Street would be extended to the north away from South Street from 160 feet in length to 320 feet in length. This extension would allow for two two-car light rail trains to simultaneously board or alight passengers along the platform prior to or following a large event at

[23] Paratransit is a specialized, door-to-door transport service for people with disabilities who are not able to ride fixed-route public transit. This may be due to a disability or a disabling health condition. SF Paratransit, a service of the SFMTA, provides van and taxi paratransit service.

[24] SFMTA, *Mission Bay Parking Management Implementation*, July 2012. A copy of this report is available for review at the San Francisco Planning Department, 1650 Mission Street, Suite 400, San Francisco as part of Case File No. 2014.1441E. Available online at http://sfpark.org/wp-content/uploads/2012/07/MissionBayParkingStrategy_July2012.pdf. Accessed May 28, 2015.

the project site. Passenger access to the expanded northbound platform would continue to be provided from a single point at the south end of the platform closest to South Street. The existing painted median area adjacent to the northbound track between South and 16th Streets would be raised 6 inches. This improvement would allow for staging of two, two-car northbound light rail trains. Fencing would also be placed in such a manner as to discourage pedestrian crossings midblock between the intersection of Campus Way with southbound Third Street, and the event center which would be located directly across from Campus Way.

In addition, crossover tracks would be constructed on Third Street near South Street within the light rail median to enable light rail vehicles to move from one set of tracks to another to reverse travel. The exact location (i.e., north and/or south of the UCSF/Mission Bay station) and the configuration of the crossover tracks (i.e., a single crossover, a double crossover, or a diamond crossover) have not been identified.

3. Pedestrian Network Improvements

Consistent with the Mission Bay South Infrastructure Plan, the proposed project includes construction of new sidewalks along the perimeter of the project site on South Street (12.5 feet wide), on Terry A. Francois Boulevard (12.5 feet wide), on 16th Street (15 feet wide), and widening of the existing sidewalk on Third Street from 12 to 16 feet. As required by the Mission Bay South Design for Development Guidelines, a 20-foot wide setback would be provided along the 16th Street frontage, and a 5-foot wide setback would be provided for buildings fronting South Street and Terry A. Francois Boulevard. The exceptions would be at the South Street Tower, where a setback in excess of 5 feet would be provided at grade to create a cantilever over the site's northwest corner, and on 16th Street at approximately midblock, where the event center curves slightly closer to the street. In addition, as shown on Figure 3-5 in Chapter 3, Project Description, buildings on the project site would be set back from all four corners to provide for a corner queuing/waiting area.

New pedestrian crosswalks, consistent with the continental design recommendations in the *Better Streets Plan*,[25] would be installed at the following intersections:

- South Street/Bridgeview Way (two-way stop-controlled)
- South Street/Terry A. Francois Boulevard (signalized)
- Illinois Street/Mariposa Street (signalized)
- 16th Street/Illinois Street (all-way stop-controlled)
- 16th Street/Terry A. Francois Boulevard (signalized)

In addition, the existing crosswalks at the signalized intersections of Third/South and Third/16th would be restriped with the continental design.

[25] Crosswalks with a continental design have parallel markings that are the most visible to drivers. Use of continental design for crosswalk marking also improves crosswalk detection for people with low vision and cognitive impairments. FHWA, Part Ii of II: Best Practices Design Guide, Designing Sidewalks and Trails for Access, Available online at http://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/sidewalk2/contents.cfm. Accessed May 28, 2015.

At the intersections of Terry A. Francois/South, Terry A. Francois/16th, and Illinois/Mariposa, where new traffic signals are proposed, pedestrian countdown signals would also be provided.

4. *Bicycle Network Improvements*

With implementation of the proposed project, 16th Street between Illinois Street and Terry A. Francois Boulevard would be completed, and Class II bicycle lanes on 16th Street (i.e., Bicycle Route 40) would be extended east to the reconfigured Terry A. Francois Boulevard. On both sides of 16th Street between Third and Illinois Streets, a 6-foot wide bicycle lane would be located adjacent to the 8-foot wide curb parking lane. On both sides of 16th Street between Illinois Street and Terry A. Francois Boulevard, a 6-foot wide bicycle lane would be provided adjacent to the curb, and a 4-foot wide buffer would separate the bicycle lane from the adjacent 8-foot wide parking lane.

In addition, with relocation of Terry A. Francois Boulevard between South and 16th Streets as part of the Mission Bay South Infrastructure Plan, the existing bicycle lanes on both sides of the street would be replaced with a 13-foot wide two-way protected bicycle lane, known as cycle track,[26] on the east side of the street. A 4-foot wide raised buffer would separate the bicycle lane from the adjacent 8-foot wide parking lane. As described in Chapter 3, the Mission Bay master developer would implement the realignment of Terry A. Francois Boulevard and associated improvements prior to occupancy of buildings at the project site.

At the intersections of Terry A. Francois/16th and Illinois/Mariposa, where new traffic signals are proposed, bicycle signals would be provided, and at the intersection of Terry A. Francois/16th two-stage turn queue boxes[27] would be installed to facilitate turns between the bicycle lanes on 16th Street and the two-way cycle track on the east side of Terry A. Francois Boulevard.

5. *Mission Bay TMA Shuttle Program Improvements*

With implementation of the project, the existing Mission Bay TMA shuttle service would be expanded with more frequent service, and a new TMA shuttle stop would be located on South Street east of Third Street adjacent to the project site. The project sponsor would join the Mission Bay TMA and the project's required contributions to the association would enable the expanded shuttle service. The additional service would enable office employees and retail visitors to access the site from key transit locations. All standard shuttle service funded in part by the proposed project would be an integrated part of the Mission Bay TMA network and would continue to be free of charge for all residents and employees in Mission Bay, regardless of their origin or destination. If the project sponsor chooses to fund incremental event-only shuttle service in partnership with the Mission Bay TMA, such service would be supported exclusively by the project sponsor and provided for the use by event attendees only. **Table 5.2-14** summarizes the headways between shuttles for the existing routes, and proposed service improvements.

[26] A cycle track is an exclusive bicycle facility that is separated from vehicle traffic and parked cars by a buffer zone. Cycle tracks offer safer and calmer cycling conditions for a much wider range of cyclists and cycling purposes, especially on street with greater traffic volumes traveling at relatively high speeds.

[27] Two-stage turn queue boxes offer bicyclists a safe way to make left turns at multi-lane signalized intersections from a right side cycle track or bicycle lane, or right turns from a left side cycle track or bicycle lane.

- The existing routes would be revised to provide additional service (i.e., more frequent service), plus extended service to late evenings and on Saturdays. In addition to the expanded service hours on the East route, the route would be modified to travel on South Street and stop at the new Mission Bay TMA shuttle stop. The Mission Bay TMA Mission Bay Loop service would be expanded from 6:00 to 7:00 a.m. to 6:00 to 10:00 a.m., and from 4:00 to 6:00 p.m.

- Three new regular routes (a Fourth/King Caltrain loop route, a 16th Street BART route, and a Transbay Terminal route) would operate throughout the day, similar to the existing shuttle service, but would have extended hours and operate on weekends.

- One Event Express route (the Fourth/King Caltrain route) with limited stops, would be provided prior to and following a peak event (i.e., events with more than 14,000 attendees).

TABLE 5.2-14
EXISTING MISSION BAY TMA HEADWAYS AND PROPOSED REVISIONS TO EXISTING ROUTES AND NEW ROUTES

Existing and Proposed Routes	Weekday Headways[a]					Saturday Headways	
	Early Morning (6 to 7 a.m.)	AM Peak (7 to 10 a.m.)	PM Peak (4 to 6 p.m.)	Evening (6 to 8 p.m.)	Late Evening (9 to 11 p.m.)	Evening (6 to 8 p.m.)	Late Evening (9 to 11 p.m.)
Existing Routes[b]							
East	--	10	15	15	--	--	--
West	--	15	15	20	--	--	--
Caltrain & Transbay	18	18	40	--	--	--	--
Mission Bay Loop	30	--	--	--	--	--	--
Revised Existing Routes[c]							
East	--	10	12	12	60	60	--
West	--	15	15	15	60	60	--
Mission Bay Loop	30	30	30	30	--	--	--
New Regular Routes[d]							
Caltrain	--	--	60	--	30	30	--
16th Street BART	--	--	30	30	30	30	--
Transbay Terminal	--	--	30	60	--	--	--
Event Express Routes[e]							
Caltrain	--	--	20	15	10	10	--

NOTES:
[a] Headways between shuttle buses in minutes.
[b] Existing Mission Bay TMA shuttle routes operate Monday through Friday, generally between 7:00 and 10:00 a.m., and 4:00 and 8:00 p.m. Mission Bay Loop operates between 6:00 and 7:00 a.m. only.
[c] With the proposed project, current service on the existing Mission Bay routes would be extended to 11:00 p.m. on weekdays, and would operate between 6:00 and 8:00 p.m. on Saturdays.
[d] Proposed new routes would operate on weekdays between 7:00 and 10:00 a.m., and between 4:00 and 11:00 p.m., and on Saturdays between 6:00 and 8:00 p.m.
[e] Event express routes would operate on weekday and weekend event days generally between 4 and 11 p.m. for weekday events and between 6:00 and 8:00 p.m. for weekend events.

SOURCE: Mission Bay TMA, Golden State Warriors, 2015

6. Muni Special Event Transit Service Plan

In addition to the existing scheduled transit service in the project vicinity, the SFMTA would provide additional service to accommodate large evening events. The Muni Special Event Transit Service Plan was developed by the SFMTA based on the estimated number of attendees taking transit, their origins and destinations, and arrival and departure patterns, as well as Muni's experience with providing shuttle services for special events (e.g., at Golden Gate Park, and for the 49ers stadium at Candlestick Park). The Muni Special Event Transit Service Plan includes increasing light rail service on the T Third, adding a Muni Metro shuttle via The Embarcadero, and three Muni special event shuttles. The three Muni Special Event Shuttles are presented in **Figure 5.2-10** and described below:

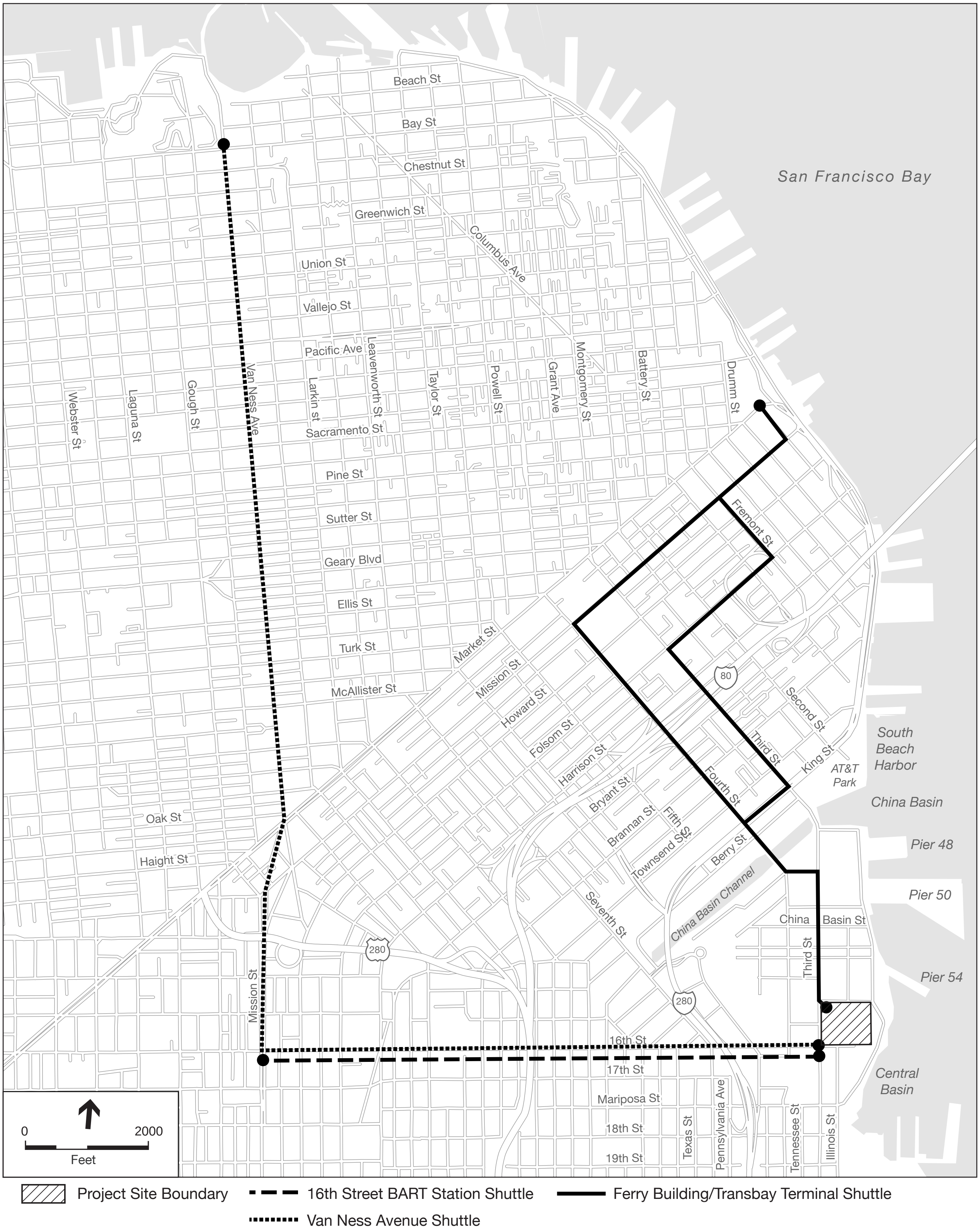
- **Muni Special Event 16th Street BART Shuttle** would run on 16th Street between the event center and the 16th Street BART station. This shuttle would primarily serve attendees originating from and destined to the East Bay and South Bay and the Mission district. Pre-event, the bus stop for the 16th Street BART shuttle would be located on the south side of 16th Street between Third and Illinois Streets, and post-event the bus stop would be located on the east side of Illinois Street south of 16th Street.

- **Muni Special Event Van Ness Avenue Shuttle** would run between the event center and Fort Mason. The shuttle would run on 16th Street, Mission Street, and Van Ness Avenue, with limited stops at key transfer locations (e.g., at Market Street to connect with Muni Metro and at Geary Boulevard to connect with the 38 Geary and 38L Geary Limited). Pre-event, the bus stop for the Van Ness Avenue shuttle would be located on the south side of 16th Street between Third and Illinois Streets, and post-event the bus stop would be located on the north side of 16th Street between Illinois Street and Terry A. Francois Boulevard.

- **Muni Special Event Transbay Terminal/Caltrain/Ferry Building Shuttle** would loop between the event center, the new Transbay Terminal, and the Ferry Building via Fourth, King, Third, Folsom, Fremont, and Mission Streets. Pre-event, the bus stop for the Transbay Terminal/Caltrain/Ferry Building shuttle would be located on the south side of South Street between Third Street and Bridgeview Way, and post-event the bus stop would be located on the east side of Third Street north of South Street.

Table 5.2-15 presents the proposed service for the T Third and the Muni Special Event Shuttles for large events (18,000 attendees), medium events (7,500 to 13,000 attendees), and small events (less than 7,500 attendees). The service levels are representative, and the actual service that would be provided would be appropriately scaled to respond to the projected attendance level for the event. For events with more than 13,000 attendees increases in T Third service and the three Muni Special Event Shuttles would be provided, while for events with fewer than 13,000 attendees increases in T Third service and only the Muni Special Event 16th Street BART Station Shuttle route would be provided.

The proposed project includes the procurement of up to four light rail vehicles to increase the Muni light rail capacity on the T Third line as part of the Muni Special Event Transit Service Plan.



SOURCE: SFMTA, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-10
Proposed Muni Special Event Shuttles

TABLE 5.2-15
PRELIMINARY MUNI SPECIAL EVENT TRANSIT SERVICE PLAN

	Headways[a]			
	Pre-Event		Post-Event	
Special Event Service[b]	**Weekday**	**Weekend**	**Weekday**	**Weekend**
For Large Events (12,500 or more attendees)[c]				
T Third/Central Subway with Special Event Shuttles	3	5	4	5
Muni Metro Shuttle via The Embarcadero	--	--	On demand[g]	On demand[g]
16th Street BART Station Shuttle	10	10	7-8	7-8
Van Ness Avenue Shuttle	12	15	On demand[d]	On demand[d]
Ferry Building/Caltrain/Transbay Terminal Shuttle	10	8-9	On demand[d]	On demand[d]
For Medium Events (7,500 to 12,500 attendees)				
T Third/Central Subway with Special Event Shuttles	3	5	5	5
Muni Metro Shuttle via The Embarcadero	--	--	On demand[g]	On demand[g]
16th Street BART Station Shuttle	13	13	15	15
For Small Events (less than 7,500 attendees)				
T Third/Central Subway with Special Event Shuttles	--	--	On demand[d,e]	On demand[d,e]
16th Street BART Station Shuttle	--	--	On demand[d,f]	On demand[d,f]

NOTES:
[a] Headways between shuttle buses in minutes.
[b] The service plan by event size is representative, and the actual service that would be provided would be appropriately scaled to respond to the projected attendance level for the event.
[c] Service plan for large event presented for an event with 18,000 attendees.
[d] Post event, the light rail or bus shuttles would depart as soon as the vehicles are full, rather than operate on a preset headway.
[e] T Third/Central Subway with Special Event Shuttles - between three and seven two-car trains, depending on attendance level.
[f] 16th Street BART Station Shuttle - between one and two shuttle buses, depending on attendance levels.
[g] Muni Metro Shuttle via The Embarcadero – about three three-car trains.

SOURCE: SFMTA, 2015

7. *Transportation Management Plan*

As part of the proposed project operations, the project sponsor prepared and would implement a Transportation Management Plan (TMP) to serve as a management and operating plan to provide multi-modal access during events at the project site. See **Appendix TMP**. The TMP includes various management strategies designed to reduce use of single-occupant vehicles and to increase the use of rideshare, transit, bicycle and walk modes for trips to and from the project site. The TMP program was developed in consultation with the SFMTA and the Planning Department. The TMP is a working document that would be expanded and refined over time by the project sponsor and City agencies involved in implementing the plan. As described below, a monitoring and refinement process is included as part of the TMP.

The TMP includes the appointment of a full-time Event Center Transportation Coordinator to manage the transportation needs of employees and event attendees. In addition, an in-building and crowd-sourced smart phone application would be developed that would provide multi-modal travel information and real-time advisories on the status of the transportation system and provide options to event center employees, event attendees, and anyone working in, living near, or visiting Mission Bay. The Event Center Transportation Coordinator would be responsible for distributing information related to temporary travel lane and/or street closures to event center attendees, emergency service providers, UCSF, and other neighbors prior to events. The following elements of the TMP are summarized below:

- Muni Special Event Transit Service Plan and Platform Improvements
- Mission Bay TMA Shuttle Event Express Routes
- Event Transportation Management Strategies
- Travel Demand Management Strategies
- Communication
- Monitoring, Refinement, and Performance Standards

Muni Special Event Transit Service Plan and Light Rail Platform and Track Improvements

As described above, in addition to the existing scheduled transit service in the project vicinity, the SFMTA would provide additional service (i.e., the Muni Special Event Transit Service Plan) to accommodate peak evening events such as basketball games and sold-out concerts, as presented in **Table 5.2-16**. Also, as described above, light rail platform and track improvements would also be made in order to support the additional light rail service, particularly for post-event conditions.

Expansion of Mission Bay TMA Shuttle Program

As described above, with implementation of the project, the existing Mission Bay TMA shuttle service would be expanded (see **Table 5.2-14**). The revised existing routes, new regular routes, and event express would generally operate on weekday evenings between 4:00 and 11:00 p.m., and on Saturdays between 6:00 and 8:00 p.m.

Event Transportation Management Strategies

The TMP identifies the additional strategies that would be implemented to accommodate travel to and from the event center during events by all modes to enhance safety through reduction of conflicts between modes, to facilitate ingress and egress to the project site and vicinity, and to minimize traffic congestion and delays to vehicles, including transit. **Table 5.2-16** below presents a summary of the transportation management strategies that would be implemented during the various types of events, as presented in the TMP. The transportation management strategies for small and convention events, and for large concerts and basketball games, are summarized below.

For all events, a PCO Supervisor would be located within the Event Center Command Center, and would manage the PCOs assigned to the event. The PCO Supervisor would have radio contact with the Field Supervisor and all PCOs on the street and phone contact with relevant city agencies and departments (Muni, SFMTA Signal Shop, SFPD, SFFD), transit operators (Muni, BART, Caltrans) and event center staff (security, valet attendants, etc.). The PCO Supervisor would also have authority and discretion in how PCOs are deployed, and may adjust the controls described below as conditions warrant. Transportation conditions during various-sized events would be monitored during the first year of operations to refine the appropriate number of PCOs and/or locations for the various event types.

TABLE 5.2-16
SUMMARY OF TRANSPORTATION MANAGEMENT STRATEGIES BY EVENT TYPE

	Event Type			
Management Strategy	**Convention/ Small Event (Weekday Daytime)[a]**	**Arena Concert (Evening)[b]**	**Peak Event/ NBA Game (Evening)**	**Overlapping Peak Event with AT&T Park Event**
Coordinate with SFMTA and Mission Bay Ballpark Transportation Coordinating Committee (MBBTCC)	√	√	√	√
Muni Ticket Sales at Event Center Box Office	√	√	√	√
Taxi Zone on Terry A. Francois Boulevard	√	√	√	√
Taxi Zone on South Street	√	√	√	√
Designated Commercial loading zone (non-event hours)	√	√	√	√
Dedicated TMA Shuttle Stop	√	√	√	√
Dedicated Charter Bus Stop on 16th Street	√			
Dedicated Shuttle Zone for Connection to 16th BART Station		√	√	√
Dedicated Paratransit Stop on Terry A. Francois Blvd	√	√	√	√
Dedicated Media Truck Zone			√	√
PCO Supervisor at Event Center Command Center		√	√	√
PCOs positioned at key locations throughout the surrounding intersections and transportation network	√	√	√	√
Event Center staff positioned at key locations throughout the site to facilitate crowd control, wayfinding, and curb management.	√	√	√	√
Post-Event Temporary Lane Closure: Northbound lanes on Third Street between 16th Street and Mission Bay Boulevard South		√	√	√
Post-Event Temporary Lane Closure: South Street between Third Street and 450 South Street garage entrance		√	√	√
Post-Event Temporary Lane Closure: Northbound lanes on Illinois Street between Mariposa and 16th Streets, except for local traffic and shuttle staging and loading		√	√	√
Post-Event Temporary Lane Closure: Westbound lanes on 16th Street between Terry A. Francois Blvd and Illinois Street, and eastbound lanes on 16th Street between Third Street and Illinois Street, Except for Shuttle staging and loading		√	√	√
Coordinate with BART, Caltrain, Muni	√	√	√	√
Coordinate with SF Giants/AT&T Park Special Events Staff	√	√	√	√

NOTES:
[a] The 55 family shows held each year, with an average of 5,000 attendees, are expected to require similar controls to the small event.
[b] Refers to an evening concert with more than 14,000 attendees.

SOURCE: *Final Transportation Management Plan for the Warriors San Francisco Event Center*, April 2015

Small Events and Convention Events. Prior to an event, up to six PCOs would be stationed at the following intersections: Third Street/South Street, Third Street/16th Street, Terry A. Francois Boulevard/South Street, Terry A. Francois Boulevard/16th Street, and Illinois Street/16th Street.

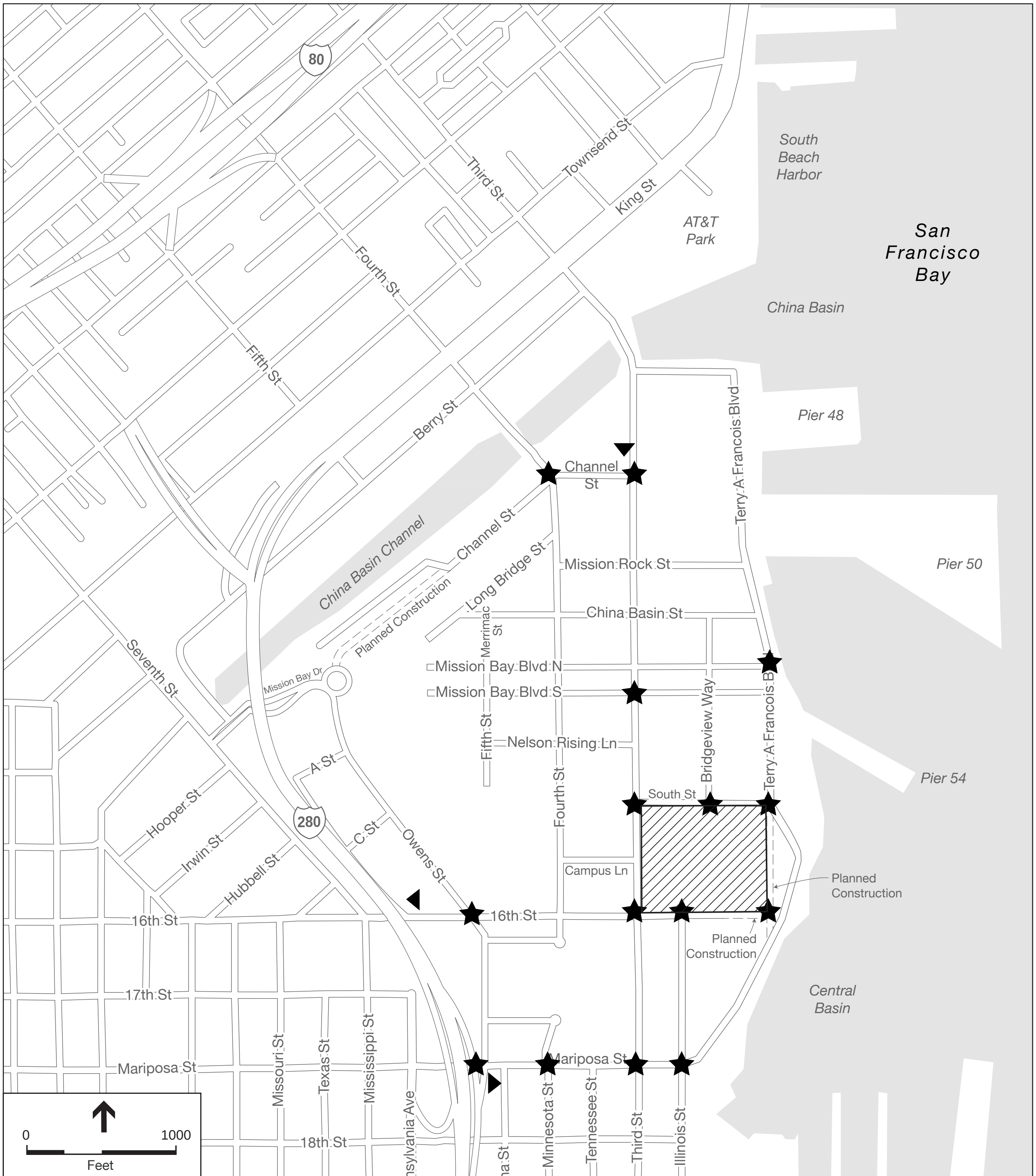
The following temporary curb regulations on the curb frontages adjacent to the project site would be initiated about two hours prior to the event start time, and would continue until about 1.5 hours following the end of the event. Only changes to the proposed curb regulations from conditions without an event (as described above) are noted.

- Two taxi zones would be provided: on South Street between Bridgeview Way and Terry A. Francois Boulevard (300 feet), and on Terry A. Francois Boulevard south of South Street (200 feet). Event center crowd control staff would be assigned to taxi zones to facilitate coordinated passenger loading/unloading and departure of taxis.
- A passenger loading/unloading zone approximately 340 feet in length would be provided on Terry A. Francois Boulevard and would accommodate private vehicles and TNC vehicles.[28] The proposed permanent 60-foot wide paratransit stop on Terry A. Francois Boulevard would not be affected during events. Event center crowd control staff would be assigned to passenger loading/unloading zones to ensure coordinated curb access, and to facilitate passenger loading/unloading, as well as departure of vehicles.
- A charter bus zone about 500 feet in length (accommodating about six buses) would be provided along the north curb of 16th Street west of Terry A. Francois Boulevard.

Basketball Games and Large Concert Events. The transportation management strategies for concerts with about 12,500 or more attendees and basketball games (with about 18,000 attendees) would be similar. During events with more than 12,500 attendees, up to 17 PCOs would be stationed in the project vicinity, managing vehicular, transit, bicycle and pedestrian flows, as shown in **Figure 5.2-11**. The exact locations would be determined by the PCO Supervisor, but it is anticipated that PCOs would be stationed at the following intersections pre-event and/or post-event:

- Fourth Street/Channel Street
- Third Street/Channel Street
- Terry A. Francois Boulevard/Mission Bay Boulevard North
- Third Street/Mission Bay Boulevard South
- Third Street/South Street
- Bridgeview Way/South Street
- Terry A. Francois Boulevard/South Street
- Third Street/16th Street
- Owens Street/16th Street
- Illinois Street/16th Street
- Terry A. Francois Boulevard/16th Street
- I-280 northbound ramps/Owens Street/Mariposa Street
- Fourth Street/Mariposa Street
- Third Street/Mariposa Street
- Illinois Street/Mariposa Street

28 Transportation Network Company (TNC) is a company or organization that provides transportation services using an online-enabled platform to connect passengers with drivers using their personal vehicles (e.g., Lyft, SideCar, Uber).



Project Site Boundary

Parking Control Officer (PCO) Location

Variable Message Sign (VMS) Location

SOURCE: Final Transportation Management Plan for the Warriors San Francisco Event Center, April 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E: Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-11

Proposed Locations of PCOs and VMSs

PCOs would also be stationed at the light rail platforms to facilitate pedestrian crossings, and to minimize conflicts between pedestrians, light rail, and vehicular traffic. In addition, it is anticipated that there would be roving PCO(s) in adjacent neighborhoods, as necessary, to monitor general parking issues and respond to calls during the events. Passenger loading onto the light rail vehicles would be monitored by SFMTA Transit Fare Inspectors and Passenger Assistance Program Staff, who would also be stationed at the light rail platforms.

Three permanent Variable Message Signs (VMS) would be installed to provide traffic alerts, messages, and alternate driving routes for drivers traveling to the event center, to destinations in the vicinity, or through the area. These would be in addition to the existing VMS located on northbound Third Street south of 16th Street, and all four VMSs would be used during large events. The proposed locations for the new VMSs include:

- Westbound 16th Street east of I-280
- Southbound Third Street south of the Lefty O'Doul Bridge
- Eastbound Mariposa Street east of the I-280 ramps

As shown on **Figure 5.2-12** and **Figure 5.2-13**, the following temporary curb regulations on the curb frontages adjacent to the project site would be initiated about two hours prior to the event start time, and would continue until about 1.5 hours following the end of the event:

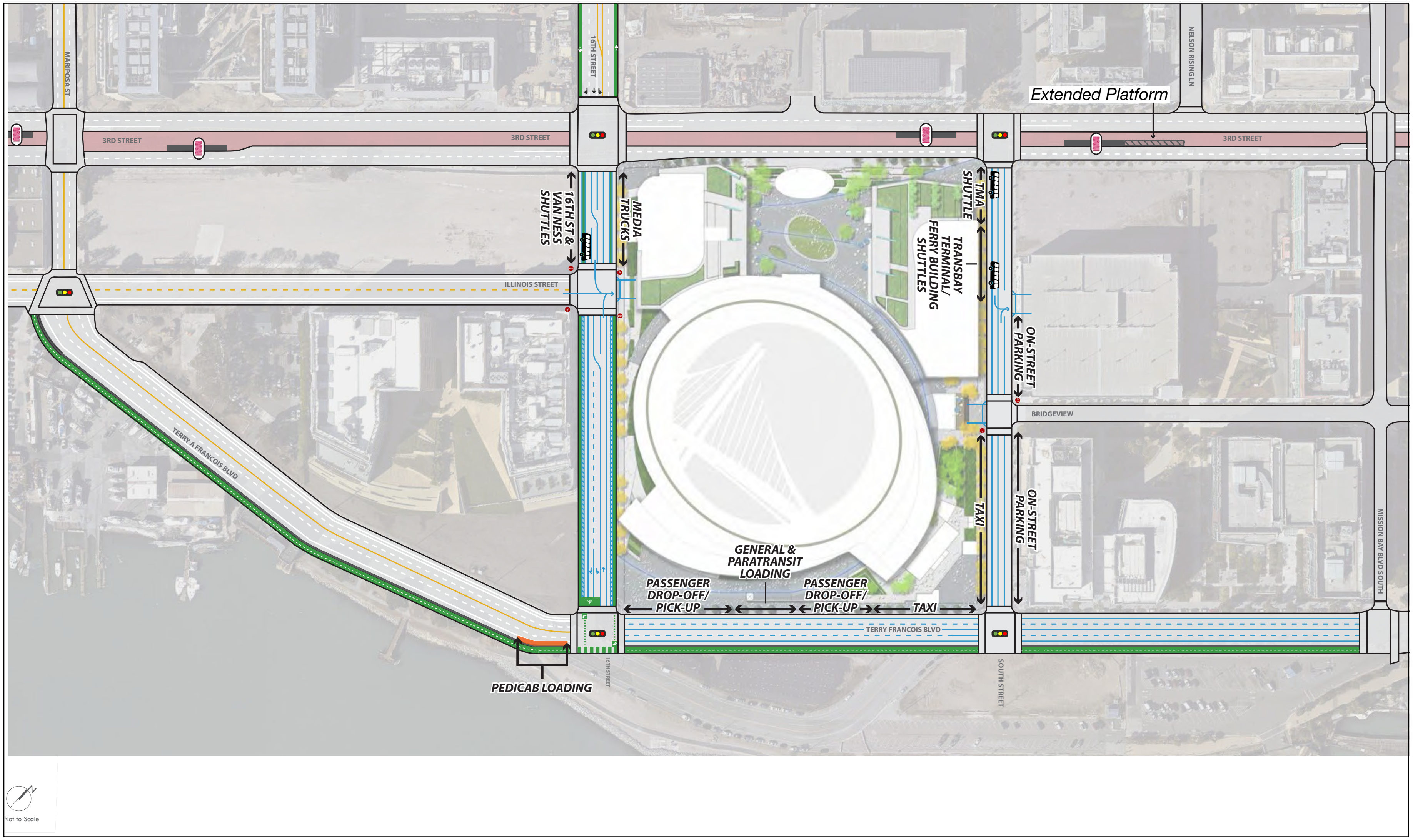
- Two taxi zones would be provided: on South Street between Bridgeview Way and Terry A. Francois Boulevard (300 feet), and on Terry A. Francois Boulevard south of South Street (200 feet). Event center crowd control staff would be assigned to taxi zones to facilitate coordinated passenger loading/unloading and departure of taxis.

- Two passenger loading/unloading zones with a total of about 535 feet in length would be provided on Terry A. Francois Boulevard. The proposed permanent 75-foot wide paratransit stop on Terry A. Francois Boulevard would not be affected during events.

- Media trucks would park on 16th Street adjacent to the project site, between Third Street and the entrance into the parking garage. About 185 feet of curb would be dedicated for media trucks.

- Prior to an event, the Muni Special Event Transbay Terminal/Caltrain/Ferry Building Shuttle stop would be on South Street adjacent to the project site, west of the proposed Mission Bay TMA shuttle stop, while the shuttle stop for the Muni Special Event 16th Street BART Shuttle route and the Muni Van Ness Avenue Shuttle route would be on the south side of 16th Street (i.e., across the street from the project site) between Third and Illinois Streets.

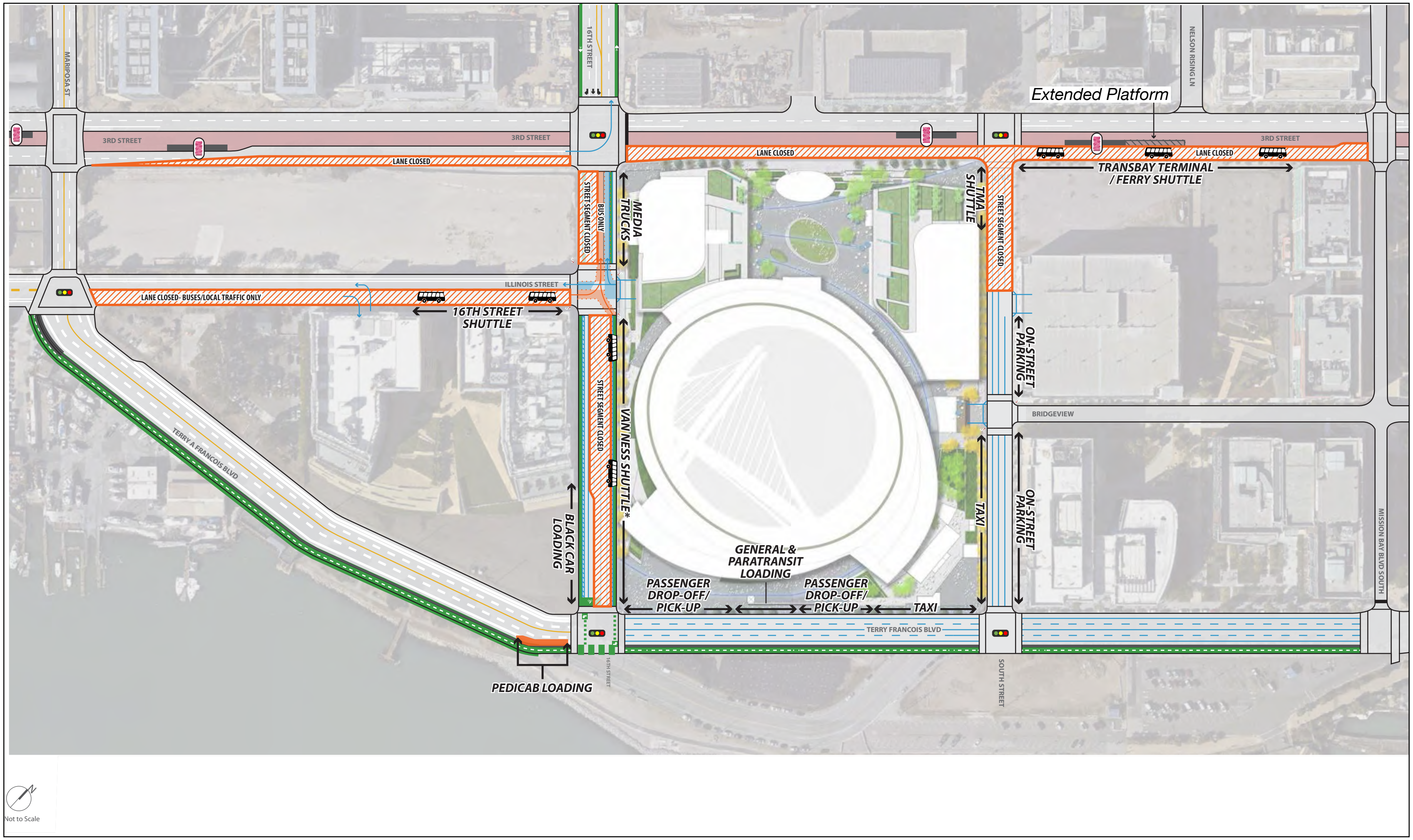
- Prior to the end of the event, temporary travel lane closures (except for emergency vehicles) would be implemented on Third Street between Mariposa Street and Mission Bay Boulevard South, on South Street between Third Street and Bridgeview Way, on 16th Street between Third Street and Terry A. Francois Boulevard, and on Illinois Street between Mariposa and 16th Streets. The temporary lane closures are anticipated to be in place for approximately 30 to 45 minutes after the end of the event, or until vehicular traffic dissipates and most event attendees taking transit have boarded. Southbound traffic flow on Third Street would not be affected by these temporary northbound travel lane closures. These travel lane closures would involve the following:



SOURCE: Final Transportation Management Plan for the Warriors San Francisco Event Center, April 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-12
Pre-Event Controls for Large Events



SOURCE: Final Transportation Management Plan for the Warriors San Francisco Event Center, April 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-13
Post-Event Controls for Large Events

- On northbound Third Street between Mariposa and 16th Streets, one of the two northbound travel lanes (i.e., the curb lane) would be temporarily closed, and all northbound traffic on this segment would be directed to turn left onto westbound 16th Street (i.e., about 140 vehicles during the late evening peak hour). On Third Street between 16th and South Streets, both of the northbound travel lanes would be closed to all vehicular traffic and bicycles. On Third Street between South Street and Mission Bay Boulevard South, both travel lanes would be closed to vehicular traffic, with the exception of the Muni Special Event Transbay Terminal/Caltrain/Ferry Building Shuttle route, which would have a bus stop/unloading zone on Third Street north of South Street.

- On Illinois Street between Mariposa and 16th Streets, the northbound lane would be temporarily closed, with the exception of the Muni Special Event 16th Street BART Shuttle and local access into the buildings at 409/499 Illinois Street (a vehicle entrance to the building is located approximately midblock). As noted above, the Muni Special Event 16th Street BART Shuttle would have a bus stop/loading zone on the east side of Illinois Street south of 16th Street. Southbound traffic flow on Illinois Street (i.e., from the project garage) would not be affected by these temporary northbound travel lane closures.

- On 16th Street, travel lanes on the segment between Illinois Street and Terry A. Francois Boulevard would be closed to vehicular traffic both ways, with the following exceptions: Muni Special Event Van Ness Avenue Shuttle would have a bus stop/loading zone on the north side of 16th Street (westbound travel) adjacent to the project site; a black car loading zone would be provided on the south side of 16th Street (eastbound travel) between a driveway to the 409/499 Illinois Street building and Terry A. Francois Boulevard (about 150 feet in length); vehicles exiting the 409/499 Illinois Street building on the south side of 16th Street would be permitted access onto eastbound 16th Street towards Terry A. Francois Boulevard; and bicyclists would be permitted with some on-street controls.

- Left turns would be restricted from westbound 16th Street onto Third, Owens and Mississippi Streets through signage, temporary barriers, and/or PCOs.

- On the segment of 16th Street between Third and Illinois Streets, the eastbound travel lane would be closed to vehicular traffic except transit and bicyclists, while the westbound lanes would remain open to accommodate: vehicles exiting the project garage; the Muni Special Event 16th Street BART Shuttle that would travel northbound on Illinois Street, and turn left onto 16th Street westbound to continue towards the 16th Street BART station; and the Muni Special Event Van Ness Avenue Shuttle that would travel westbound on 16th Street after loading passengers at the north curb of 16th Street between Illinois Street and Terry A. Francois Boulevard.

- On South Street, all travel lanes (both ways) on the segment between Third Street and the entrance/exit to the 450 South Street parking facility would be closed to vehicular traffic, except for the Mission Bay TMA shuttle routes, which would have a stop in this section of South Street. Taxis would be directed to arrive at the taxi zone on South Street prior to the temporary closure of South Street at Third Street, and to stage until the end of an event. Taxis arriving post-event would access this taxi zone on South Street from Bridgeview Way.

- Tow-away regulations, similar to those implemented following a SF Giants baseball game at AT&T Park, would be implemented on the west side of Illinois Street between Mariposa and 18th Streets to allow for two southbound lanes to continue on Illinois Street. Additional signage would be added at tow-away locations.

Garage Operations. Attendees with pre-sold parking passes for the project garage would access the garage at 16th Street from the left turn pocket on eastbound 16th Street at the approach to Illinois Street, from westbound 16th Street, or from northbound Illinois Street to self-park. Event center staff would check parking passes before vehicles enter the garage. PCOs would be stationed at the project garage driveway to facilitate vehicle egress (office employees leaving on weekday evenings) and ingress (event attendees entering the garage), minimize conflicts with pedestrians and bicycles on 16th Street, and to coordinate with PCOs positioned at nearby intersections. PCOs stationed at the intersection of Illinois/16th Street would provide priority to the eastbound left turn movements from 16th Street into the garage to ensure that queues for the garage do not extend upstream onto Third Street. PCOs would also work with event center staff that would be checking attendees' tickets for valid access to the garage. Drivers who attempt to access the garage without a valid parking pass would be redirected eastbound on 16th Street to Terry A. Francois Boulevard to other nearby garages or parking lots.

Following an event, PCOs would manage alternating flows of vehicle traffic exiting the garage with pedestrian and bicycle flows along and crossing 16th Street, manage alternating flows of vehicle traffic exiting the garage with the Muni Special Event 16th Street BART shuttles accessing 16th Street eastbound from Illinois Street northbound and with the Muni Special Event Van Ness Avenue shuttles traveling westbound on 16th Street, and coordinate with PCOs along 16th Street that would be managing pedestrian flows across 16th Street.

Vehicles exiting the project garage on South Street, vehicles exiting the 450 South Street garage, and vehicles traveling southbound on Bridgeview Way would be directed eastbound on South Street to Terry A. Francois Boulevard.

Overlap between events at the proposed Event Center and at AT&T Park. In circumstance when events at the proposed event center partially or completely overlap with baseball games or other events at AT&T Park, additional adjustments to the Transportation Management Plan for the proposed event center would be made, specifically:

- Because PCOs would be stationed at some of the same intersections where PCOs are stationed during SF Giants evening games, staffing would be adjusted to eliminate duplication of efforts, and to address the overlapping impacts.

- Because the Fourth Street bridge is closed to northbound travel (transit and taxis excepted) and the Third Street bridge is congested following a SF Giant game, event center attendees would generally be directed to travel southbound on Terry A. Francois Boulevard, and then westbound on 16th Street to access locations to the west and north via Seventh Street. Some vehicles, depending on where they have parked, would access Seventh Street via Mission Bay Boulevard and Mission Bay Drive.

Transportation Demand Management (TDM) Strategies

The TMP includes TDM strategies for employees and for event center visitors. TDM strategies for office, retail, restaurant and event center employees:

TDM strategies for all on-site employees:

Policy/Operations

- Participate in and promote pre-tax commuter benefits, a federal program that allows employees to reduce their commuting costs by up to 40 percent using tax-free dollars to pay for their commuting expenses.
- Enroll in free-to-employees ride-matching program through www.511.org.
- Enroll in free-to-employers Emergency Ride Home Program through the City of San Francisco.
- If applicable, comply with California's parking cash-out program.[29]
- Contribute to the Mission Bay TMA shuttle program.
- Provide indoor secure bicycle parking facilities for employees.
- Provide shower and locker facilities for employee use.
- Identify potential tenants who may provide on-site amenities (such as fitness and exercise centers, food and beverage options, and/or automated banking resources) to encourage employees to stay on-site during the workday.
- Encourage tenants to allow certain employees to work flexible schedules and telecommute, to the extent reasonable.
- Designate parking spaces for carpool/vanpool participants.

Marketing/Communications

- Promote use of Mission Bay TMA shuttles to employees; notify them that they are eligible to ride the Mission Bay TMA shuttles for free; and provide information about routes, stop locations, and schedule.
- Encourage employees and visitors to participate in public events that promote bicycling such as the annual "Bike to Work" day.
- Organize and publicize community efforts, such as Spare the Air days (as declared for the Bay Area region) or a Rideshare Week.

Capital

- Sponsor a Bay Area Bike Share station in the project vicinity.
- Designate priority curb areas on-site for TMA shuttles.

TDM strategies for event center employees:

- Provide non-event day access to the enclosed bicycle valet facility (approximately 300 bike spaces; valet operations during events only.

[29] In accordance with California's parking cash-out law – Assembly Bill 2109, Katz; Chapter 554, Statutes of 1992. Available online at http://www.arb.ca.gov/planning/tsaq/cashout/cashout_guide_0809.pdf. Accessed May 28, 2015.

TDM strategies for event center visitors:

Policies/Operations

- Work with the City to identify arena event patrons arriving via transit and reward those patrons with promotional incentives that may include discounted food or beverage, team or venue merchandise, raffle entry, access to a "fast-track" security line or one or more other options. Market these incentives with a robust communications strategy prior to an event day so that visitors can make choices accordingly.

- Identify and reward patrons of the bike valet with promotional incentives that may include discounted food or beverage, team or venue merchandise, raffle entry, access to a "fast-track" security line or one or more other options. Market these incentives with a robust communications strategy prior to an event day so that visitors can make choices accordingly.

- Distribute GSW-branded Clipper Cards to encourage patrons to associate event attendance with transit usage during attendee's trip planning process.

- Work with the SFMTA to determine the market feasibility and benefits of bundling the cost of a round-trip Muni fare ($4.50) into the cost of all ticketed events.

- If parking is not bundled with ticket purchases for arena events (i.e., select event days and types), charge market-rate fees for on-site parking in connection with such arena events. Encourage off-site partners to charge market-rate parking fees for all arena events.

- Designate a TDM/TMP coordinator to develop and implement marketing/communications/ incentive programs, and coordinate with facility on policies and capital needs to support sustainable trip making by GSW employees and event center visitors.

- Establish an annual TDM budget for all components of the TDM program applying to GSW employees and event center visitors.

Communications/Marketing

- At point of ticket purchase, encourage patrons to use sustainable modes of transportation via communications on the internet and through the ticket vendor.

- Design a "Getting There" page for the venue website that lists multi-modal options and comparisons before showing preferred driving routes or available parking. Promote transit access to the project site by providing: interactive trip-planning tools; transit maps with recommended stops/stations for accessing site and best routes to the event center; and walking directions from transit stations/stops. Promote transit information on event center website, mobile apps, websites of events taking place at the site (to be required as a standard part of event contract) and in event literature and advertisements, when appropriate.

- Provide real-time transit information, including train or bus arrivals and departures, in key event center locations (exit areas, gathering areas, etc.), inside the building (on TVs and other screens), and/or via mobile applications.

- Make available additional communication of transit options and wayfinding during playoff games for non-season pass holders who may be coming from out of town by providing information to, and encouraging displays within, hotels and local businesses in the event center vicinity.

- Promote use of the enclosed on-site bicycle valet facility (approximately 300 bike spaces). Provide a bicycle map, showing routes to the project site, on the event center web site, mobile applications, and in event literature and advertisements, when appropriate.
- Create schedules of upcoming events for display on electronic message boards, to discourage auto use and parking in the Event Center vicinity.

Capital

- Work with SFMTA to brand transit stops/stations near the project site, covering any costs associated with re-branding.
- Provide outdoor bicycle racks for visitors to the office, retail, and restaurant uses.
- If and when peak event bicycle storage demand exceeds the 300 space enclosed valet facility and on-site bike rack capacity, provide additional temporary outdoor bike valet parking areas.
- Sponsor a Bay Area Bike Share station(s) in the project vicinity.
- Designate priority curb areas on-site for taxis, charter buses, and rideshare vehicles. Explore partnership options with rideshare/carpool/TNC[1] companies to offer discounts to event attendees and/or employees.

Communication

The TMP includes strategies related to distributing information on transportation management for the various modes at the event center for pre-event and post-event conditions as part of the ticket purchase process, and wayfinding signage for multi-modal access and egress. The communication strategies would discourage use of private autos and encourage use of transit and other modes.

Monitoring, Refinement, and Performance Standards

The TMP outlines the process to monitor and refine the strategies within the TMP in conjunction with the City throughout the life of the project. Monitoring methods include field monitoring of operations during the first four years and an annual surveying and reporting program, thereafter. Surveys of event attendees and event center employees would be conducted annually, and visitor surveys of Mission Bay neighbors and UCSF staff and emergency providers would be conducted in the initial years of operation.

The TMP also identifies performance standards for events that the project sponsor has committed to maintaining:

- Weekday Auto Mode Share: Implement measures intended to reach a goal of on average, attendees for peak events do not exceed a 53 percent auto mode share for weekday peak event arrivals (i.e., 6:00 to 8:00 p.m.). The performance standard is based on the mode of travel results shown in **Table 5.2-24** in Section 5.2.5.3, Approach to Analysis.

[1] Transportation Network Company (TNC) is a company or organization that provides transportation services using an online-enabled platform to connect passengers with drivers using their personal vehicles (e.g., Lyft, SideCar, Uber).

- Weekend Auto Mode Share: Implement measures intended to reach a goal of on average, attendees for peak events do not exceed a 59 percent auto mode share for weekend peak event arrivals (i.e., 6:00 to 8:00 p.m.). The performance standard is based on the mode of travel results shown in **Table 5.2-24** in Section 5.2.5.3, Approach to Analysis.
- Vehicle Queuing on City Streets: Traffic entering the parking garage from eastbound 16th Street does not spill back from the eastbound left turn lane on 16th Street into the intersection with Third Street.
- Vehicle Queuing on City Streets: Event traffic does not block access to the UCSF emergency room entrance for emergency vehicles or patients on Mariposa Street between I-280 and Third Street.
- Pedestrian Flows: Pedestrians do not spill out of sidewalks onto streets with moving vehicles, or out of crosswalks when crossing the street.
- Bicycle Parking: Signage is clearly visible to direct bicyclists to event valet and other bicycle parking, and ensure that adequate bicycle parking supply is provided to accommodate a typical peak event.
- Transit Mode Share: All Muni light rail and special event shuttle passengers are able to board their transit vehicle within 45 minutes[30] following an event, if desired.
- Good Neighbor: Mission Bay TMA shuttles continue to run and maintain capacity for simultaneous neighborhood use.

In the event that ongoing monitoring shows at any time that the performance standards outlined above are not being met, the project sponsor would explore additional travel demand strategies, operational efforts, or design refinements to meet the goals identified in the TMP. Revisions to this policy would be brought before the Mission Bay CAC, or its successor body, for approval. A representative list of possible strategies is as follows:

- Increase project sponsor contribution to the Mission Bay TMA to directly fund incremental, event-only service, which may include additional shuttle bus purchases and/or expanded hours of operation.
- Establish a partnership with a private shuttle provider for incremental, event-only service to and from satellite parking locations (if designated) or transit centers.
- Facilitate charter bus/private shuttle program purchases for group ticket sales and/or suite purchases for events.
- Reduce the project parking demand through a variety of mechanisms, including pricing.
- Explore partnerships with car-sharing services (e.g., Zipcar, City CarShare) for spaces on-site to reduce car ownership amongst employees.

[30] The 45 minutes for boarding of all passengers was determined to be an appropriate period of time given the anticipated time attendees would spend exiting the building, crossing the plaza, and traveling to the appropriate shuttle stop. It reflects anticipated delay by some attendees who may remain within the event center following an event's end to take advantage of promotions, watch post-game interviews, etc. and by other attendees who may patronize the retail businesses located on-site following an event by prior to leaving Mission Bay.

- Undertake media campaigns, including in social media, which promote walking and/or bicycling to the event center.
- Conduct cross-marketing strategies with event center businesses (e.g., 10 percent off merchandise/food if patrons arrive by transit and/or bicycle or on foot).
- Carry out public education campaigns.
- Offer special event ferry service to the closest ferry station to the project site (similar to the existing service provided between AT&T Park and Alameda, Marin and Solano Counties by Golden Gate Transit, Alameda/Oakland and Vallejo ferry service).
- Provide transit fare subsidies to event ticket holders.
- In consultation with the SFMTA, remove any street furniture or landscaping obstructing pedestrian paths of travel or Muni staging areas.

5.2.5.3 Approach to Analysis

This section presents the methodologies for analyzing and organizing the transportation impacts and information considered in the travel demand and impact analysis. This section is organized in the following order:

1. Approach to impact analysis, including analysis scenarios, analysis periods, analysis years, and analysis methodology.
2. Organization of impacts and overarching scenario assumptions.
3. Methodology and results of travel demand forecasts for the proposed project.
4. Methodology for development of 2040 cumulative traffic, transit, and pedestrian forecasts.

1. Approach to Impact Analysis Methodology

This section presents the methodology for analyzing transportation impacts and information considered in developing travel demand for the proposed project. The impacts of the proposed project on the surrounding transportation network were analyzed using the *Transportation Impact Analysis Guidelines* issued by the Planning Department in 2002 (*SF Guidelines 2002)*, which provides direction for analyzing transportation conditions and in identifying the transportation impacts of a proposed project.

As described in Chapter 3, Table 3-3, the event center would have up to 225 events per year, of which up to 60 would be Golden State Warriors basketball games. Other events would include about 45 small and large concert events, about 55 family shows, and about 61 convention, civic, and other sporting events. Average and maximum attendance estimates by type of event for the proposed event center were prepared by the project sponsor and are summarized in **Table 3-3** in Chapter 3. The expected attendance would vary depending on the type of event held (e.g., basketball game, concert, other non-Golden State Warriors sporting event), but would be expected to be similar on weekdays and on weekends. In the case of other non-Golden State Warriors sporting events, the expected attendance would also depend on the interest in competing teams, and, in the case of concerts, on the popularity of the performing artists.

Average visitor attendance for the proposed event center is projected to range between 5,000 attendees for a family show event, to between 17,000 and 18,000 attendees for a regular season or post season basketball game; concert average attendance is estimated to range between 3,000 attendees for arena theater concerts to 12,500 attendees for the typical end-stage full arena configuration, and average convention attendance is estimated at 9,000 attendees. Overall, it is estimated that there would be up to 225 event days in any given year.

Event Scenarios

For purposes of the transportation analysis, three analysis scenarios were analyzed as representative of the range of project impacts, depending on the type of activity at the event center.

- ***No Event*** **–** The No Event scenario reflects conditions associated with the 605,000 gross square feet (gsf) of office uses, the 62,500 gsf of retail uses, and 62,500 gsf of restaurant uses on days when there are no events scheduled at the event center.
- ***Convention Event*** **–** The Convention Event scenario reflects conditions for a convention-type event with an average attendance of about 9,000 attendees. For convention/corporate events, a 9,000-attendee event was analyzed, as this attendance level represents the average attendance for about 50 percent of the events that would occur at the proposed event center (i.e., the convention events, family shows, and other sporting events).[31] This scenario assesses the impacts of a daytime event at the project site.
- ***Basketball Game*** **–** The Basketball Game scenario reflects sell-out conditions for a Golden State Warriors evening basketball game, as it would be the most conservative approach that assumes that the event center would be filled to capacity (i.e., 18,064 attendees). It also represents conditions for a sold-out evening concert.

Analysis Periods

Per the *SF Guidelines*, the weekday p.m. peak hour is the standard analysis period for development projects in San Francisco and was analyzed for the proposed project. In addition to the weekday p.m. peak hour typically studied, three additional analysis hours were selected for analysis of transportation impacts. These three additional analysis hours were selected to address impacts of the event center. Each project scenario was evaluated for the particular time periods during which the specific conditions would occur. For example, convention events are not anticipated to occur in the weekday evening and late evening peak hours or on weekends, and therefore, analysis of convention events during these time periods was not conducted. **Table 5.2-17** summarizes the time periods analyzed for each scenario.

- The weekday p.m. peak hour (the peak hour of the 4:00 to 6:00 p.m. peak commute period) was selected because it represents the period during which weekday background traffic volumes and transit demand are the greatest. The weekday p.m. peak hour was analyzed for the No Event, Convention Event, and Basketball Game scenarios.

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[31] The event center is expected to typically serve as a satellite venue for conventions/conferences held primarily at the Moscone Center, with an attendance of 9,000 people. The maximum attendance of 18,500 shown in Table 2 represents the maximum number of conference attendees that could be accommodated in a 360-degree center stage configuration, which would be infrequent.

TABLE 5.2-17
ANALYSIS HOURS FOR PROPOSED PROJECT SCENARIOS

Proposed Project Scenario	Weekday			Saturday
	PM Peak Hour	Evening Peak Hour	Late Evening Peak Hour	Evening Peak Hour
No Event	X	--	--	X
Convention Event	X	--	--	--
Basketball Game[a]	X	X	X	X

NOTE:
[a] The Basketball Game scenario represents conditions for a sold out evening concert.

- The weekday evening peak hour (the peak hour of the 6:00 to 8:00 p.m. period) was analyzed only for the Basketball Game scenario because basketball games typically start at 7:30 p.m. and therefore, a higher percentage of inbound event attendees would travel to the event center during the 6:00 to 8:00 p.m. period than during the 4:00 to 6:00 p.m. commute peak period.

- The weekday late evening peak hour (the peak hour of the 9:00 to 11:00 p.m. period) was analyzed only for the Basketball Game scenarios. For evening period the Basketball Game scenario, it represents the period during which the highest number of outbound event trips would occur after a basketball game or concert event.

- The Saturday evening peak hour (the peak hour of the 7:00 to 9:00 p.m. period) was analyzed for the No Event and Basketball Game scenarios. For the Basketball Game scenario it represents the period during which the highest number of inbound event trips would occur. Approximately 68 percent of attendees are projected to arrive at the event center during the 7:00 to 8:00 p.m. peak hour.

Analysis of weekday a.m. peak hour conditions was not conducted because travel demand associated with the proposed project would be greater during the p.m. peak hour than during the a.m. peak hour. For example, the retail and restaurant uses would generate substantially fewer trips in the a.m. peak hour than during the p.m. peak hour, as most would not be open during the a.m. Most events, including family shows, would not overlap with the a.m. peak hour, and daytime convention events would generate fewer trips in the a.m. peak hour than during the p.m. peak hour. Furthermore, comparison of a.m. and p.m. peak hour LOS conditions at intersections in the vicinity of the project site, as presented in the UCSF 2014 LRDP EIR, demonstrate that intersections operate similarly during both peak hours. Therefore, because the proposed project would generate more trips in the p.m. peak hour than in the a.m. peak hour, analysis of potential traffic impacts would be adequately addressed in the p.m. peak hour analysis.

The travel demand for concerts, family shows and other sporting events was not estimated quantitatively because, as shown in **Table 3-3** in Chapter 3, these types of events are expected to attract a lower attendance and require fewer employees than a basketball game. In addition, arrival and departure travel patterns for these types of events would also be expected to be similar to those of basketball game. As such, the transportation infrastructure (roadways, transit vehicles, stations, sidewalks, etc.) would be expected to operate similar to or better before and after concerts than before or after a sold-out basketball game of the same attendance level. As noted above, the Basketball Game scenario also represents maximum impact conditions for a sold out evening concert. However, evening concerts could start later than basketball games, generally between 8:00 and 9:00 p.m., and have a more spread out arrival period than basketball games due to opening act performances before the featured headliner.

The analysis of the proposed project was conducted for existing and 2040 cumulative conditions. "Existing plus Project" conditions assess the near-term impacts of the proposed project, while "2040 Cumulative plus Project" conditions assess the long-term impacts of the proposed project in combination with other reasonably foreseeable development. Year 2040 was selected as the future analysis year because 2040 is the latest year for which travel demand forecasts were available from the San Francisco County Transportation Authority (SFCTA) travel demand forecasting model.

As discussed in Section 5.2.3 above, the data collected in 2013/2014 for the quantitative existing conditions analysis was adjusted upwards to reflect the opening of the UCSF Medical Center Phase 1 and Public Safety Building in early 2015. The travel demand associated with these two projects was determined from previous studies conducted by UCSF and the SF Department of Public Works, respectively.

Construction Analysis Methodology

Potential short-term construction impacts were assessed based on preliminary construction information for the proposed project. The construction impact evaluation addresses the staging and duration of construction activity, truck routings, estimated daily truck volumes, roadway and/or sidewalk closures, and evaluates the effect of construction activities on sidewalks, bicycle lanes, or travel lanes.

Vehicular Traffic Analysis Methodology

The traffic impact assessment for the proposed project was conducted for 23 study intersections and six freeway ramp locations in the vicinity of the project site. The study intersections were evaluated using the *HCM 2000* methodology. For signalized intersections, this methodology uses various intersection characteristics (e.g., traffic volumes, lane geometry, and signal phasing and timing) to estimate the capacity for each lane group approaching the intersection, and to calculate the average control delay experienced by motorists traveling through the intersection. The level of service (LOS) is based on average delay (in seconds per vehicle) for the various movements within the intersection. A combined weighted average delay and LOS is presented for the intersection. For unsignalized intersections, average delay and LOS operating conditions are calculated by approach (e.g., northbound) and movement (e.g., northbound left-turn), for those movements that are subject to delay. For purposes of this analysis, the operating conditions (LOS and delay) for unsignalized intersections are presented for the worst approach (i.e., the approach with the highest average delay per vehicle). **Table 5.2-18** presents the LOS descriptions and associated delays for signalized and unsignalized intersections.

TABLE 5.2-18
LEVEL OF SERVICE DEFINITIONS FOR SIGNALIZED AND UNSIGNALIZED INTERSECTIONS

Control/LOS	Description of Operations	Average Control Delay (seconds per vehicle)
Signalized		
A	Insignificant Delays: No approach phase is fully used and no vehicle waits longer than one red indication.	≤ 10
B	Minimal Delays: An occasional approach phase is fully used. Drivers begin to feel restricted.	> 10.0 and ≤ 20
C	Acceptable Delays: Major approach phase may become fully used. Most drivers feel somewhat restricted.	> 20.0 and ≤ 35
D	Tolerable Delays. Drivers may wait through no more than one red indication. Queues may develop but dissipate rapidly without excessive delays.	> 35.0 and ≤ 55
E	Significant Delays: Volumes approach capacity. Vehicles may wait through several signal cycles and long queues form upstream.	> 55.0 and ≤ 80
F	Excessive Delays: Represents conditions at capacity, with extremely long delays. Queues may block upstream intersections.	> 80
Unsignalized		
A	No delay for STOP-controlled approach.	≤ 10
B	Operations with minor delays.	> 10.0 and ≤ 15
C	Operations with moderate delays.	> 15.0 and ≤ 25
D	Operations with some delays.	> 25.0 and ≤ 35
E	Operations with high delays and long queues.	> 35.0 and ≤ 50
F	Operations with extreme congestion, with very high delays and long queues unacceptable to most drivers.	> 50

NOTE: LOS – Level of Service

SOURCE: Transportation Research Board, 2000. Highway Capacity Manual, Washington, DC.

It should be noted that at some of the study intersections, the average delay per vehicle would remain the same, or slightly reduced, with the addition of project-related traffic. Using the *HCM 2000* methodology, the level of service is calculated based on an average of the total vehicular delay per approach, weighted by the number of vehicles at each approach. Increases in traffic volumes at an intersection usually result in increases in the overall intersection delay. However, if there are increases in the number of vehicles at movements with low delays, the average weighted delay per vehicle may remain the same or decrease.

Under existing plus project conditions, the proposed project was determined to have a significant traffic impact at a signalized intersection if it would cause an intersection operating at LOS D or better under existing conditions to operate at LOS E or LOS F, or intersections operating at LOS E under existing conditions to deteriorate to LOS F conditions. At signalized intersections that operate at LOS E or LOS F under existing conditions and would continue to operate at LOS E or LOS F under existing plus project conditions, the change in traffic volumes was reviewed at the critical movements to determine whether a resulting increase in traffic volumes would contribute considerably to unacceptable levels of service (i.e., a contribution of 5 percent or more to the traffic volumes at the critical movements operating at LOS E or LOS F).

Under 2040 cumulative conditions, the proposed project was also determined to have a significant cumulative impact if it would cause an intersection operating at LOS D or better to operate at LOS E or LOS F, or intersections operating at LOS E to deteriorate to LOS F conditions. At signalized intersections that operate at LOS E or LOS F under 2040 cumulative conditions and would continue to operate at LOS E or LOS F under 2040 cumulative plus project conditions, the proposed project would have a significant impact if it would contribute considerably to delays at intersections operating at LOS E or LOS F. The increases in project-related vehicle trips were reviewed at the critical movements to determine whether these increases would contribute considerably to the critical movements (i.e., a contribution of 5 percent or more to the traffic volumes at the critical movements operating at LOS E or LOS F).

Under existing plus project conditions and 2040 cumulative conditions, the proposed project was determined to have a significant traffic impact at an unsignalized intersection if project-related traffic causes the level of service at the worst approach to deteriorate from LOS D or better to LOS E or LOS F and peak hour signal warrants[32] would be met, or would cause peak hour signal warrants to be met when the worst approach is already operating at LOS E or LOS F.

In addition, if it was determined that the proposed project would have a significant project-specific traffic impact at a signalized or unsignalized intersection under existing plus project conditions, then the impact would also be considered a significant cumulative impact under 2040 cumulative conditions.

Similar to intersections, the operating characteristics of freeway ramps are evaluated using the concept of LOS. Freeway ramp LOS is based on vehicle density (passenger cars per lane-mile) and service volume (passenger cars per hour). In San Francisco, LOS A through D is considered acceptable; LOS E and LOS F are considered unsatisfactory service levels. **Table 5.2-19** presents the level of service designation and associated maximum densities for ramp merge and diverge operations.

For freeway ramp merge and diverge analyses, the proposed project was determined to have a significant impact on ramp operations if it would cause a ramp operating at LOS D or better under existing conditions to operate at LOS E or LOS F, or a ramp operating at LOS E under existing conditions to deteriorate to LOS F conditions. At ramps that operate at LOS E or LOS F under existing conditions and would continue to operate at LOS E or LOS F under existing plus project conditions, the change in traffic volumes on the ramp was reviewed to determine whether a resulting increase in traffic volumes would contribute considerably to unacceptable levels of service (i.e., a contribution of 5 percent or more to the traffic volumes on the ramp).

[32] A signal warrant is a condition that an intersection must meet to justify a signal installation. There are different warrants, which examine factors such as the volume of vehicles, bicyclists, and pedestrian, the signal system, collision statistics, as well as the geometric/physical configuration of the intersection. Even if a signal warrant is not met under the strictest interpretation, the determination to signalize an intersection could be made based upon the city traffic engineer's professional judgment of intersection operations.

TABLE 5.2-19
LEVEL OF SERVICE DEFINITIONS FOR FREEWAY RAMP JUNCTIONS

LOS	Maximum Density (passenger cars per mile per lane)
A	< 10
B	> 11 to 20
C	> 20 to 28
D	> 28 to 35
E	> 35
F	Demand exceeds capacity

NOTE: LOS – Level of Service

SOURCE: Transportation Research Board, 2000. Highway Capacity Manual – Special Report, Washington, DC

Under 2040 cumulative conditions, the proposed project was also determined to have a significant cumulative impact if it would cause a ramp operating at LOS D or better to operate at LOS E or LOS F, or a ramp operating at LOS E to deteriorate to LOS F conditions. For ramps that operate at LOS E or LOS F under 2040 cumulative conditions and would continue to operate at LOS E or LOS F under 2040 cumulative plus project conditions, the proposed project would have a significant impact if it would contribute considerably to the ramp volumes (i.e., a contribution of 5 percent or more to the traffic volumes on the ramp. In addition, if it was determined that the proposed project would have a significant project-specific traffic impact at a ramp under existing plus project conditions, then the impact would also be considered a significant cumulative impact under 2040 cumulative conditions.

Transit Analysis Methodology

The impact of additional transit ridership generated by the proposed project on local and regional transit providers was assessed by comparing the projected ridership to the available transit capacity at the maximum load point. Transit "capacity utilization" refers to transit riders as a percentage of the capacity of the transit line, or group of lines combined and analyzed as screenlines across which transit lines travel. The transit analyses were conducted for the peak direction of travel for each of the analysis time periods.

- For the weekday p.m. peak hour analyses, the transit capacity utilization was conducted at the Planning Department's three regional screenlines (for transit trips from the East Bay, North Bay, and South Bay), and at the four Muni downtown screenlines. In addition, transit capacity utilization was conducted for the T Third light rail line and the 22 Fillmore bus route that serve the project site. Weekday p.m. peak hour analysis was conducted for the outbound direction of travel (i.e., away from the project site). The weekday p.m. peak hour coincides with the peak evening commute period, and with the time when most employees at the site would be departing work.
- For the weekday evening peak hour, the transit analysis was conducted for the T Third light rail line and the 22 Fillmore bus route and for the regional screenlines in the inbound direction of travel (i.e., towards the project site, and into San Francisco). The weekday evening peak hour coincides with the period when most attendees would be traveling to the event center for a weekday evening event.

- For the weekday late evening peak hour, the transit analysis was conducted for the T Third light rail line and the 22 Fillmore bus route and for the regional screenlines in the outbound direction of travel (i.e., away from the project site). The weekday late evening peak hour coincides with the period when attendees would be leaving the event center following a weekday evening event.
- For the Saturday evening peak hour, the transit analysis was conducted for the T Third light rail line and the 22 Fillmore bus route and for the regional screenlines in the inbound direction of travel (i.e., towards the project site, and into San Francisco). The Saturday evening peak hour coincides with the period when most attendees would be traveling to the event center for a Saturday evening event.

The existing peak hour ridership and capacity data were obtained from Muni and reflect conditions that would occur following completion of the Central Subway project and the 22 Fillmore Transit Priority Project. (As explained below, both of these projects have been approved and are funded and are scheduled to become operational in the near future.) For service provided by Muni, the capacity includes seated passengers and an appreciable number of standing passengers per vehicle (the number of standing passengers is between 30 and 80 percent of the seated passengers depending upon the specific transit vehicle configuration). Muni has established a capacity utilization standard of 85 percent, which was applied for assessment of weekday p.m. peak hour conditions. For analysis of events at the project site, a capacity utilization standard of 100 percent was used, since more congested conditions on transit are acceptable for temporary special event conditions.

Weekday p.m. peak hour ridership and capacity for the regional transit service providers at the three regional screenlines were based on the *SF Guidelines* regional screenline data. Weekday evening, weekday late evening, and Saturday evening ridership and capacity were obtained from the regional transit providers, including AC Transit, BART, Caltrain, WETA, SamTrans, and Golden Gate Transit. All regional transit providers have a peak hour capacity utilization standard of 100 percent.

Because the Central Subway is anticipated to be operational in 2019, the existing plus project transit impact analysis was conducted assuming the additional light rail capacity in the project vicinity that would be provided via the Central Subway. Similarly, the 22 Fillmore Transit Priority Project is anticipated to be operational in 2020, and was also included in the existing plus project transit analysis. The ridership at the maximum load point and capacity of the 22 Fillmore and the T Third conditions reflect 2020 conditions for the Central Subway (i.e., conditions for the year following the start of revenue service on the light rail line and when the 22 Fillmore Transit Priority Project is completed and replaces the 55 16th Street route).[33]

The proposed project was determined to have a significant transit impact if project-generated transit trips would cause downtown or regional screenlines, and, where applicable, directly affected routes, operating at less than its capacity utilization standard under existing conditions,

[33] Ridership and capacity for year 2020 was used in the analysis of existing transit conditions, as it is the year for which near-term transit ridership forecasts that include implementation of the Central Subway and Muni Forward projects (e.g., the 22 Fillmore Transit Priority Project) are available.

to operate at more than capacity utilization standard. For Muni, the capacity utilization standard is 85 percent for conditions without an event at the project site, and 100 percent for conditions with an event at the project site. For regional operators, the capacity utilization standard is 100 percent for conditions without and with an event at the project site.

Under 2040 cumulative conditions, the proposed project was determined to have a significant cumulative impact if its implementation would cause the capacity utilization at the Muni and regional screenlines and/or corridors within the screenlines to exceed the capacity utilization standard noted above for conditions without and with an event at the project site, or if its implementation would contribute considerably to a screenline or corridor projected to operate at greater than the capacity utilization standard under 2040 cumulative plus project conditions (i.e., a contribution of 5 percent or more to the transit ridership on the screenline or route). In addition, if it was determined that the proposed project would have a significant project-specific transit impact under existing plus project conditions, then the impact would also be considered a significant cumulative impact under 2040 cumulative conditions.

Pedestrian Analysis Methodology

Pedestrian conditions were assessed qualitatively and quantitatively. Quantitative analysis of operating characteristics of the pedestrian sidewalk and crosswalk locations was conducted using the *HCM 2000* methodology. Sidewalk operating conditions are measured by average pedestrian flow rate, which is defined as the average number of pedestrians that pass a specific point on the sidewalk during a certain period (pedestrians per minute per foot or p/m/f). The width of the sidewalk at this point is considered the "effective width", which accounts for reduction in amount of sidewalk available for travel due to street furniture and the side of buildings. The level of service for sidewalks is presented for "platoon" conditions, which represents the conditions when pedestrians are walking together in a group. Pedestrian level of service conditions were calculated at the most restrictive sidewalk location (i.e., at the "pinch point") along a given block face.

Crosswalk LOS are measurements of the amount of space (square feet) each pedestrian has in the crosswalk or corner. These measurements depend on pedestrian volumes, signal timing, corner dimensions, crosswalk dimensions and roadway widths.

With the HCM methodology, an upper limit for acceptable conditions is LOS D, which equals approximately 15 to 24 square feet per pedestrian for crosswalks, and approximately 10 to 15 pedestrians per minute per foot for sidewalks. LOS E and LOS F represent unacceptable conditions. At LOS E normal walking gaits must be adjusted due to congested conditions, and independent movements are difficult; at LOS F walking speeds are severely restricted. **Table 5.2-20** shows the LOS criteria for pedestrians based on the 2000 HCM methodology.

Under existing plus project and 2040 cumulative conditions, the proposed project was determined to have a significant pedestrian impact at a sidewalk or crosswalk location if it would cause the analysis location to deteriorate from LOS D or better to LOS E or LOS F, or from LOS E to LOS F conditions. In addition, if it was determined that the proposed project would have a significant project-specific pedestrian impact under existing plus project conditions, then the impact would also be considered a significant cumulative impact under 2040 cumulative conditions.

TABLE 5.2-20
PEDESTRIAN LEVEL OF SERVICE CRITERIA

LOS	Crosswalks Density (sq ft per pedestrian)	Sidewalk Flow Rate (pedestrians per minute per foot)
A	> 13	< 0.5
B	> 10 – 13	> 0.5 – 3
C	> 6 – 9.9	> 3 – 6
D	> 3 – 5.9	> 6 – 11
E	> 2 – 2.9	> 11 – 18
F	< 2	> 18

SOURCE: Transportation Research Board, 2000. Highway Capacity Manual – Special Report, Washington, DC

Bicycle Analysis Methodology

The project impact analysis includes a qualitative assessment of bicycle conditions. Bicycle conditions are assessed as they related to the proposed project area, including bicycle routes, safety and right-of-way issues, and potential conflicts with traffic.

Loading Analysis Methodology

Loading analysis for the proposed project was conducted by comparing the loading supply that would be provided to the projected demand that would be generated.

Emergency Vehicle Access Analysis Methodology

Potential changes to emergency vehicle access were assessed qualitatively. Specifically, the analysis assessed whether any of the event center transportation management strategies would impair adequate emergency vehicle access.

Parking Conditions

As discussed in Chapter 2, Introduction, Section 2.8, Senate Bill 743 amended CEQA by adding Public Resources Code §21099 regarding the analysis of parking impacts for certain urban infill projects in transit priority areas.[34] Public Resources Code §21099(d), effective January 1, 2014, provides that "… parking impacts of a residential, mixed-use residential, or employment center project on an infill site located within a transit priority area shall not be considered significant impacts on the environment." Accordingly, parking is no longer to be considered in determining if a project has the potential to result in significant environmental effects for projects that meet all three criteria established in the statute. The proposed project meets all of the criteria, and thus the

[34] A "transit priority area" is defined as an area within one-half mile of an existing or planned major transit stop. A "major transit stop" is defined in California Public Resources Code §21064.3 as a rail transit station, a ferry terminal served by either a bus or rail transit service, or the intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning and afternoon peak commute periods. A map of San Francisco's Transit Priority Areas is available online at http://sfmea.sfplanning.org/Map%20of%20San%20Francisco%20Transit%20Priority%20Areas.pdf. Accessed May 28, 2015.

transportation impact analysis does not consider the adequacy of parking in determining the significance of project impacts under CEQA. However, the OCII acknowledges that parking conditions may be of interest to the public and the decision-makers. Therefore, this SEIR presents a parking demand analysis for informational purposes only, and considers any secondary physical impacts associated with constrained supply (e.g., queuing by drivers waiting for scarce on-site parking spaces that affects the public right-of-way) as applicable in the following transportation impact analysis.

Furthermore, SB 743 requires that the State Office of Planning and Research (OPR) develop revisions to the *CEQA Guidelines* establishing criteria for determining the significance of transportation impacts of projects within transit priority areas that promote a reduction in greenhouse gas emissions and do not use automobile delay (level of service) in determining significance (see p. 4.A.3). These provisions of SB 743 have not yet been established and currently are only available in preliminary draft form. Therefore, as directed by OCII, this SEIR analyzes the traffic-related impacts of the project as they pertain to LOS.

A parking assessment was conducted by comparing the proposed parking supply to the parking demand generated by the proposed project uses. An assessment of cumulative parking conditions at build-out of the Mission Bay Area was also conducted.

2. *Organization of Impacts and Overarching Scenario Assumptions*

The general organization of the impact analysis is construction impacts, followed by operational impacts, followed by cumulative impacts, and ending with a discussion of parking conditions. Construction impacts are discussed in **Impact TR-1**. Operational impacts are covered in **Impact TR-2** through **Impact TR-25**, under three overarching scenarios, described below. Cumulative impacts are described in **Impact C-TR-1** through **Impact C-TR-10.** These impact evaluations are then followed by a discussion of parking conditions under proposed project conditions, but not in terms of a CEQA impact, as described above.

For the operational impacts, the impact evaluations uses the methodologies described above to address each of the following topics: vehicular traffic; transit; pedestrian; bicycle; loading; air traffic; and emergency vehicle access. These topics are all analyzed under each of three overarching scenario assumptions that represent the range of potential project impacts, including the reasonable worst-case scenarios. The three overarching scenario assumptions are:

- Conditions *without* a SF Giants game at AT&T Park ("Without a SF Giants Game"), **Impact TR-2** through **Impact TR-10**. This represents the most typical conditions expected to occur if the project were to be implemented.
- Conditions *with* an overlapping SF Giants evening game at AT&T Park ("With a SF Giants Evening Game"), **Impact TR-11** through **Impact TR-17**. As described further below, there is the likelihood that some events at the proposed event center could overlap with SF Giants evening games, with the potential to exacerbate transportation effects as analyzed in the first group of impacts.
- Conditions *without* implementation of the Muni Special Event Transit Service Plan, **Impact TR-18** to **Impact TR-24.** The two overarching scenarios above assume

implementation of the Muni Special Event Transit Service Plan, as described above in Section 5.2.5.2 and on Table 5.2-15, which indicate that the SFMTA intends to provide additional transit service to accommodate peak evening events, including basketball games and concerts with more than 14,000 attendees. The City and County of San Francisco fully anticipates implementation of this plan and has identified sufficient funding.[35] However, in order to provide a conservative CEQA analysis as well as information to the public and decision-makers, this group of impacts discloses the impacts of the proposed project if for some unknown reasons in the future, the City is unable to implement the Muni Special Event Transit Service Plan. This group of impacts analyzes only the Basketball Game scenario as the representative worst-case scenario.

For the conditions *with* an overlapping SF Giants evening game at AT&T Park, it is estimated that there would be a potential for about 32 overlapping events per year, but in rare circumstances there could be as many as 40 events (with varying combined total attendance) in one year. These estimates are based on the following assumptions, which are conservative because they rely on current scheduling information and do not account for any advanced coordination between the SF Giants and the Golden State Warriors, or internal schedule coordination at the event center:

- Overlap with Golden State Warriors games. The regular NBA (late October through mid-April) and regular baseball seasons (April through September) overlap slightly in the first half of April, and for both teams, only half of the games are home games. Conservatively, about 2 games per year could overlap during the regular season. If either or both of the Warriors and SF Giants were to move on to the post season, there would be increased likelihood of overlapping events, with up to approximately 5 additional overlapping events if both teams were to advance to their respective championship final series in the same year.

- Overlap with concerts. As indicated in Chapter 3, Project Description, Table 3-3, the major concert season is fall, winter, and early spring. Thus, of the 45 yearly concerts, about 20 could overlap with the regular baseball season, but at most, only half of these (10) are estimated to occur on the same day as a SF Giants home game.

- Overlap with family shows. As indicated in Chapter 3, Project Description, Table 3-3, the approximate 55 family shows would be distributed throughout the year on Wednesday through Sunday. Since the SF Giants play for 6 months of the year during the regular season, it is assumed that half of the family shows (27) would occur during the baseball season (April through September), but the SF Giants only play home games at AT&T Park for half of that time, leaving 14 days of possible overlap. However, the SF Giants also play games on Monday and Tuesday when there would be no family shows. So, about 10 of the family shows are estimated to occur on the same day as a SF Giants home game.

- Overlap with other non-Golden State Warriors sporting events. Of the approximate 30 other non-Golden State Warriors sporting events that would be held at the event center, it is assumed that half could occur during baseball season, and half of those could overlap with SF Giants home games, or about 7 events.

- Overlap with conventions/corporate events. Of the approximate 31 conventions or corporate events, it is assumed that half could occur during baseball season, and half of

[35] Letter to Tiffany Bohee, Executive Director, OCII, from Edward D. Reiskin, Director of Transportation, SFMTA, Re: SFMTA Transit Service Plan, Enforcement Support and Capital Investment Funding for the Golden State Warriors Multipurpose Arena, dated May 15, 2015.

those could overlap with SF Giants home games. However, these events would almost exclusively be during the day, and only about 35 percent of the SF Giants games are day games; this indicates the potential for an estimated 3 overlapping events.

Based on league schedules and concert scheduling as described above and in Chapter 3, Project Description, Table 3-3, it is anticipated that in a regular year, on average, there is a possibility of about nine large events (about 12,500 or more attendees) at the event center overlapping with a SF Giants evening game at AT&T Park (i.e., two basketball games and seven concerts) annually. If either or both teams make it to their respective championships, the number of large events overlapping could moderately increase; however, it is unlikely that this scenario would occur on a regular basis.

3. *Travel Demand Methodology and Results*

The memorandum containing the detailed methodology and information used to calculate the project travel demand is included in **Appendix TR**. This section summarizes the information and analysis contained in the travel demand memorandum.[36] As described above, travel demand estimates for the Basketball Game scenario assume that the SFMTA would provide additional transit service to accommodate peak evening events. However, travel demand estimates for the Basketball Game scenario for conditions without implementation of the Muni Special Event Transit Service Plan are also included in this section.

Introduction

Travel demand refers to the new vehicle, transit, pedestrian and bicycle trips generated by the proposed project. The methods commonly used for forecasting travel demand for development projects in San Francisco are based on person-trip generation rates, trip distribution information, and mode splits data described in the *SF Guidelines*, and which are based on a number of detailed travel behavior surveys conducted within San Francisco. The data in the *SF Guidelines* are generally accepted as more appropriate for use in transportation impact analyses for San Francisco development projects than conventional transportation planning data because of the unique mix of uses, density, availability of transit, and cost of parking in San Francisco.

However, the *SF Guidelines* do not include travel demand characteristics for the specialized uses (e.g., sports events, conventions, and other events) that would take place at the proposed event center. Similarly, standard trip generation resources, such as the Institute of Transportation Engineer's *Trip Generation Manual*, do not include sufficiently detailed trip generation data for such specialized uses. Therefore, the travel demand for the event center component of the proposed project was based on the estimated attendance, as well as information on current travel characteristics of Golden State Warriors basketball attendees at the Oracle arena in Oakland. In addition, the trips generation rates presented in the *SF Guidelines* and ITE's *Trip Generation Manual* cannot be directly applied to some development projects, such as the proposed project, because of its large scale, unique location, and mixed-use character (restaurant and retail uses

[36] Travel, Parking, and Loading Demand Estimates for the Proposed Event Center & Mixed-Use Development at Mission Bay Blocks 29-32 – Case No. 2014.1441E, Final Memorandum, May 2015. See **Appendix TR**.

supporting an event center as an anchor use). Thus, adjustments have been made to account for these factors. See **Appendix TR**.

The weekday daily p.m. peak hour travel demand for standard project land uses, such as office, retail, and restaurant uses were developed in accordance with the *SF Guidelines*, which provides p.m. peak hour trip generation rates and modal split, trip distribution, and average vehicle occupancy data specific to the southeast quadrant of San Francisco (Superdistrict 3, referred to as SD 3) where the project site is located.[37] The modal split and trip distribution assumptions presented in the *SF Guidelines* for work trips into and out of SD 3 were further refined using more recent travel pattern data of existing Mission Bay employees collected by the Mission Bay TMA. Travel demand was also determined for weekday evening and late evening and for Saturday daily and evening conditions based on adjusted trip generation rates developed for the office, retail, and restaurant uses using information obtained from ITE's *Trip Generation Manual*, the *Urban Land Institute's Shared Parking (2nd Edition)*, and Pushkarev and Zupan's, *Urban Space for Pedestrians*. See **Appendix TR**.

The No Event scenario reflects travel demand associated with the office uses, retail, and restaurant uses for the weekday p.m. commute peak hour of analysis and the Saturday evening peak hour. The Convention Event scenario reflects the travel demand of the office, retail and restaurant uses, plus a daytime convention event.

The Basketball Game scenario reflects the travel demand of the office, retail and restaurant uses, plus an evening basketball game. The transportation impact analysis of the Basketball Game scenario was conducted for four analysis hours (weekday p.m., weekday evening, weekday late evening, and Saturday evening), for conditions without and with an overlapping SF Giants evening game at AT&T Park.

Table 5.2-21 presents the expected temporal distribution of arrival and departure patterns for basketball game attendees of the proposed project. The data are based on information provided by the Golden State Warriors for their current facility, which was then adjusted to provide for earlier arrival patterns based on comparable information collected at similar NBA facilities to account for the increased availability of retail and restaurant uses at the proposed project site compared to Oracle Arena in Oakland. A summary of this data is provided in the travel demand technical memorandum included in **Appendix TR**. Based on this information, it was be assumed that approximately 5 percent of arrivals to a basketball game would occur during the p.m. peak hour (5:00 to 6:00 p.m.), and up to 66 percent of arrivals would occur during the evening peak hour (7:00 to 8:00 p.m.). Similarly, up to 70 percent of the departures would occur during the late evening peak hour (9:00 to 10:00 p.m.). Event staff for basketball games would be expected to arrive between 4:30 and 5:00 p.m. and would be on post prior to the gate opening time; event staff would leave between 11:00 and 11:30 p.m.

[37] Superdistricts are travel analysis zones established by the Metropolitan Transportation Commission (MTC). These Superdistricts provide geographic subareas for planning purposes in San Francisco; a map with the Superdistrict boundaries is included in **Appendix TR**).

TABLE 5.2-21
BASKETBALL GAME ATTENDEE ARRIVAL AND DEPARTURE PATTERNS
FOR 7:30 P.M. START TIME AND 9:40 P.M. END TIME

Time Period	by Hour	Cumulative
Arrivals		
5:00 to 5:30 p.m.	1%	1%
5:30 to 6:00 p.m.	4%	5%
6:00 to 6:30 p.m.	11%	16%
6:30 to 7:00 p.m.	20%	35%
7:00 to 7:30 p.m.	33%	68%
7:30 to 8:00 p.m.	33%	100%
Departures		
9:00 to 9:30 p.m.	30%	30%
9:30 to 10:00 p.m.	40%	70%
10:00 to 10:30 p.m.	30%	100%

SOURCE: *Technical Memorandum - Travel, Parking and Loading Demand Estimates for the Proposed Event Center & Mixed-Use Development at Mission Bay Blocks 29-32*, May 2015. See **Appendix TR**.

Trip Generation

The person-trip[38] generation for the proposed project includes trips made by event attendees, employees, and other visitors to the project site and are based on the appropriate trip generation rates as described in a previous section, and which were then applied, as appropriate, to the number of expected event attendees, 1,000 gross square feet (GSF) of office, retail and restaurant uses in order to obtain the number of person trips generated by each land use. See **Appendix TR** for additional details.

The trip generation rates represent the number of person trips that would be generated by each project component as a stand-alone use. Some of the visitor trips entering/exiting the project retail and restaurant uses would be made by individuals destined to other components of the proposed project (referred to as visitor linked trips), such as the event center or the office uses. Thus, to account for the linked visitor trips, based on studies of non-work (visitor) trips conducted along the San Francisco waterfront and the type of retail and restaurant uses accessory to the event center, a daily 67 percent linked trips reduction was applied to non-work (visitor) trips for retail and restaurant uses during an event day (i.e., 33 percent of the visitor trips are considered new trips to the area unrelated to other nearby uses). On the other hand, because it is likely that more people would come to the area to specifically visit the project retail and restaurant uses on a non-event day, the daily linked trip factor was reduced to 33 percent for the sit-down restaurant and retail uses when no events are planned to take place at the site (i.e., 67 percent of the visitor trips are new trips to the site and to the area on non-event days). These assumptions are consistent with and more conservative (i.e., generates more trips) than the data obtained from a survey of shoppers conducted in the vicinity of the San Francisco Center at Powell and Market Streets, which found a

[38] A person trip is a trip made by one person by any means of transportation (auto, transit, walk, etc.).

linked trip factor of 67 percent for retail uses. Higher visitor linked trip ratios were assumed for the evening and late evening periods during an event when the percent of visitors unrelated to nearby project uses would be expected to be lower. It was assumed that the visitor linked trip factor would generally be constant throughout the day during non-event days. For event days, however, it was assumed that the linked trip factor would progressively increase as the event start time approaches. No linked trip factors were assumed under any scenario for visitors to the office uses.

Table 5.2-22 presents the number of person trips generated by the proposed project uses for the weekday and Saturday daily and peak hour analysis periods.

No Event. As shown in **Table 5.2-22**, the overall daily person trip generation would be lower on a Saturday than on a weekday, due to the higher trip generation associated with the office use on a weekday. On a weekday without an event, the proposed project would generate 26,998 daily person trips (inbound plus outbound), and 2,796 person trips during the weekday p.m. peak hour. On a Saturday without an event, the proposed project would generate 21,883 daily person trips and 3,130 person trips during the Saturday evening peak hour.

TABLE 5.2-22
PROPOSED PROJECT PERSON TRIP GENERATION BY LAND USE AND TIME PERIOD[a]

Land Use Type	Weekday				Saturday	
	Daily	PM Peak Hour	Evening Peak Hour	Late Evening Peak Hour	Daily	Evening Peak Hour
No Event						
Event Center[b]	263	22	--	--	263	0
Office	10,951	931	--	--	2,442	27
Retail	6,405	576	--	--	7,496	300
Quick Service Restaurant[d]	2,376	321	--	--	2,959	710
Sit-down Restaurant[d]	7,004	946	--	--	8,724	2,093
Total person trips w/out event	**26,998**	**2,796**	N.A.[c]	N.A.[c]	**21,883**	**3,130**
With Event						
Basketball Game	38,128	1,803	11,742	12,845	38,128	11,742
Convention Event	28,688	3,113	N.A.[c]	N.A.[c]	N.A.[c]	N.A.[c]
Office	10,951	931	186	47	2,442	27
Retail[d]	3,375	304	56	26	3,950	39
Quick Service Restaurant[d]	2,376	321	118	118	2,959	174
Sit-down Restaurant[d]	3,708	501	184	184	4,618	271
Total person trips w/ event						
Basketball Game	58,538	3,859	12,285	13,218	52,098	13,252
Convention Event	49,097	5,169	N.A.[c]	N.A.[c]	N.A.[c]	N.A.[c]

NOTES:
[a] Numbers may not sum to total due to rounding to the nearest person-trip.
[b] 105 employees would work at the event center on no-event days.
[c] Not applicable; not part of the travel demand analysis.
[d] Includes linked trip reductions as appropriate.

SOURCE: *Technical Memorandum - Travel, Parking and Loading Demand Estimates for the Proposed Event Center & Mixed-Use Development at Mission Bay Blocks 29-32*, May 2015. See **Appendix TR.**

Basketball Game. The total number of daily person trips generated on a weekday event day with a basketball game would be 58,538 person trips. Of these, 3,859 person trips would occur during the p.m. peak hour, 12,285 person trips would occur during the evening peak hour, and 13,218 person trips would occur during the weekday late evening peak hour. The total number of daily person trips generated on a Saturday with a basketball game would be 52,098 for a basketball game, of which 12,252 person trips would occur during the evening peak hour.

Convention Event. Convention events would generate fewer daily person trips than a basketball game (38,128 person trips for a basketball game versus 28,688 person trips for a convention event). However, because convention events would typically occur during the weekday, the proportion of convention event trips during the weekday p.m. peak hour would be greater than during a basketball game. This is because it is anticipated that many people would leave the convention event during the weekday p.m. peak hour while the majority of basketball fans arrive after the end of the p.m. peak hour (i.e., after 6:00 p.m.). The total number of daily person trips generated on a weekday event day with a convention event would be 49,097 trips, of which 5,169 person trips would occur during the p.m. peak hour.

Trip Distribution

The directional distribution is based on the origins and destinations of trips for each specific land use, which are then assigned to the four quadrants of San Francisco (Superdistricts 1 through 4), East Bay, North Bay, South Bay and Out of Region. The trip distribution percentages are summarized in **Table 5.2-23**.

The directional distribution of visitor trips for the proposed office, restaurant, and retail uses was obtained from the *SF Guidelines* for SD 3, in which the project is located. The distribution of convention/corporate events attendees was based on data provided by the Moscone Center Operator and documented in the Moscone Center Expansion EIR. The distribution of basketball game attendees was derived from information provided by Golden State Warriors (based on a market study assessment conducted by the project sponsor for the previously-proposed project location at Piers 30-32 in San Francisco). The directional distribution of employee trips for all proposed project uses was obtained from information provided by the Mission Bay TMA derived from transportation surveys of residents and employees in Mission Bay conducted in 2012, 2013, and 2014.

For worker trips to all land uses, the majority would be to/from San Francisco (47.3 percent), with the greatest proportion within SD 3 (22.3 percent), followed by East Bay (27.7 percent), and then South Bay (19.0 percent) origins/destinations. For visitor trips to a basketball game, the majority of trips would be to/from East Bay origins/destinations (31.1 to 33.0 percent), followed by the South Bay (26.7 to 28.0 percent), and then San Francisco (22.0 to 29.3 percent) origins/destinations.

The origin/destination distribution range for a weekday basketball game reflects an adjustment for event attendees who would travel to the event center directly from work rather than from their place of residence. The adjustment was based on a survey of Golden State Warriors season ticket holders (see **Appendix TR**). As shown in **Table 5.2-23**, the number of trips starting in

TABLE 5.2-23
PROPOSED PROJECT TRIP DISTRIBUTION PATTERNS BY LAND USE[a]

Place of Trip Origin/Destination	Basketball Game			Convention Event		Retail		Office/Restaurant	
		Visitors							
	Workers	Weekday Inbound	All Other	Workers	Visitors	Workers	Visitors	Workers	Visitors
San Francisco									
Superdistrict 1	7.7%	14.8%	11.1%	7.7%	55.0%	7.7%	6.0%	7.7%	13.0%
Superdistrict 2	9.9%	4.6%	3.4%	9.9%	5.0%	9.9%	9.0%	9.9%	14.0%
Superdistrict 3	22.3%	5.5%	4.2%	22.3%	5.0%	22.3%	61.0%	22.3%	44.0%
Superdistrict 4	7.4%	4.4%	3.3%	7.4%	5.0%	7.4%	5.0%	7.4%	7.0%
East Bay	27.7%	31.1%	33.0%	27.7%	7.5%	27.7%	3.0%	27.7%	9.0%
North Bay	3.5%	8.9%	13.0%	3.5%	2.5%	3.5%	2.0%	3.5%	1.0%
South Bay	19.0%	26.7%	28.0%	19.0%	10.0%	19.0%	9.0%	19.0%	9.0%
Out of Region	2.5%	4.0%	4.0%	2.5%	10.0%	2.5%	5.0%	2.5%	3.0%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

NOTES:

[a] Percentages may not sum to 100 due to rounding.

SOURCE: *Technical Memorandum - Travel, Parking and Loading Demand Estimates for the Proposed Event Center & Mixed-Use Development at Mission Bay Blocks 29-32*, May 2015. See **Appendix TR**.

San Francisco on a weekday is projected to be about 7.5 percentage points greater than on a weekend, with the corresponding reductions in trips arriving from the East Bay (2 percentage points), North Bay (4 percentage points), and South Bay (1.5 percentage points) areas.

The majority of visitor trips to a convention event, retail, office, and restaurant uses would be from within San Francisco (70 to 81 percent), followed by South Bay (9 to 10 percent), and then East Bay (3 to 9 percent) origins/destinations.

Mode of Travel

The estimated daily, p.m. peak hour, evening peak hour, and late evening peak hour person trips were allocated to travel modes in order to determine the number of auto, transit, taxi, TNC vehicles, motor coaches, bicycle, walk, and other trips. For event center basketball games, the "other" category includes motorcycles and non-conventional travel modes such as pedicabs, while for the non-event related uses of the proposed project (office, retail, and restaurant) "other" includes bicycles, motorcycles, taxis, and TNC vehicles. The bicycle trips generated by a basketball game were calculated as a separate mode of travel, but have been aggregated with those under the "other" category in the summary tables presented in this technical memorandum.

Travel mode splits of visitor trips for the non-event related uses were estimated from information in the *SF Guidelines* to the southeastern waterfront (i.e., SD 3), where the project site is located. Travel mode splits of all employee trips (including event employees at basketball games and conventions) were estimated from information provided by the Mission Bay TMA based on transportation surveys conducted in 2012, 2013, and 2014.

Mode split assumptions for convention/corporate events attendees were based on data provided by the Moscone Center Operator and documented in the Moscone Center Expansion EIR, with some adjustments to account for the SD 3 location of the proposed project. Specifically, it was assumed that the overall auto usage would be twice the Moscone Center (20 percent at the proposed project site versus 10 percent at the Moscone Center), with minimal walk trips (2 percent at the proposed project site versus 30 percent at the Moscone Center). Taxi and shuttle bus trips would continue to represent about half of all the trips, while transit trips would increase to 23 percent. The modal split allocation for each major origin/destination was estimated by using the *SF Guidelines* data for visitor trips to SD 3 as a guide and proportionally shifting walk trips from SD 1, SD 2 and SD 4 to transit trips and shifting walk trips starting or ending outside of San Francisco to auto trips; no adjustments were made for walk trips within SD 3.

The estimation of the mode of travel assumptions for the basketball game attendees and the configuration of the Muni Special Event Transit Service Plan presented in Section 5.2.5.2, Project Transportation Improvements Assumptions, were developed concurrently. On one side, the modal splits for basketball game attendee trips were derived from similar data obtained from surveys conducted in 2012 by the SF Giants.[39] The transit utilization for an event at the project

[39] The overall modal split to a SF Giants game on a weekday was 38 percent auto, 45 percent transit, and 17 percent by other means of travel, including walking. The overall modal split to a weekend game was 45 percent auto, 40 percent transit, and 15 percent by other means of travel, including walking.

site was assumed to be lower than for a baseball game given that transit access to the project site is more limited than at AT&T Park. Similarly, given that the project site is located further away from downtown and the Market Street corridor (approximately 0.6 additional miles to the south of AT&T Park), the component of event attendees either walking to the event center or taking transit to downtown and then walking to the project site would also be lower than at AT&T Park. In addition, the area surrounding the proposed project would be expected to have larger parking availability concentrated in a relatively small number of large easy to locate facilities, making it more appealing to drive to the proposed event center than to AT&T Park. Parking near the event center would be closer to, more prominent, and easier to find, and with more availability than the parking facilities near AT&T Park.

The number of attendees taking transit to and from the event center was also compared against the transit service that could reasonably be provided by Muni prior to and following the largest event that could be accommodated at the proposed event center. The T Third light rail line and the 22 Fillmore bus route are the only existing Muni routes providing close transit access to the project site's immediate vicinity. The operation of the T Third is constrained by the length of the station platforms along the line, both above and within the planned subway, which are designed to accommodate trains that are no longer than two cars. In addition, the number of trains that can be accommodated on the subway where they have to be turned around at the end of the line also limits the maximum frequency of the T Third service that can be offered. Similarly, the frequency of operation of the 22 Fillmore line is constrained by the maximum number of trolley buses that can be operated on a given segment of the line, traffic congestion along other portions of the line, and the need to provide reasonable minimum headways to avoid bunching of transit vehicles.

Given these limitations, a supplemental system of transit shuttles (i.e., the Muni Special Event Transit Service Plan) was developed to operate during the evening period immediately prior to events and after events, thereby providing additional transit options for attendees. A system of three event-oriented shuttle bus line was developed by SFMTA to provide attendees with additional transit access along 16th Street (supplementing the 22 Fillmore), and to/from the Van Ness corridor and the Transbay/Ferry Building area (supplementing the T Third). The sizing of these three supplemental Muni shuttle bus services considered, in addition to the potential event transit ridership, the need to provide reasonable accommodation adjacent to the site for buses to pick up passengers, the estimated travel time from the site to its destination, and the potential for some buses to turnaround at the end of their trip and return to the event center to pick up passengers.

As a result of this combination of potential basketball game attendee transit demand with Muni's modified transit capacity under conditions with the Muni Special Event Transit Service Plan, and in consultation with SFMTA, the estimated modes of travel assumptions were developed, in consultation with SFMTA. The overall auto share for a basketball game at the project site was estimated to be 54 percent (weekdays) and 60 percent (weekends), which is 16 and 8 percentage points higher than at AT&T Park (38 and 52 percent, respectively). At the same time, the overall auto share for a basketball game at the project site, would be 3 to 10 percentage points lower than a similar average for the proposed project location (64 percent for retail and 57 percent for other uses for proposed developments within SD 3) per information within the *SF Guidelines*. Similarly, the overall transit mode share was estimated to be about 35 percent, compared to 45 percent (weekdays) and 36 percent (weekends) at AT&T Park, and 19 percent (retail uses) to 22 percent (other uses) for projects within SD 3. Thus, the overall transit mode share of 35 percent reflects the anticipated additional transit service to and from the event center during large events, as well as the TDM strategies in the proposed project's TMP designed to encourage use of non-auto modes by event attendees.

Table 5.2-24 summarizes the trip generation by mode of travel for the proposed project land uses for the standard weekday p.m. peak hour, as well for the weekday evening and late evening peak hours, and for the Saturday evening peak hour. The overall percentage of trips shown in **Table 5.2-24** as arriving to the event center for the Basketball Game scenario by automobile during the weekday evening peak hour (i.e., 53 percent) and during the Saturday evening peak hour (i.e., 59 percent) were used to establish the weekday and weekend evening auto mode share minimum performance standards committed to by the project sponsor in the proposed project's TMP (see description of the TMP above in Section 5.2.5.2, Project Transportation Improvements Assumptions).

The resulting weekday and Saturday basketball game attendee transit demand was then assigned to the various Muni lines depending on their origins and destinations so that the initial Muni Special Event Transit Service Plan could be refined by SFMTA. The resulting plan was then incorporated into the proposed project as an intrinsic element of the design. Mode split assumptions and travel demand estimates for the Basketball Game scenario for conditions without implementation of the Muni Special Event Transit Service Plan (i.e., without the incorporation of this design feature) are included at the end of this section.

To determine the number of vehicle trips generated by the proposed project under various scenarios, an average vehicle occupancy rate was applied to the number of person trips by automobile mode. Average vehicle occupancies for a convention event as well as for standard project land uses, such as office, retail, and restaurant uses were estimated in accordance with the methodologies in the *SF Guidelines*. Vehicle occupancy data for the basketball games at the event center were developed based on information from surveys conducted by the SF Giants in 2007; data from 2007 were used because the 2012 SF Giants survey used to derive the modal split ratios did not include information about vehicle occupancy. The average vehicle occupancy for attendees for a weekday and Saturday evening event derived from the SF Giants survey (2.7 passengers per vehicle) is comparable to data obtained from other similar transportation planning studies for arenas in urban settings, which estimated average vehicle occupancies between 2.35 and 2.8 passengers per vehicle, with the higher values being observed on weekends. When combined with employee trips and trips to/from other on-site uses, the overall average vehicle occupancy during a convention event and a basketball would range between 1.5 and 3.6 passengers per vehicle, depending on the type, day of the event, and peak hour. It should be noted that the trips made by rideshare, such as taxis, shuttle buses, Uber and similar other smart phone application-based transportation services, were included in the vehicle trips as two vehicle trips during the analysis hour (i.e., one inbound and one outbound trip).

The overall number of vehicle trips generated by the proposed project by origin and destination is also presented in **Table 5.2-25**, while the number of transit trips is presented in **Table 5.2-26**.

TABLE 5.2-24
PROPOSED PROJECT TRIP GENERATION BY MODE, LAND USE AND TIME PERIOD[a]

Project Land Use	Weekday												Saturday			
	PM Peak Hour				Evening Peak Hour				Late Evening Peak Hour				Evening Peak Hour			
	Auto	Transit	Walk/ Other[b]	Total	Auto	Transit	Walk/ Other[b]	Total	Auto	Transit	Walk/ Other[b]	Total	Auto	Transit	Walk/ Other[b]	Total
No Event																
Event Center	6	14	3	22	--	--	--	--	--	--	--	--	0	0	0	0
Office	298	506	127	931	--	--	--	--	--	--	--	--	7	17	3	27
Retail[e]	357	84	135	576	--	--	--	--	--	--	--	--	185	44	70	300
Quick Service Restaurant[e]	170	75	76	321	--	--	--	--	--	--	--	--	376	167	168	710
Sit-down Restaurant[e]	514	201	230	946	--	--	--	--	--	--	--	--	1,139	446	509	2,093
Total person trips w/out event	1,344	881	570	2,796	N.A.[c]				N.A.[c]				1,707	673	750	3,130
	48%	32%	20%	100%									55%	22%	24%	100%
With Event																
Basketball Game	731	872	200	1,803	6,340	4,121	1,280	11,742	7,126	4,527	1,191	12,845	7,045	4,110	587	11,742
Convention Event[e]	633	772	1,708	3,113	N.A.[c]				N.A.[c]				N.A.[c]			
Office	298	506	127	931	50	115	21	186	13	29	5	47	7	17	3	27
Retail[e]	182	52	69	304	26	19	10	56	12	9	5	26	18	13	7	39
Quick Service Restaurant[e]	170	75	76	321	50	45	22	118	50	45	22	118	74	66	33	174
Sit-down Restaurant[e]	265	118	118	501	79	70	35	184	79	70	35	184	116	104	51	271
Total person trips w/ event																
Basketball Game[f]	1,645	1,625	590	3,859	6,546	4,371	1,368	12,285	7,280	4,680	1,258	13,218	7,261	4,310	681	12,2526
	43%	42%	15%	100%	**53%**	36%	11%	100%	55%	35%	10%	100%	**59%**	35%	6%	100%
Convention Event	1,547	1,524	2,098	5,169	N.A.[c]				N.A.[c]				N.A.[c]			
	30%	29%	41%	100%												

NOTES:
a Numbers may not sum to total due to rounding.
b "Other" includes walk, bicycle, motorcycle, taxis, limousines, TNC vehicles, etc.
c Not applicable; not part of the travel demand analysis.
d Transit mode includes trips made by convention event shuttle.
e Includes linked trip reductions.
e The overall percentage of trips arriving to the event center for the Basketball Game scenario by automobile during the weekday evening peak hour (i.e., 53 percent) and during the Saturday evening peak hour (i.e., 59 percent), highlighted in **bold**, were used to establish the weekday and weekend evening auto mode share minimum performance standards committed to by the project sponsor in the proposed project's TMP.

SOURCE: *Technical Memorandum - Travel, Parking and Loading Demand Estimates for the Proposed Event Center & Mixed-Use Development at Mission Bay Blocks 29-32*, May 2015. See **Appendix TR**.

TABLE 5.2-25
PROPOSED PROJECT VEHICLE TRIPS BY PLACE OF ORIGIN AND TIME PERIOD[a,b]

Place of Trip Origin/ Destination	Weekday					Saturday	
	PM Peak Hour			Evening Peak Hour	Late Evening Peak Hour	Evening Peak Hour	
	No Event	Basketball Game	Convention Event	Basketball Game	Basketball Game	No Event	Basketball Game
San Francisco							
Superdistrict 1	46	58	161	266	217	66	191
Superdistrict 2	101	93	87	128	106	141	103
Superdistrict 3	236	193	165	162	136	266	143
Superdistrict 4	52	63	54	161	133	59	120
East Bay	70	146	93	787	898	74	831
North Bay	19	46	51	286	446	10	422
South Bay	148	261	245	907	1,024	129	938
Out of Region	30	27	62	55	59	40	66
Total Vehicles	**702**	**886**	**919**	**2,752**	**3,018**	**785**	**2,815**
Inbound	255	524	256	2,553	134	367	2,687
Outbound	447	362	663	198	2,883	418	128

NOTES:
[a] Numbers may not sum due to rounding.
[b] For all analysis scenarios, vehicle trips include the proposed office, retail, and restaurant uses, as well as an event or no event at the event center, depending on the analysis scenario (i.e., No Event, Basketball Game, Convention Event).

SOURCE: Technical Memorandum - Travel, Parking and Loading Demand Estimates for the Proposed Event Center & Mixed-Use Development at Mission Bay Blocks 29-32, May 2015. See **Appendix TR**.

TABLE 5.2-26
PROPOSED PROJECT TRANSIT TRIPS BY PLACE OF ORIGIN AND TIME PERIOD[a,b]

Place of Trip Origin/Destination	Weekday					Saturday	
	PM Peak Hour			Evening Peak Hour	Late Evening Peak Hour	Evening Peak Hour	
	No Event	Basketball Game	Convention Event	Basketball Game	Basketball Game	No Event	Basketball Game
San Francisco							
Superdistrict 1	88	177	467	834	681	82	698
Superdistrict 2	93	149	99	184	157	72	151
Superdistrict 3	261	311	228	188	167	290	163
Superdistrict 4	61	104	81	125	107	43	94
East Bay	237	535	387	1,663	1,898	124	1,698
North Bay	18	55	19	295	460	5	399
South Bay	94	236	139	855	967	34	854
Out of Region	30	57	104	227	244	23	253
Total Transit Trips	**881**	**1,625**	**1,524**	**4,371**	**4,680**	**673**	**4,310**
Inbound	157	944	212	4,138	0	261	4,134
Outbound	724	681	1,312	232	4,680	413	176

NOTES:
a Numbers may not sum due to rounding.
b For all analysis scenarios, the transit trips include the proposed office, retail, and restaurant uses, as well as an event or no event at the event center, depending on the analysis scenario (i.e., No Event, Basketball Game, Convention Event).

SOURCE: *Technical Memorandum - Travel, Parking and Loading Demand Estimates for the Proposed Event Center & Mixed-Use Development at Mission Bay Blocks 29-32*, May 2015. See **Appendix TR**.

No Event Scenario. On a weekday with no event, the proposed project would generate 1,344 person trips by automobile (48 percent), 881 person trips by transit (32 percent), and 570 person trips by other modes (20 percent) during the p.m. peak hour. On a Saturday with no event, the proposed project would generate 1,707 person trips by automobile (55 percent), 673 person trips by transit (22 percent), and 750 person trips by other modes (24 percent) during the evening peak hour.

During the weekday p.m. peak hour without an event, the proposed project land uses would generate 702 vehicle trips. On Saturdays without an event, the number of vehicle trips during the Saturday evening peak hour (785 vehicle trips) would be higher but comparable to those occurring during the weekday p.m. peak hour (702 vehicle trips). The number of vehicle trips would be higher because trip generation associated with the office uses would be minimal on a Saturday, and the reduction in office trip generation (with a higher transit than auto mode split) would be offset by a greater trip generation for the retail and restaurant uses (with a higher auto than transit mode split) on a Saturday than on a weekday.

Basketball Game Scenario. The person trips by mode generated by the proposed project on a weekday with a basketball game would be as follows:

- The overall project would generate 1,645 person trips by automobile (43 percent), 1,625 person trips by transit (42 percent), and 590 person trips by other modes (15 percent) during the weekday p.m. peak hour.
- The overall project would generate 6,546 person trips by automobile (53 percent), 4,371 person trips by transit (36 percent), and 1,368 person trips by other modes (11 percent) during the weekday evening peak hour.
- The overall project would generate 7,280 person trips by automobile (55 percent), 4,680 person trips by transit (35 percent), and 1,258 person trips by other modes (10 percent) during the weekday late evening peak hour.

On weekdays with a basketball game, the proposed project would generate 886 vehicle trips during the p.m. peak hour, and the number of vehicle trips would increase to 2,752 vehicle trips during the evening peak hour (mostly arrivals to the event center), and to 3,018 vehicle trips during the late evening peak hour (mostly departures from the event center). More vehicle trips would be generated by a basketball game during the weekday late evening peak hour than during the p.m. peak hour because arrivals (inbound trips) tend to be spread out over a longer period of time as sport fans shop, buy food or meet on their way to their seats, whereas departures (outbound trips) are typically concentrated within the one hour immediately following the conclusion of an event.

On a Saturday with a basketball game, the proposed project would generate 7,261 person trips by automobile (59 percent), 4,310 person trips by transit (35 percent), and 681 person trips by other modes (6 percent). On a Saturday event day during the evening peak hour, the project would generate a higher percentage of auto trips than on a weekday event day (59 percent on a Saturday, as compared to 53 percent on a weekday), as a result of the typically lower transit service available, combined with a greater number of attendees arriving from outside San Francisco.

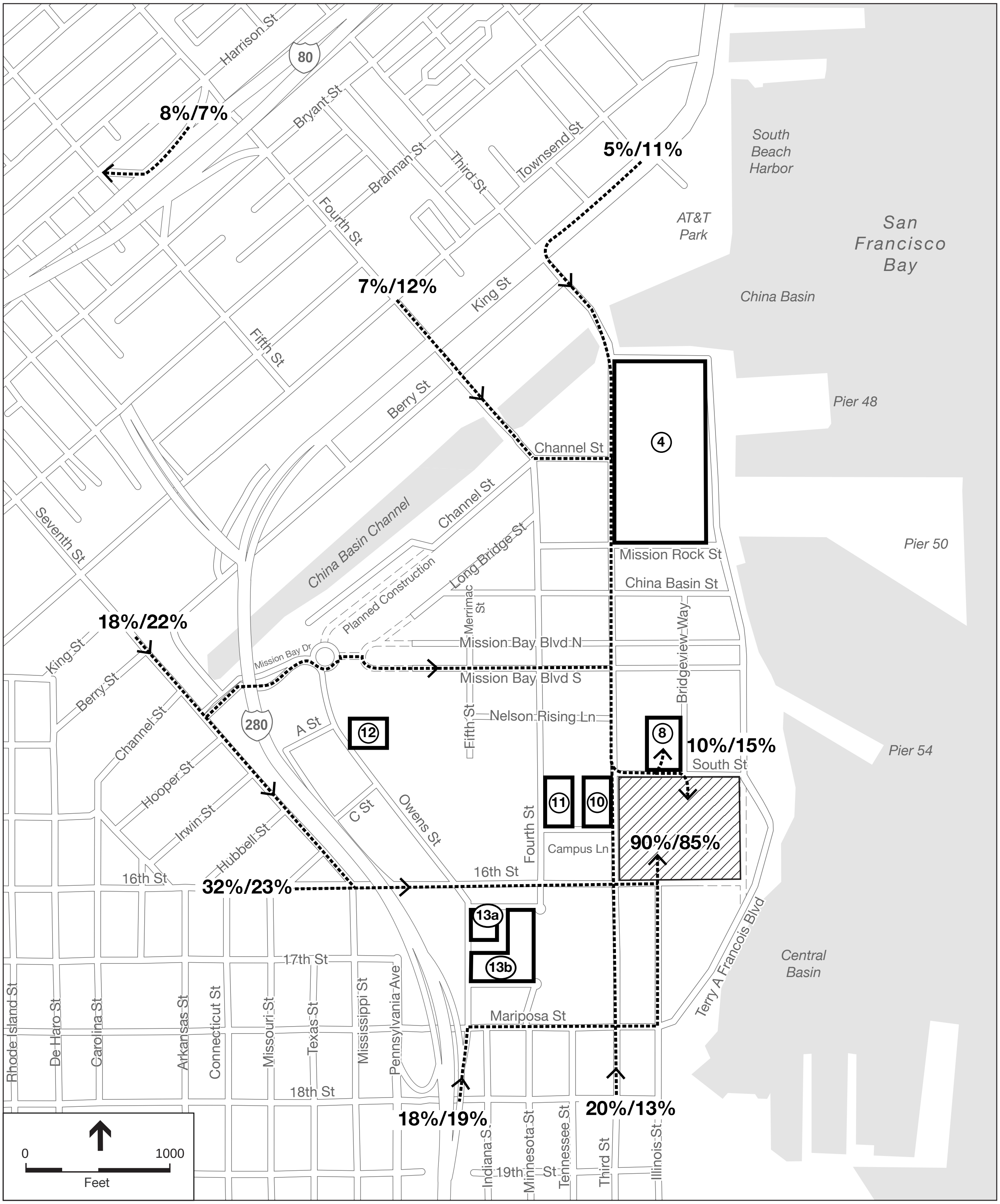
On Saturdays with a basketball game, the proposed project would generate 2,815 vehicle trips during the evening peak hour. As indicated in **Table 5.2-25**, there would be a somewhat greater vehicle trip generation for a Saturday basketball game (2,815 vehicle trips) than for a weekday basketball game (2,752 vehicle trips) as more people tend to drive on weekends because of the typically lighter traffic, more parking availability, and less transit service (e.g., fewer routes and/or longer headways between buses on Saturdays than on weekdays). In addition, retail, and restaurant uses would generate more vehicle trips on a Saturday than on a weekday.

Convention Event Scenario. On a weekday with a convention event, during the p.m. peak hour the proposed project would generate a relatively low percentage of weekday auto trips (30 percent for a convention event compared to 43 percent for a basketball game), since about 80 percent of the convention trips would be expected to arrive by transit, taxi, TNC vehicles, or convention shuttle bus service. Approximately 2 percent of the convention attendees are expected to walk to the site.

On a weekday with a convention event, the proposed project would generate 919 vehicle trips during the p.m. peak hour, slightly more than those generated by a basketball game during the same period (886 vehicle trips). Although a convention event would generate fewer weekday p.m. peak hour private vehicles trips than a basketball game, the addition of vehicle trips made by taxis and shuttle buses, (which are counted twice - once arriving and once departing the event center) would result in more trips being generated by convention events.

Vehicle Assignment

The trip distribution presented in **Table 5.2-25** was used as the basis for assigning project generated vehicle trips to the local streets in the study area during the analysis periods. **Figure 5.2-14A** and **Figure 5.2-14B** graphically depict the assignment paths for the vehicles accessing and departing the project site, respectively, for the No Event and Convention Event scenarios for the weekday p.m. peak hour, **Figure 5.2-14C** and **Figure 5.2-14D** present the inbound and outbound paths, respectively, for the No Event scenario for the Saturday evening peak hour, while **Figure 5.2-14E** and **Figure 5.2-14F** present the inbound and outbound paths, respectively for the Basketball Game scenario for the weekday and Saturday peak hours for conditions without an overlapping SF Giants evening game. For the analysis of No Event and Convention Event scenarios, vehicles were assumed to arrive at or depart from the proposed project garage or the 450 South Street garage. For the analysis of the Basketball Game scenario, vehicles were assumed to arrive/depart from the proposed project garage as well as other public parking facilities in the vicinity of the project site, such as Lot A, or various UCSF garages in the Mission Bay Area. Lot A (on Mission Rock Street) and other SF Giants-managed parking facilities such as Pier 48 and Lot C were assumed to be unavailable to basketball game attendees when evaluating overlapping baseball-basketball game conditions. Thus, for purposes of this analysis, all off-street parking facilities that are open to the paying public were assumed to be available for patrons of the event center in order to analyze the most conservative distribution of arriving vehicles (i.e., assigning more vehicles to parking facilities closer to the project site and through the greatest number of study intersections).



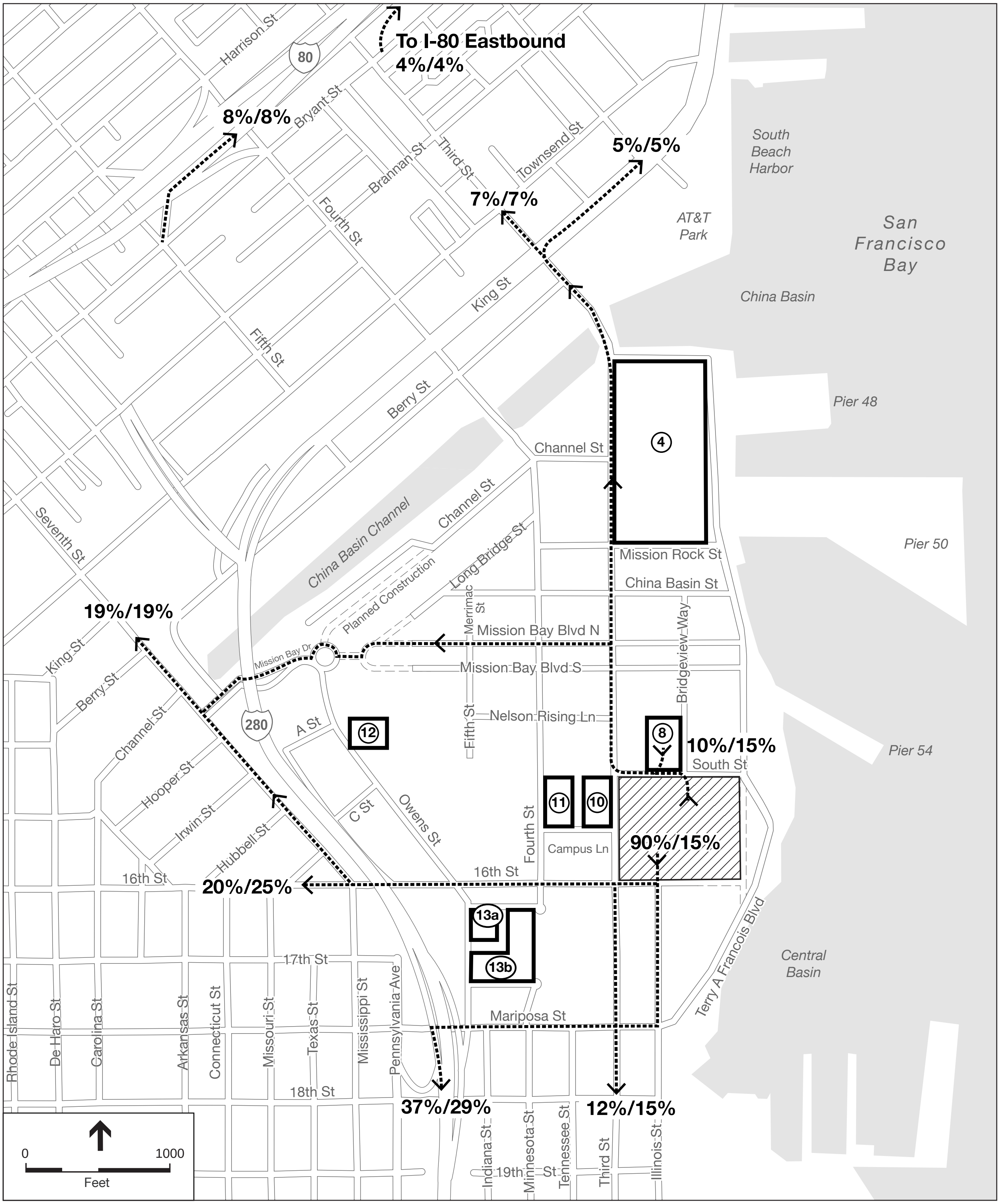
Project Site Boundary (#) Keyed to Table 5.2-8 No Event/Convention Event

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E: Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-14A

Project Vehicle Trip Patterns to Major Parking Facilities-Inbound Weekday PM Peak Hour - No Event and Convention Event



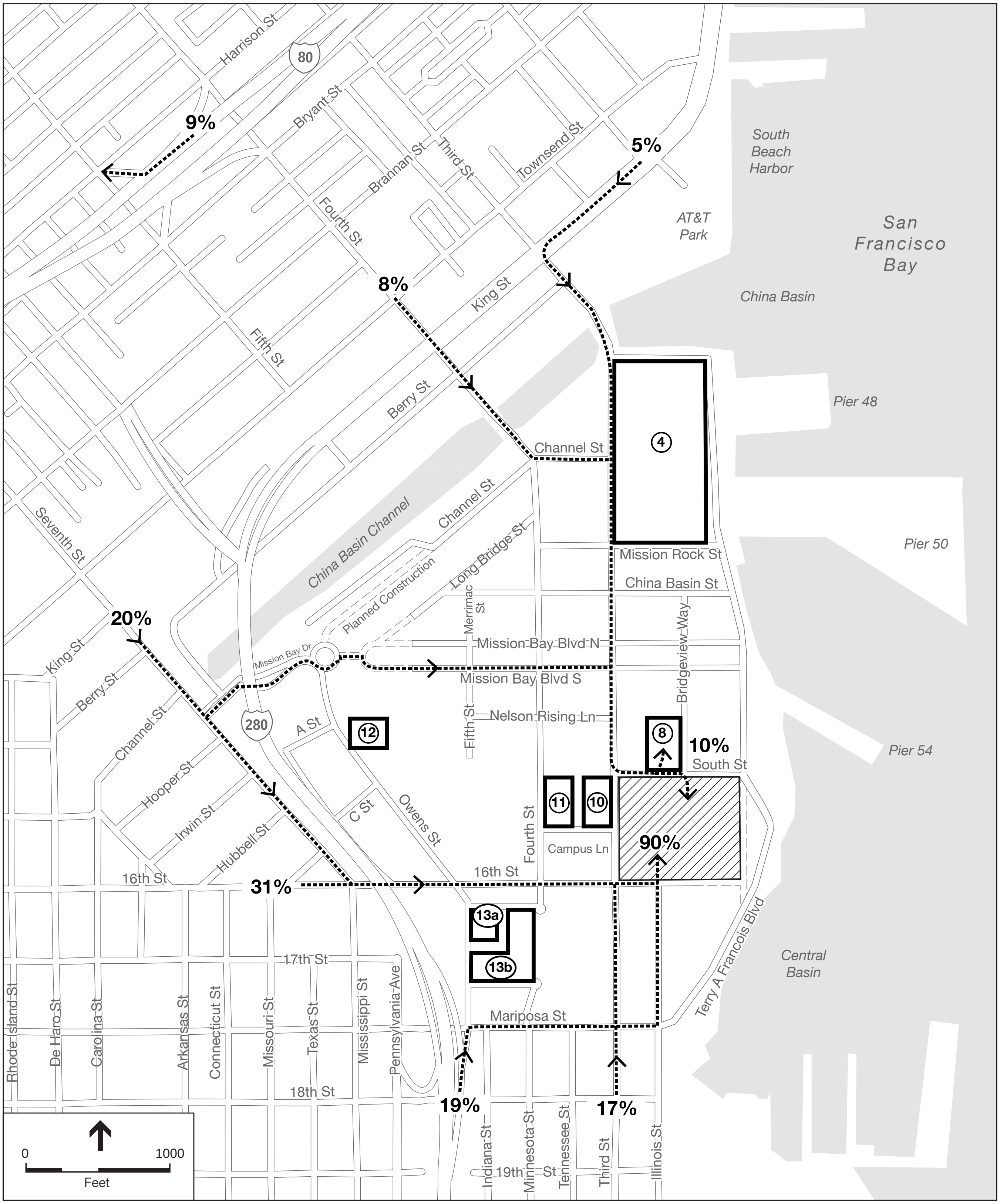
Project Site Boundary (#) Keyed to Table 5.2-8 No Event/Convention Event

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-14B

Project Vehicle Trip Patterns to Major Parking Facilities-Outbound
Weekday PM Peak Hour - No Event and Convention Event

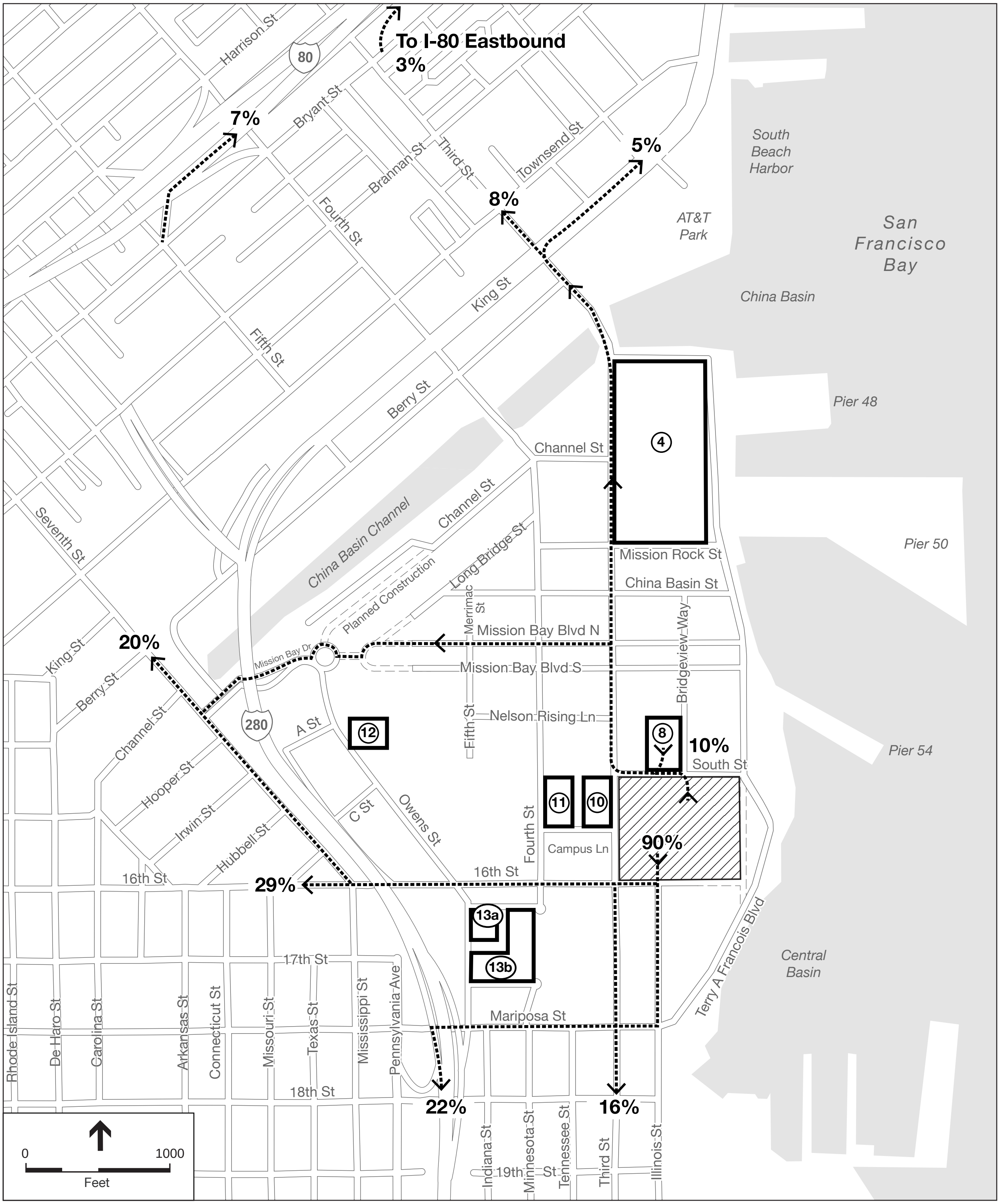


Project Site Boundary (#) Keyed to Table 5.2-8

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-14C
Project Vehicle Trip Patterns to Major Parking Facilities-Inbound
Saturday Evening Peak Hour - No Event



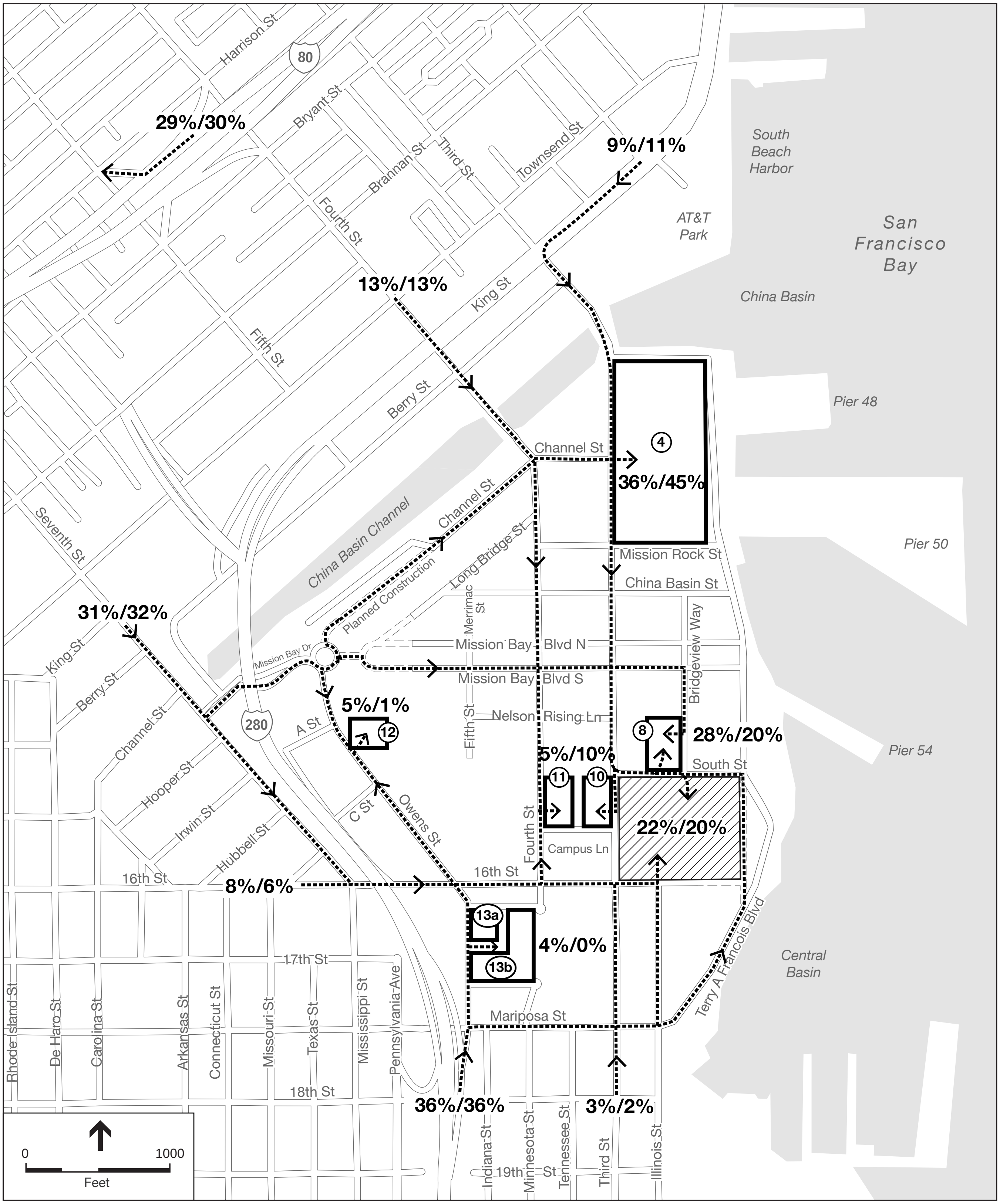
Project Site Boundary   (#) Keyed to Table 5.2-8

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E: Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-14D

Project Vehicle Trip Patterns to Major Parking Facilities-Outbound
Saturday Evening Peak Hour - No Event



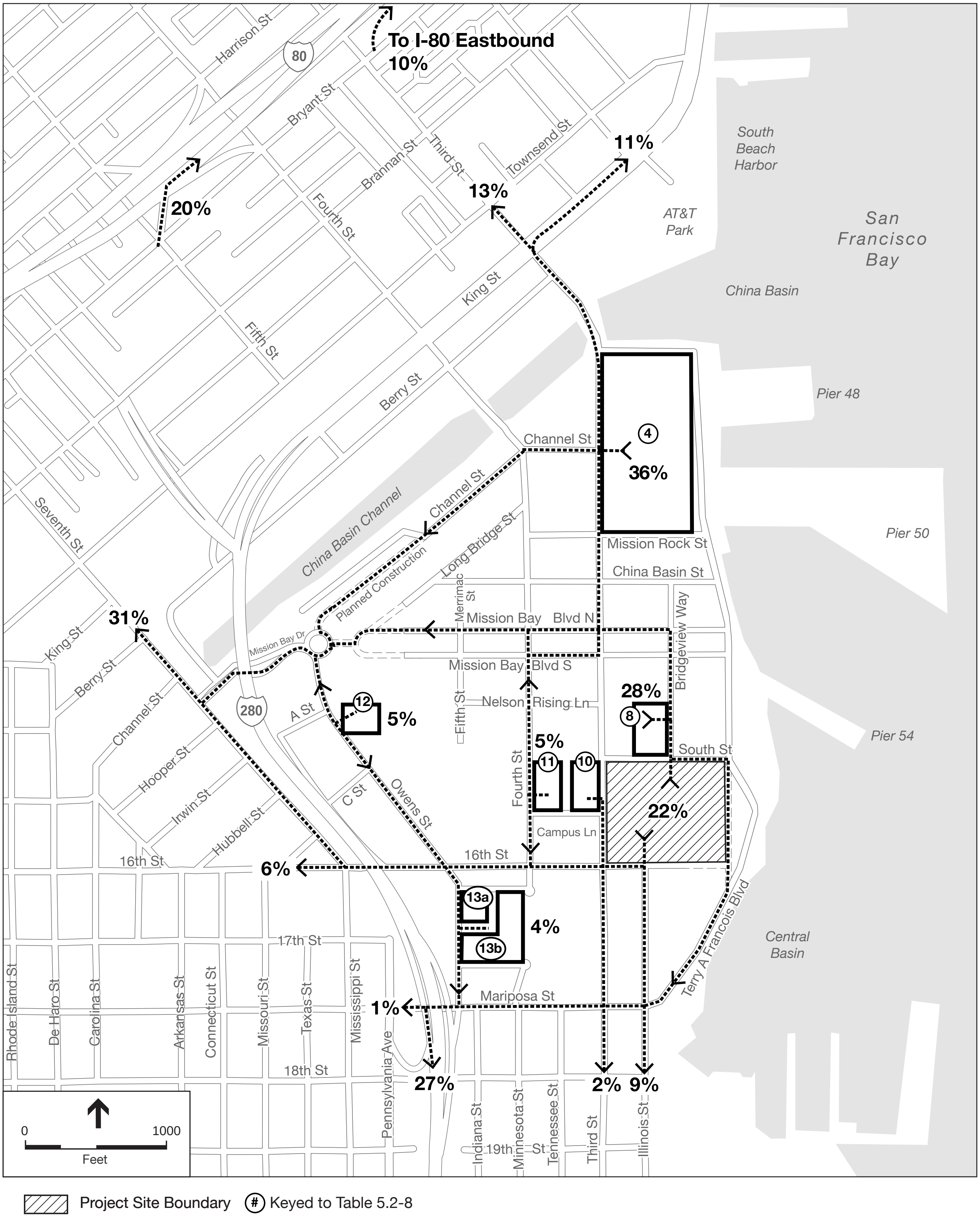
Project Site Boundary (#) Keyed to Table 5.2-8 Weekday/Saturday

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E: Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-14E

Project Vehicle Trip Patterns to Major Parking Facilities-Inbound
Weekday and Saturday Peak Hours
Basketball Game Without a SF Giants Evening Game



SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-14F
Project Vehicle Trip Pattterns to Major Parking Facilities-Outbound
Weekday Late Evening Peak Hour-
Basketball Game Without a SF Giants Evening Game

As discussed below in Section 5.2.5.6, and quantified in **Table 5.2-69** and **Table 5.2-70**, it is possible that some parking facilities (such as the 450 South Street Parking Garage or UCSF parking facilities) may not be made available (e.g., permit parking after 7 p.m.) for weekday and weekend evening events at the project site. In this case, the vehicle assignment paths graphically depicted in **Figure 5.2-14E** and **Figure 5.2-14F** would still be applicable, except that project-generated vehicles that were assumed to park at those facilities would instead park at Lot A, or at other parking facilities outside of the study area. Thus, while in the future, more existing and planned parking facilities may have limited public access, the approach described above represents a reasonable assignment of project-generated vehicle trips to the study intersections.

As discussed below in Section 5.2.5.4, parking facilities in the study area would be expected to be full during overlapping SF Giants and basketball evening games. In those instances, drivers would have to park farther away, most likely outside of the study area, and then walk the rest of the way to the event center; as a result, they would not drive through many of the study intersections in the project vicinity. However, for a more conservative traffic impact analysis, it has been assumed that in those instances when parking facilities in the vicinity of the proposed project would be full, vehicles would still arrive at the vicinity of the project site.

For conditions without and with a SF Giants evening game at AT&T Park, it was assumed that the vehicles currently traveling to and from the two surface parking lots on the project site (610 parking spaces) that would be eliminated with the project would park instead at nearby garages (e.g., UCSF Third Street Garage, 450 South Street Garage), following similar travel paths to these alternate parking facilities. Thus, no vehicle assignment credit was applied to the project, and therefore the project-generated trips would be in addition to those vehicles already traveling to and from the parking facilities on the project site.

Freight Delivery and Service Vehicle Demand

The *SF Guidelines* methodology for estimating commercial vehicle and freight loading demand was used to calculate the daily truck/service vehicle trips and the average hour and peak hour loading space demand for the office, retail, and restaurant uses. Daily truck trips generated per 1,000 square feet were calculated based on the rates contained within the *SF Guidelines*, then converted to hourly demand based on a 9-hour day and a 25-minute average stay. Average hour loading space demand was converted to a peak hour demand by applying a peaking factor, as specified in the *SF Guidelines*. For the event center, information from the project sponsor on the loading activity for the Golden State Warriors at the Oracle Arena in Oakland, and event loading activity at the Toyota Center in Houston, Texas and at the Barclays Center in Brooklyn, New York was used to estimate the event center loading demand.

Table 5.2-27 presents the number of trucks generated on a daily basis, and the demand for loading dock spaces during the average hour and peak hour of loading activity. The office, retail, and restaurant uses would generate about 360 delivery and service vehicle trips per day, which corresponds to a demand for 17 loading spaces during the average hour of loading activity and 21 loading spaces during the peak hour of loading activity. In addition, as indicated in **Table 5.2-27**, the event center would generate a demand of up to 30 delivery and service vehicle trips on the day prior to an event. Non-Golden State Warriors events would generate a greater number of delivery and service vehicle trips associated with show components (e.g., stage, sound equipment and controls, video equipment and controls, and props), as well as food and beverage trucks, than basketball games. As indicated in **Table 5.2-27**, the event center would generate a loading space demand for seven loading spaces during the average and peak hour of loading activity. The loading space demand for seven loading spaces takes into consideration that the loading demand would occur over a shorter period (i.e., over a period of about four hours, rather than 9-hour period for the office, retail, and restaurant uses), and some loading spaces would be occupied for one or more days (e.g., TV crew trucks).

TABLE 5.2-27
PROPOSED PROJECT DELIVERY/SERVICE VEHICLE TRIPS AND LOADING SPACE DEMAND

Land Use	GSF	Daily Trucks/ Service Vehicle Trip Generation	Loading Space Demand	
			Average Hour Loading Spaces	Peak Hour Loading Spaces
Event Center[a]	750,000	30	7	7
Office	605,000	127	6	7
Retail	62,500	14	1	1
Restaurant	62,500	225	10	13
Total		**396**	**24**	**28**

NOTE:
[a] Represents maximum loading demand associated with non-Golden State Warriors events, which would be higher than Golden State Warriors events (see text for explanation).

SOURCE: *Technical Memorandum - Travel, Parking and Loading Demand Estimates for the Proposed Event Center & Mixed-Use Development at Mission Bay Blocks 29-32*, May 2015. See **Appendix TR**.

Vehicle Parking Demand

Weekday and Saturday parking demand for the proposed project was determined based on methodologies presented in the *SF Guidelines*, supplemented with data obtained from the Urban Land Institute[40] and the project sponsor on the characteristics of the event center. Parking demand consists of both long-term demand (typically employees) and short-term demand (typically visitors). Peak parking demand was estimated for the midday period (1:00 to 3:00 p.m.) when parking occupancy is typically greatest for office and retail uses, and for the late evening (7:00 to 9:00 p.m.) period when parking demand is greater for the evening events and restaurant uses. Long-term parking demand for the office, retail, and restaurant uses was estimated by applying the average mode split and vehicle occupancy from the trip generation estimation to the number of employees for each of the proposed land uses. Short-term parking for these uses was estimated based on the total daily vehicle visitor trips and an average daily parking turnover rate of 5.5 vehicles per space per day for the office, retail, and restaurant uses.[41]

40 Shared Parking, Urban Land Institute, Second Edition, 2005.
41 A turnover of 5.5 means that each parking space is utilized by an average of 5.5 vehicles during the day.

Parking demand for attendees at a basketball game and convention event were estimated based on the total number of attendee vehicle trips expected at each event (i.e., the maximum number of vehicles arriving for the event, not just during the analysis hours) and an average daily parking turnover rate (1 vehicle per space per day for all basketball games on weekdays and Saturdays, and 1.5 vehicles per space per day for convention events). Event employee parking demand was estimated by applying the average mode split and vehicle occupancy from the trip generation estimation described in the previous sections to the number of employees expected at each event. **Table 5.2-28** summarizes the estimated weekday and Saturday parking demand for the proposed project during the midday and late evening periods.

TABLE 5.2-28
PROJECT PARKING DEMAND BY LAND USE AND TIME PERIOD[a]

	Weekday		Saturday	
	Midday Period	**Late Evening Period**	**Midday Period**	**Late Evening Period**
Land Use Type	**Total spaces**	**Total spaces**	**Total spaces**	**Total spaces**
No Event				
Event Center	22	2	22	2
Office	613	54	82	0
Retail	222	211	254	193
Quick Service Restaurant	54	44	66	53
Sit-down Restaurant	138	178	165	214
Total spaces w/out event	**1,049**	**489**	**589**	**462**
With Event				
Basketball Game	137	3,885	143	4,222
Convention Event	971	284	N.A.[b]	N.A.[b]
Office	613	54	82	0
Retail	164	155	185	141
Quick Service Restaurant	54	44	66	53
Sit-down Restaurant	104	132	122	157
Total spaces with event				
Basketball Game	1,072	4,270	598	4,573
Convention Event	1,906	669	N.A.[b]	N.A.[b]

NOTES:

[a] Numbers may not sum due to rounding.

[b] Not applicable; not part of the travel demand analysis.

SOURCE: *Technical Memorandum - Travel, Parking and Loading Demand Estimates for the Proposed Event Center & Mixed-Use Development at Mission Bay Blocks 29-32*, May 2015. See **Appendix TR**.

No Event. On weekdays without an event, the proposed project would generate a maximum parking demand for 1,049 spaces during weekday midday period and 489 spaces during the late evening period. The parking demand on Saturday (589 spaces during the midday and 462 spaces during the late evening period) would be lower because the parking demand associated with the office use would be substantially less on a Saturday than on a weekday, particularly at midday, and the reduction in the office parking demand would not be offset by the higher Saturday parking demand associated with the retail and restaurant uses.

With Event. On weekdays with an event, the proposed project would generate a maximum parking demand for 1,906 spaces during weekday midday period during a convention event, and 4,270 spaces during the late evening period with a basketball game.

On a Saturday with a basketball game, the midday parking demand would be similar to conditions with no event because basketball games start at 7:30 p.m. and game attendees would not have had arrived during the midday period. Thus, on Saturdays with a basketball game the midday parking demand associated with the event center would be somewhat greater, but similar to conditions without an event (i.e., 598 spaces with an event, as compared to the parking demand for 589 spaces without an event). The late evening parking demand on Saturday with a basketball game (4,573 spaces) would be greater than on weekdays (4,270 spaces) due to the higher auto mode share for basketball game attendees on Saturdays than on weekdays. As discussed above, concerts are anticipated to have a similar travel mode characteristics as a basketball game, and therefore, parking demand for sell-out event concerts would be similar to a basketball game.

Travel Demand for Conditions without Implementation of the Muni Special Event Transit Service Plan

The project sponsor is working with the City to secure funding for the Muni Special Event Transit Service Plan described above as part of the project improvements, and which would be implemented by the SFMTA before, during, and immediately after large events at the project site. The transportation impact analysis assumes that the special event transit service would be provided during basketball games to accommodate the transit demand. However, in the event that the SFMTA would not be able to provide all or a portion of the Muni Special Event Transit Service Plan, it is expected that transit would be less convenient for event attendees, and, therefore, that fewer attendees would travel to the site by transit. In order to determine the impact of not providing additional transit service during large events, the travel demand estimates were recalculated for conditions assuming the existing and planned (i.e., Central Subway) transit serving the project site.

Because the Muni Special Event Transit Service Plan was assumed only for analysis of a basketball game at the event center (i.e., the analysis did not assume that additional service would be provided for the Convention Event or No Event analysis scenarios), the travel demand and subsequent analysis of conditions without the Muni Special Event Transit Service Plan was conducted only for the Basketball Game scenario for the weekday p.m., evening and late evening and for Saturday evening hours of analysis.

The travel mode for attendees for conditions without the Muni Special Event Transit Service Plan for the Basketball Game scenario was estimated from information in the *SF Guidelines* for SD 3, similar as described above for non-event related project land uses, with some adjustments to account for availability of transit service. With these adjustments for no additional transit service specifically for the game or concert, the mode split for attendees was estimated to be 63 percent auto, 20 percent transit, and 17 percent walk/other (as compared to 54 percent auto, 35 percent transit, and 11 percent walk/other for conditions with the Muni Special Event Transit Service Plan). This shift in the mode choice for attendees reflects the conservative assumption that the SFMTA would not provide any additional transit service during a large event, though it is anticipated that the SFMTA would provide some additional transit service, as they currently do for large events throughout San Francisco.

Table 5.2-29 presents the trip generation by mode, by land use, and by time period for the Basketball Game scenario without implementation of the Muni Special Event Transit Service Plan. **Table 5.2-30** presents the vehicle trips by origin and destination, while **Table 5.2-31** presents the transit trips by origin and destination. **Table 5.2-32** presents a summary comparison for the Basketball Game scenario for conditions with and without the Muni Special Event Transit Service Plan. The complete set of travel demand calculations are included in **Appendix TR**.

Overall, without implementation of the Muni Special Event Transit Service Plan for a basketball game, during the weekday p.m. peak hour the number of vehicle trips would increase by 54 trips, while the number of transit trips would decrease by 136 trips. During the weekday and Saturday evening peak hours (i.e., the peak hour of arrivals to the event center), the number of vehicle trips would increase by 697 vehicles, while the number of transit trips would decrease by 1,762 trips. During the weekday late evening peak hour (i.e., departures from the event center), the number of vehicle trips would increase by 742 vehicles, while the number of transit trips would decrease by 1,878 trips. The number of pedestrian/other trips would remain similar for conditions with and without implementation of the Muni Special Event Transit Service Plan.

Because more attendees would be driving to the event center, the parking demand would also increase over conditions with the Muni Special Event Transit Service Plan, particularly during the late evening period when parking demand would be greatest. **Table 5.2-32** also presents the parking demand comparison. During the late evening the parking demand would increase by 606 spaces on weekdays and 669 spaces on a Saturday.

These travel demand estimates were used in the assessment of transportation impacts of conditions without implementation of the Muni Special Event Transit Service Plan, as presented in Section 5.2.5.5, **Impact TR-18** to **Impact TR-24**.

TABLE 5.2-29
PROPOSED PROJECT TRIP GENERATION BY MODE, LAND USE AND TIME PERIOD FOR BASKETBALL GAME SCENARIO WITHOUT IMPLEMENTATION OF THE MUNI SPECIAL EVENT TRANSIT SERVICE PLAN[a]

	Weekday												Saturday			
	PM Peak Hour				Evening Peak Hour				Late Evening Peak Hour				Evening Peak Hour			
Project Land Use	Auto	Transit	Walk/ Other[b]	Total	Auto	Transit	Walk/ Other[b]	Total	Auto	Transit	Walk/ Other[b]	Total	Auto	Transit	Walk/ Other[b]	Total
Basketball Game	810	737	256	1,803	7,374	2,360	2,008	11,742	8,304	2,649	1,892	12,845	8,219	2,348	1,174	11,742
Office	298	506	127	931	50	115	21	186	13	29	5	47	7	17	3	27
Retail[e]	182	52	69	304	26	19	10	56	12	9	5	26	18	13	7	39
Quick Service Restaurant[e]	170	75	76	321	50	45	22	118	50	45	22	118	74	66	33	174
Sit-down Restaurant[e]	265	118	118	501	79	70	35	184	79	70	35	184	116	104	51	271
Total person trips w/ event	1,724	1,489	646	3,859	7,579	2,609	2,096	12,285	8,458	2,802	1,959	13,218	8,435	2,548	1,268	12,252
	45%	39%	17%	100%	62%	21%	17%	100%	64%	21%	15%	100%	69%	21%	10%	100%

NOTES:
a Numbers may not sum to total due to rounding.
b "Other" includes walk, bicycle, motorcycle, taxis, limousines, TNC vehicles, etc.
c Not applicable; not part of the travel demand analysis.
d Transit mode includes trips made by convention event shuttle.
e Includes linked trip reductions.

SOURCE: *Technical Memorandum - Travel, Parking and Loading Demand Estimates for the Proposed Event Center & Mixed-Use Development at Mission Bay Blocks 29-32*, May 2015. See **Appendix TR**.

TABLE 5.2-30
PROPOSED PROJECT VEHICLE TRIPS BY PLACE OF ORIGIN AND TIME PERIOD FOR BASKETBALL GAME SCENARIO WITHOUT IMPLEMENTATION OF THE MUNI SPECIAL EVENT TRANSIT SERVICE PLAN[a,b]

Place of Trip Origin/ Destination	Weekday			Saturday
	PM Peak Hour	Evening Peak Hour	Late Evening Peak Hour	Evening Peak Hour
San Francisco				
Superdistrict 1	68	403	327	302
Superdistrict 2	95	160	132	128
Superdistrict 3	195	182	152	158
Superdistrict 4	65	189	155	141
East Bay	166	1,050	1,198	1,104
North Bay	49	333	519	488
South Bay	275	1,077	1,216	1,109
Out of Region	27	56	60	82
Total Vehicles	**940**	**3,449**	**3,760**	**3,512**
Inbound	566	3,094	287	3,253
Outbound	374	355	3,473	259

NOTES:
a Numbers may not sum due to rounding.
b For all analysis scenarios, vehicle trips include the proposed office, retail, and restaurant uses, as well as an event or no event at the event center, depending on the analysis scenario (i.e., No Event, Basketball Game, Convention Event).

SOURCE: Technical Memorandum - Travel, Parking and Loading Demand Estimates for the Proposed Event Center & Mixed-Use Development at Mission Bay Blocks 29-32, May 2015. See **Appendix TR**.

TABLE 5.2-31
PROPOSED PROJECT TRANSIT TRIPS BY PLACE OF ORIGIN AND TIME PERIOD FOR BASKETBALL GAME SCENARIO WITHOUT IMPLEMENTATION OF THE MUNI SPECIAL EVENT TRANSIT SERVICE PLAN[a,b]

Place of Trip Origin/Destination	Weekday			Saturday
	PM Peak Hour	Evening Peak Hour	Late Evening Peak Hour	Evening Peak Hour
San Francisco				
Superdistrict 1	151	498	409	415
Superdistrict 2	143	110	97	89
Superdistrict 3	306	124	115	107
Superdistrict 4	100	73	65	55
East Bay	487	1,042	1,188	1,038
North Bay	46	170	263	223
South Bay	207	482	545	469
Out of Region	48	112	121	154
Total Transit Trips	**1,489**	**2,609**	**2,802**	**2,548**
Inbound	808	2,377	0	2,372
Outbound	681	232	2,802	176

NOTES:
a Numbers may not sum due to rounding.
b For all analysis scenarios, the transit trips include the proposed office, retail, and restaurant uses, as well as an event or no event at the event center, depending on the analysis scenario (i.e., No Event, Basketball Game, Convention Event).

SOURCE: *Technical Memorandum - Travel, Parking and Loading Demand Estimates for the Proposed Event Center & Mixed-Use Development at Mission Bay Blocks 29-32*, May 2015. See **Appendix TR**.

TABLE 5.2-32
COMPARISON OF PROPOSED PROJECT VEHICLE TRIPS, TRANSIT TRIPS, AND PARKING DEMAND FOR BASKETBALL GAME SCENARIO WITH AND WITHOUT IMPLEMENTATION OF THE MUNI SPECIAL EVENT TRANSIT SERVICE PLAN

Trips and Parking Demand by Time Period	With Muni Special Event Transit Service Plan	Without Muni Special Event Transit Service Plan	Difference
Weekday PM			
Vehicle Trips	886	940	54
Transit Trips	1,625	1,489	-136
Weekday Evening			
Vehicle Trips	2,752	3,449	697
Transit Trips	4,371	2,609	-1,762
Weekday Late Evening			
Vehicle Trips	3,018	3,760	742
Transit Trips	4,680	2,802	-1,878
Saturday Evening			
Vehicle Trips	2,815	3,512	687
Transit Trips	4,310	2,548	-1,762
Parking Demand			
Weekday Late Evening	4,270	4,876	606
Saturday Late Evening	4,573	5,242	669

SOURCE: *Technical Memorandum - Travel, Parking and Loading Demand Estimates for the Proposed Event Center & Mixed-Use Development at Mission Bay Blocks 29-32*, May 2015. See **Appendix TR**.

4. Development of 2040 Cumulative Traffic and Transit Forecasts Methodology

Foreseeable Nearby Development Projects

In addition to full build-out of the Mission Bay South area and associated roadway infrastructure improvements, other reasonably foreseeable development projects that were considered in the cumulative transportation analysis include the following, which are described in Section 5.1.5.

- University of California at San Francisco (UCSF), 2014 Long Range Development Plan (LRDP), Mission Bay Campus
- Eastern Neighborhoods Program
- Seawall Lot 337 and Pier 48 Mixed-Use Project (Mission Rock Project)
- Pier 70 Mixed-Use Development

Cumulative Transportation Network Changes

The following transportation network changes, some of which were originally identified in the Mission Bay FSEIR, are incorporated into the cumulative analysis:

Improvements identified in Mission Bay FSEIR

- **Mission Bay FSEIR Mitigation Measure E.19b**. Restripe the I-280 off-ramp touchdown and narrow the median on the south side of King Street for a distance of about 300 feet beginning at the intersection with Fifth Street, to increase the number of eastbound lanes from the existing two to three.

- **Mission Bay FSEIR Mitigation Measure E.27.** Reroute the Muni 22-Fillmore trolleybus line to travel on 16th Street to Third Street, and then north on Third Street to The Common. If not already accomplished, install trolleybus wire support poles and/or eyebolts on buildings along the new route, and complete North Common Street and South Common Street east of Third Street. Prohibit parking on North Common and South Common Streets at trolleybus stops.

Central Subway Project. The Central Subway Project is the second phase of the Third Street light rail line (i.e., T Third), which opened in 2007. Construction is currently underway, and the Central Subway will extend the T Third line northward from its current terminus at Fourth and King Streets to a surface station south of Bryant Street and go underground at a portal under U.S. 101. From there it will continue north to stations at Moscone Center, Union Square—where it will provide passenger connections to the Muni/BART Powell station — and in Chinatown, where the line will terminate on Stockton Street at Clay Street. Construction of the Central Subway is scheduled to be completed in 2017, and revenue service is scheduled for 2019.

Central SoMa Plan. The San Francisco Planning Department is in the process of developing an integrated community vision for the southern portion of the Central Subway rail corridor. This area is located generally between Townsend and Market Streets along Fourth Street, between Second and Sixth Streets. The plan's goal is to integrate transportation and land uses by implementing changes to the allowed land uses and building heights. The plan also includes a strategy for improving the pedestrian experience in this area. These changes will be based on a synthesis of community input, past and current land use efforts, and analysis of long-range regional, citywide, and neighborhood needs. This project is currently under environmental review.

The Central SoMa Plan includes two different options for the couplet of Howard and Folsom Streets. Howard Street would be modified between 11th and Third Streets, while Folsom Street would be modified between 11th Street and The Embarcadero. Under the Howard/Folsom One-way Option, both streets would retain a one-way configuration (except Folsom Street east of Second Street which would retain its existing two-way operation). Under the Howard/Folsom Two-way Option, both streets would be converted into two-way operation, and some modifications to Harrison Street would also occur. The 2040 cumulative conditions assume implementation of the Howard/Folsom One-way Option.

Muni Forward. As indicated in Section 5.2.3.2, Muni Forward anticipates service changes to routes in the vicinity of the proposed project. Year 2040 cumulative analysis assumes changes to the capacity as identified by route changes and headway changes indicated within Muni Forward.

Railyard Alternatives and I-280 Boulevard Feasibility Study (RAB). The San Francisco Planning Department is currently conducting the Railyard Alternatives and I-280 Boulevard Feasibility Study (RAB) to holistically study transportation and land use alternatives within southeast

San Francisco that affect the City as a whole. The RAB is made up of five distinct components of analysis: (1) Reconfigure and/or relocate portions of the Fourth/King railyard storage and maintenance functions (service to the Fourth/King would remain), (2) Verify and/or potentially modify the proposed Downtown Rail Extension (DTX) (e.g., alignment, construction methods, etc.), (3) Create a loop track out of east side of Transbay Transit Center (TTC), (4) Replace the elevated portion of I-280 north of Mariposa or 16th Streets with a surface boulevard, similar to The Embarcadero or Octavia Boulevard, including improved circulation and connections throughout the area, and (5) Create opportunities for new public spaces, housing and jobs at the existing Caltrain railyard and along the freeway/rail alignment between Townsend and Mariposa Streets, including the potential to raise additional revenue to realize the transportation infrastructure.[42]

The Phase I feasibility assessment of options for each of the five components is currently underway; a future Phase II alternatives development phase will focus on developing and defining alternatives from those options. A substantial amount of additional discussion and analysis is required before the details of the feasibility and potential design and removal of I-280 and construction of California's planned high-speed rail network and related components within San Francisco are developed to a level at which that project's effects on the transportation system in Mission Bay could be understood. If a study to determine the environmental impacts of such a project is initiated, members of the public, City, State, and Federal agencies, among others, would be given a period to provide comment on the scope of the analysis. Funding has not been secured to study these identified options beyond the Phase II alternatives development phase, or to undertake or implement any aspect of this project, and thus the project is speculative and not reasonably foreseeable. Therefore, the transportation analysis of 2040 cumulative conditions does not include changes to the existing I-280 or Caltrain alignments within Mission Bay, and the RAB study is described in this section for informational purposes only.

Cumulative Traffic, Transit and Pedestrian Demand

Future 2040 cumulative traffic volumes were estimated based on cumulative development and growth identified by the San Francisco County Transportation Authority SF-CHAMP travel demand model, using model output that represents Existing conditions and model output for 2040 cumulative conditions. The SF-CHAMP model is an activity-based travel demand model that has been validated to represent future transportation conditions in San Francisco and is updated regularly. The model predicts person travel for a full day based on assumptions of growth in population, housing units, and employment. Future year 2040 intersection turning movement volumes were developed by applying growth factors calculated from traffic volume growth between existing and 2040 conditions, obtained from the SF-CHAMP model to actual traffic volumes collected in the field. The 2040 cumulative traffic volumes take into account cumulative development projects in the project vicinity, such as the build-out of the Mission Bay Area, completion of the UCSF Research Campus and the UCSF Medical Center, the Mission Rock Project at Seawall Lot 337, Pier 70, etc., as well as the additional vehicle trips generated by the proposed project.

42 San Francisco Planning Department, Railway Alternatives and I-280 Boulevard Feasibility Study. Available online at: http://www.sf-planning.org/index.aspx?page=3717 Accessed May 12, 2015.

The 2040 cumulative transit analysis accounts for ridership and/or capacity changes associated with Muni Forward, the Central Subway Project (which is scheduled to open in 2019), the new Transbay Transit Center, the electrification of Caltrain, the extension of Caltrain to the new Transbay Transit Center, expanded Water Emergency Transportation Authority (WETA) ferry service, and additional capacity planned by BART, AC Transit, SamTrans, and Golden Gate Transit. The 2040 cumulative Muni routes and Muni and regional screenline analysis was developed by the SFMTA based on the SF-CHAMP model analysis conducted as part of the ongoing Central SoMa Plan EIR.

Future 2040 cumulative pedestrian volumes were estimated based on cumulative development and growth identified by the SFCTA SF-CHAMP travel demand model, using model output that represents Existing conditions and model output for 2040 cumulative conditions. The 2040 cumulative pedestrian volumes include the additional pedestrian trips generated by the growth associated with the proposed project.

Since the SF-CHAMP model is a weekday travel demand model, future year Saturday evening peak hour conditions were estimated based on the net growth developed for the weekday p.m. condition. This approach is consistent with the methodology used on previous analyses of weekend conditions in San Francisco and provided conservative results, since in addition to the expected growth of visitor-oriented uses such as retail and restaurant, it includes additional growth from standard uses, such as office, that would not generate as many trips on a weekend as they would on a weekday.

5.2.5.4 Impact Evaluation

Project Impacts: Construction

Impact TR-1: The proposed project would not result in construction-related ground transportation impacts because of their temporary and limited duration. (Less than Significant)

The construction impact assessment is based on currently available information from the project sponsor, as described in Chapter 3, Project Description, and professional knowledge of typical construction practices citywide. Prior to construction, as part of the construction application phase, the project sponsor and construction contractor(s) would be required to meet with San Francisco Department of Public Works (DPW) and SFMTA staff to develop and review truck routing plans for disposal of excavated materials, materials delivery and storage, as well as staging for construction vehicles. The construction contractor would be required to meet the City of San Francisco's Regulations for Working in San Francisco Streets, the Blue Book, including those regarding sidewalk and lane closures, and would meet with SFMTA staff to determine if any special traffic permits would be required.[43] Prior to construction, the project contractor would coordinate with Muni's Street Operations and Special Events Office to coordinate construction activities and avoid impacts to transit operations. In addition to the regulations in the Blue Book,

[43] The SFMTA Parking and Traffic Regulations for Working in San Francisco Streets (The Blue Book), 8th Edition, is available online at http://www.sfmta.com/services/streets-sidewalks/construction-regulations. Accessed May 28, 2015.

the contractor would be responsible for complying with all City, State and federal codes, rules and regulations.

Construction of the proposed project is anticipated to begin in late 2015, and occur over an approximate 26-month period. Construction activities would include, but not be limited to: site demolition, clearing and excavation; dewatering; pile installation and foundation construction; construction of all proposed development, including event center, podium structure, office towers and plazas; installation of associated utilities; interior finishing; and exterior hardscaping and landscaping improvements.

The majority of the construction is proposed to occur Monday through Friday, although some construction activities would occur on nights and weekends. A typical work day shift would be between 7:00 a.m. and 6:00 p.m., and a typical second shift (i.e., for below-grade and interior work within buildings) would be between 4:00 p.m. and 12:30 a.m. There would also be the potential for overnight deliveries of materials and/or equipment. All construction activities are proposed to be conducted within allowable construction requirements permitted by City code. The project would also be subject to the Mission Bay Good Neighbor Policy, which limits extreme noise-generating activities in Mission Bay to Monday to Friday from 8:00 a.m. to 5:00 p.m.[44]

Table 3-5 in Chapter 3 summarizes major construction tasks, and presents a preliminary construction schedule. **Table 5.2-33** presents a summary of the major construction phases and duration, as well as the average and peak hour number of construction trucks and workers by phase. Construction duration of the event center is anticipated to be about 24 months, about 18 months each for the north and south office towers, and about 10 months for the parking garage and podium. Because construction of each of these project components would overlap, construction activities would be expected to concentrated and intensive for the entire 26-month construction period.

The proposed construction staging area for the majority of the project construction would take place between the existing alignment of Terry A. Francois Boulevard and the west face of the proposed event center. This staging area would be used until such time the planned realignment of Terry A. Francois Boulevard occurs. Any deliveries of materials that could not be accommodated within the above-described staging area would be staged on Terry A. Francois Boulevard between Piers 48 and 50. All construction equipment is proposed to be staged on-site. Refer to Section 5.2.6, Project Impacts on UCSF Helipad Operations for the discussion of construction-related impacts related to temporary effects of construction tower cranes on the UCSF emergency helicopter operations.

During construction, the southern-most eastbound lane on South Street adjacent to the project site; and the westbound curb lane on 16th Street between Third and Illinois Streets adjacent to the project site would be temporarily closed. On South Street one eastbound and two westbound travel lanes would be maintained for local circulation throughout the construction period.

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44 The Mission Bay Good Neighbor Policy specifies that pile driving or other extreme noise-generating activity shall be limited to 8:00 am to 5:00 pm, Monday through Friday.

TABLE 5.2-33
SUMMARY OF CONSTRUCTION PHASES AND DURATION AND DAILY CONSTRUCTION TRUCKS AND WORKERS BY PHASE

Construction Work	Duration (months)	Daily Construction Trucks		Daily Construction Workers	
		Peak	Average	Peak	Average
Entire Site					
Demolition	1	10	8	12	10
Excavation and Shoring	3	125	75	30	25
Event Center					
Foundation and Below-Grade Construction	6	25	20	125	100
Base Building	16	30	25	250	200
Exterior Finishing	10	30	25	75	50
Interior Finishing	18.5	40	30	300	150
Garage / Podium					
Foundation and Below-Grade Construction	6	25	20	75	50
Base Building	9	25	20	75	50
Northwest Tower					
Base Building	8	20	15	60	40
Exterior Finishing	5	5	2	15	10
Interior Finishing	12	15	10	150	100
Southwest Tower					
Base Building	8	20	15	60	40
Exterior Finishing	5	5	2	15	10
Interior Finishing	12	15	10	150	100
Entire Site					
Street Improvements	5	12	10	50	40

SOURCE: Mortenson Clark Joint Venture, 2014

It is also anticipated that the sidewalk on Third Street adjacent to the project site between 16th and South Streets would be temporarily closed during the building steel erection phase in this area, and pedestrians between 16th and South Streets would be directed to use the west side of Third Street for north/south travel. Existing pedestrian volumes on the east side of Third Street between South and 16th Streets are low, less than 60 pedestrians per hour on days without a SF Giants game and less than 50 pedestrians per hour on days with a SF Giants evening game. Pedestrian volumes on the west side of Third Street between 16th and South Streets are slightly higher (about 100 pedestrians per hour on days without and with a SF Giants evening game), and therefore, the sidewalk would be able to accommodate the additional pedestrians during the temporary sidewalk closures. Sidewalks on South Street, 16th Street and Terry A. Francois Boulevard adjacent to the project site are currently not provided, and sidewalks would be constructed as part of the project.

Construction activities on the project site would not affect access to the existing portion of the Bay Trail that runs along the shoreline east of Terry A. Francois Boulevard. However, it should be noted that the realignment of Terry A. Francois Boulevard and expansion and improvements at the Bayfront Park would overlap with a portion of construction on the project site. The Mission Bay master developer will be constructing the Bayfront Park.

Terry A. Francois Boulevard would be the primary vehicular ingress/egress to/from the project site during construction. Third Street, Illinois Street and Terry A. Francois Boulevard are the primary streets in the immediate project vicinity that are proposed to be used to connect to routes leading to/from I-280, I-80 and U.S. 101 during construction.

During the construction period, there would be a flow of construction-related trucks into and out of the site, with the greatest number occurring over a three-month period during the excavation and shoring phase (see **Table 5.2-33**). Truck access driveways at the project site would be from multiple locations on South Street (three driveways), Terry A. Francois Boulevard (two driveways), and 16th Street (two driveways). The location of the midblock driveway on South Street between Third Street and Bridgeview Way would shift as construction proceeds (i.e., the driveway would be closer to Third Street for the first three months of construction, and closer to Bridgeview Way for the remainder of the construction period). The number of driveways that would be in use at any one time would depend on the construction phase. The impact of construction truck traffic would be a temporary lessening of the capacities of streets due to the slower movement and larger turning radii of trucks, which may affect both traffic and Muni operations.

Access from I-280 northbound would be via the I-280 off-ramp at the intersection of Mariposa/ Owens, continuing on Mariposa Street to Third Street or Terry A. Francois Boulevard, then to 16th Street or South Street, or from the off-ramp continuing on the new Owens Street segment to 16th Street. Alternately, trucks would exit I-280 northbound at the Cesar Chavez Street, and continue north on Third Street to 16th Street, Terry A. Francois Boulevard, and South Street.

Access to I-280 southbound would be via South Street, Third Street, 16th Street, to the new Owens Street segment and onto the on-ramp, or Third Street to Mariposa Street to the I-280 on-ramp at Owens Street. Alternately, trucks could access the I-280 southbound via South Street, Third Street, 25th Street, to the on-ramp at Pennsylvania Street. Access from I-80 westbound would be via the Eighth Street off-ramp at Harrison Street, continuing on Eighth Street, Bryant Street, and Seventh Street to 16th Street. Access to I-80 eastbound would be via South Street, Third Street, 16th Street, Seventh Street, Bryant Street to the on-ramp at Fifth Street. Truck access routes would be reviewed with the SFMTA as part of the permit process prior to construction. Construction vehicles (i.e., construction trucks and construction workers driving to and from the project site) would not substantially affect peak period intersection conditions, as the construction traffic would be less than the vehicle trips associated with operation of the project (see Impact TR-2), and because construction work schedules do not typically overlap with peak commute periods.

The proposed project also includes extension of the existing northbound Muni light rail platform and associated track work within the median of Third Street north and south of South Street. The extension of the light rail platform would occur over a 14-month period, although construction activities would not be continuous for the entire period. Construction of the track crossovers would occur over a three-day period. Construction activities would require temporary travel lane closure of one of the two northbound lanes on Third Street, depending on the phase of construction activity. On Third Street, the temporary lane closures would reduce the roadway capacity and require all vehicles to use the remaining lane. Temporary lane closures would result in additional vehicle delay, and some drivers might shift to Terry A. Francois Boulevard to access their destinations. Construction activities that involve track work or staging within the track area would require motor coach substitution. To the extent feasible, this work would be scheduled on weekends when impacts on light rail service would be less than during the weekdays.

As presented in **Table 5.2-33**, during peak overlapping construction periods, there would be between 330 and 705 construction workers at the project site. The trip distribution and mode split of construction workers are not known. In San Francisco, some construction workers use transit or carpool to a site, particularly when located downtown, to reduce traffic and parking problems during construction. However, it is anticipated that the addition of the worker-related vehicle- or transit-trips would not substantially affect transportation conditions, as any impacts on local intersections or the transit network would be similar to, or less than, those associated with the proposed project and would be temporary in nature. Construction workers who drive to the site would cause a temporary parking demand. Nearby parking facilities, such as Lot A, the 450 South Street Garage, and UCSF's Third Street Garage, currently have availability during the day, and it is anticipated that construction worker parking demand could be accommodated without substantially affecting areawide parking conditions.

It is anticipated that construction at the project site over the 26-month construction period would overlap with the construction activity of other projects in the area, notably the UCSF LRDP projects, planned for construction between 2015 and 2019. These include 523 residential units, about 440,000 gsf of research, clinical and medical space, and a parking garage containing 500 vehicle parking spaces. Detailed construction schedules for these projects are not currently known, however, it is anticipated that a portion of the construction schedules would overlap with the project construction period. In particular, the UCSF East Campus project on Blocks 33/34, located directly south of the project site across 16th Street, consists of 500,000 gsf of office space, but may include up to 250,000 gsf of clinical space with the remainder dedicated to research/office uses.[45] The project will be built in two phases, with the first phase (about 250,000 gsf) starting construction in 2016 and continuing for about 18 to 24 months. The UCSF projects are projected to generate about 40 daily truck trips on average, and these trucks would enter/exit the UCSF campus via Mission Bay Boulevard North, Nelson Rising Lane, Owens Street, 16th Street, and Fourth Street. In addition, the Uber/ARE project on Mission Bay Blocks 26/27, located directly north of the project site across South Street, consists of 423,000 gsf of office space. Construction on this project is

[45] Clinical uses are considered a "secondary use" under the Mission Bay South Plan and would require a finding of consistency with the Plan by OCII.

estimated to start by the end of 2015 and continue for 18 to 24 months. Impact C-TR-1 presents the cumulative construction-related transportation impact analysis.

The construction activities associated with overlapping projects would affect traffic operations in the nearby vicinity, however, it is not anticipated that construction activities would substantially affect pedestrian movements. It is anticipated that the construction manager for each project would be required to work with the various departments of the City to develop a detailed and coordinated plan that would address construction vehicle routing, traffic control and pedestrian movement adjacent to the construction area for the duration of the overlap in construction activity. See **Impact C-TR-1** for discussion on cumulative construction-related construction impacts.

Overall, because construction activities would be temporary and limited in duration, and are required to be conducted in accordance with City requirements, construction-related ground transportation impacts of the proposed project would be *less than significant.*

Mitigation: Not required

While the proposed project's construction-related transportation impacts would be less than significant, the following improvement measure may be recommended for consideration by City decision makers to further reduce the proposed project's less-than-significant impacts related to construction activities.

Improvement Measure I-TR-1: Construction Management Plan and Public Updates

Construction Coordination – To reduce potential conflicts between construction activities and pedestrians, bicyclists, transit and vehicles at the project site, the project sponsor shall require that the contractor prepare a Construction Management Plan for the project construction period. The preparation of a Construction Management Plan could be a requirement included in the construction bid package. Prior to finalizing the Plan, the project sponsor/construction contractor(s) shall meet with DPW, SFMTA, the Fire Department, Muni Operations and other City agencies to coordinate feasible measures to include in the Construction Management Plan to reduce traffic congestion, including temporary transit stop relocations and other measures to reduce potential traffic, bicycle, and transit disruption and pedestrian circulation effects during construction of the proposed project. This review should consider other ongoing construction in the project vicinity, such as construction of the nearby UCSF LRDP projects and construction on Blocks 26 and 27.

Carpool, Bicycle, Walk and Transit Access for Construction Workers – To minimize parking demand and vehicle trips associated with construction workers, the construction contractor could include as part of the Construction Management Plan methods to encourage carpooling, bicycle, walk and transit access to the project site by construction workers (such as providing transit subsidies to construction workers, providing secure bicycle parking spaces, participating in free-to-employee ride matching program from www.511.org, participating in emergency ride home program through the City of San Francisco (www.sferh.org), and providing transit information to construction workers.

Construction Worker Parking Plan – As part of the Construction Management Plan that would be developed by the construction contractor, the location of construction worker parking could be identified as well as the person(s) responsible for monitoring the implementation of the proposed parking plan. The use of on-street parking to accommodate construction worker parking could be discouraged. All construction bid documents could include a requirement for the construction contractor to identify the proposed location of construction worker parking. If on-site, the location, number of parking spaces, and area where vehicles would enter and exit the site could be required. If off-site parking is proposed to accommodate construction workers, the location of the off-site facility, number of parking spaces retained, and description of how workers would travel between off-site facility and project site could be required.

Project Construction Updates for Adjacent Businesses and Residents – To minimize construction impacts on access to nearby institutions and businesses, the project sponsor could provide nearby residences and adjacent businesses with regularly-updated information regarding project construction, including construction activities, peak construction vehicle activities (e.g., concrete pours), travel lane closures, and parking lane and sidewalk closures. A regular email notice could be distributed by the project sponsor that would provide current construction information of interest to neighbors, as well as contact information for specific construction inquiries or concerns.

Comparison of Impact TR-1 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR did not identify any significant impacts related to construction-related transportation impacts within Mission Bay, and did not require any mitigation measures. Consequently, no new or different mitigation measures or alternatives to reduce project impacts related to construction activities are identified or required with respect to the currently proposed project. On the basis of the facts discussed above, the project would not have any new or substantially more severe effects than those identified in the Mission Bay FSEIR related to construction-related transportation impacts.

Project Impacts: Operations

Conditions Without a SF Giants Game at AT&T Park

Traffic Impacts

Impact TR-2: The proposed project would result in significant traffic impacts at multiple intersections that would operate at LOS E or LOS F under Existing plus Project conditions without a SF Giants game at AT&T Park. (Significant and Unavoidable with Mitigation)

Impact TR-2 presents the traffic impact analysis at the study intersections for the No Event, Convention Event, and Basketball Game scenarios for conditions without an overlapping SF Giants evening game at AT&T Park for the four analysis hours. As described in Section 5.2.5.3, each project scenario was evaluated for the particular time period(s) during which the specific conditions would occur. **Table 5.2-34**, **Figure 5.2-15** and **Figure 5.2-16** present the weekday p.m. peak hour intersection LOS conditions for the three scenarios, **Table 5.2-35** and **Figure 5.2-17** present the weekday evening and late evening peak hour conditions for the Basketball Game scenario, and **Table 5.2-36** and **Figure 5.2-18** present the Saturday evening peak hour conditions for the No Event and Basketball Game scenarios.

TABLE 5.2-34
INTERSECTION LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITHOUT A SF GIANTS GAME - WEEKDAY PM PEAK HOUR

					Existing plus Project					
			Existing		No Event		Convention Event		Basketball Game	
#	Intersection Location		Delay[a]	LOS[b]	Delay	LOS	Delay	LOS	Delay	LOS
1	King St	Third Street	**72.7**	**E**	**73.2**	**E**	**72.3**	**E**	**72.7**	**E**
2	King St	Fourth Street	51.9	D	52.5	D	**60.0**	**E**	**60.2**	**E**
3	King St/Fifth St	I-280 ramps	**59.2**	**E**	**59.2**	**E**	**59.2**	**E**	**59.2**	**E**
4	Fifth St/Harrison	I-80 WB off-ramp	48.4	D	48.5	D	48.5	D	49.8	D
5	Fifth St/Bryant St	I-80 EB on-ramp	**>80**	**F**	**>80**	**F**	**>80**	**F**	**>80**	**F**
6	Third Street	Channel Street	38.0	D	38.3	D	44.3	D	46.0	D
7	Fourth Street	Channel Street	< 10	A	< 10	A	< 10	A	11.3	B
8	Seventh Street	Mission Bay Dr	23.1	C	30.2	C	38.5	D	52.3	D
9	TA Francois Blvd	South Street[c]	10.8(eb)	B	< 10	A	< 10	A	< 10	A
10	Third Street	South Street	24.9	C	28.5	C	29.3	C	27.4	C
11	TA Francois Blvd	16th Street[c]	--	--	17.2	B	17.2	A	16.8	A
12	Illinois Street	16th Street[c]	12.6(nb)	B	12.8 (nb)	B	13.0 (nb)	B	11.5(nb)	B
13	Third Street	16th Street[e]	29.3	C	32.2	C	32.9	C	33.6	C
14	Fourth Street	16th Street[e]	21.5	B	32.7	C	37.9	D	28.0	C
15	Owens Street	16th Street[e]	35.5	C	41.2	D	53.4	D	44.2	C
16	7th/Mississippi	16th Street[e]	**68.6**	**E**	**> 80**	**F**	**> 80**	**F**	**> 80**	**F**
17	Illinois Street	Mariposa Street[c]	10.6(eb)	B	16.1	B	17.1	B	17.0	B
18	Third Street	Mariposa Street	36.2	D	42.5	D	39.4	D	42.0	D
19	Fourth Street	Mariposa Street	13.2	B	15.3	B	15.3	B	14.3	B
20	Mariposa Street	I-280 NB off-ramp	25.8	C	26.4	C	27.0	C	25.8	C
21	Mariposa Street	I-280 SB on-ramp[d]	11.9	B	12.9	B	13.9	B	12.8	B
22	Third Street	Cesar Chavez St	43.0	D	49.7	D	47.5	D	47.6	D

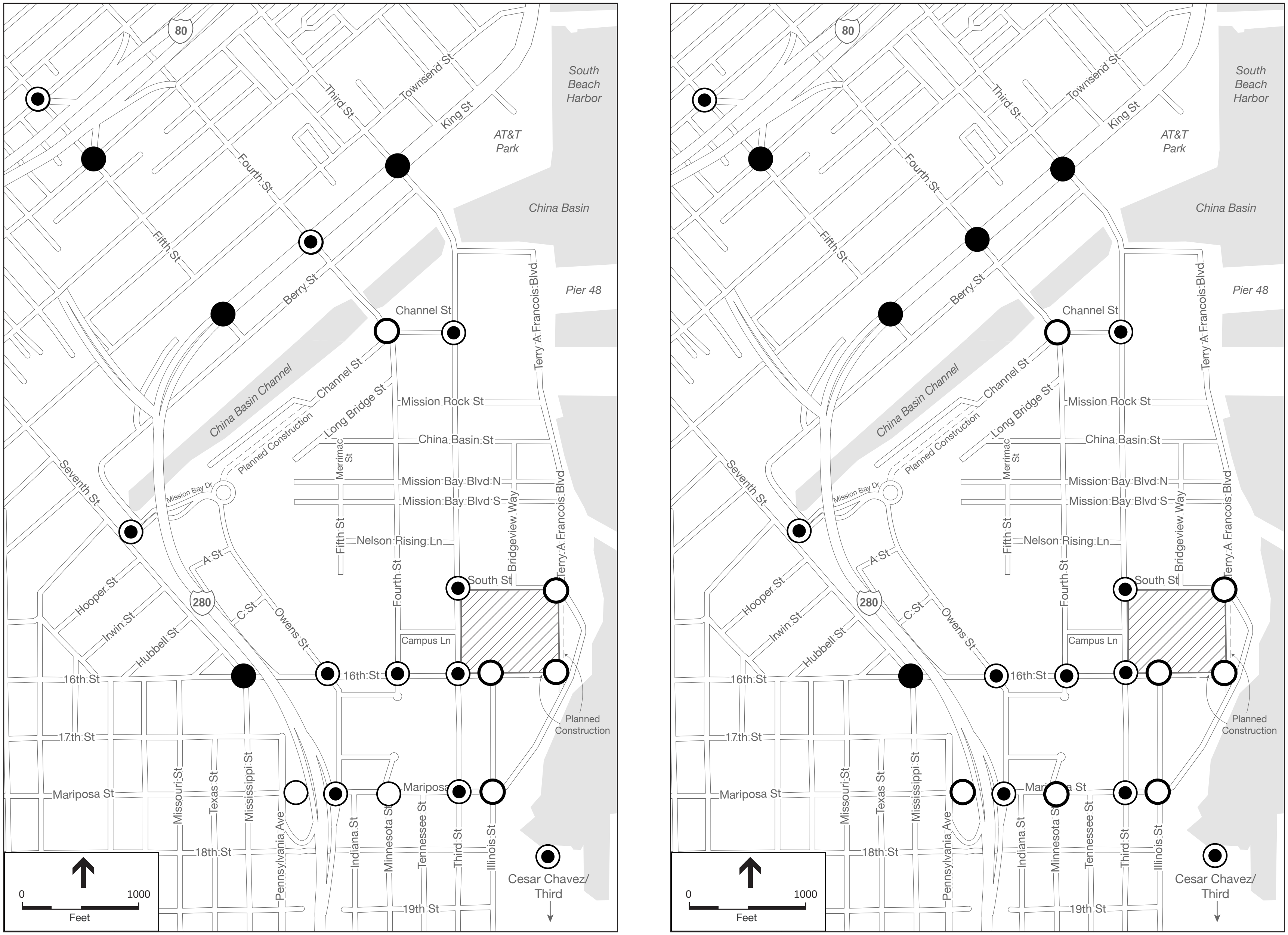
NOTES:

[a] Delay presented in seconds per vehicle. For unsignalized intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
[b] Intersections operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.
[c] All-way stop-controlled intersection. The existing intersections of Terry A. Francois/South and Illinois/Mariposa would be signalized as part of the proposed project.
[d] The traffic signal at the intersection of Mariposa/I-280 southbound on-ramp is part of the roadway improvements on Mariposa Street between the I-280 northbound off-ramp and I-280 southbound on-ramp and the extension of Owens Street between 16th and Mariposa Streets, and is currently planned to be operational by fall 2015.
[e] Includes implementation of the 22 Fillmore Transit Priority Project, which includes converting one mixed-flow lane in each direction to a side-running transit-only lane.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

NO EVENT SCENARIO

CONVENTION EVENT SCENARIO



Project Site Boundary | LOS A-B | LOS C-D | LOS E-F

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
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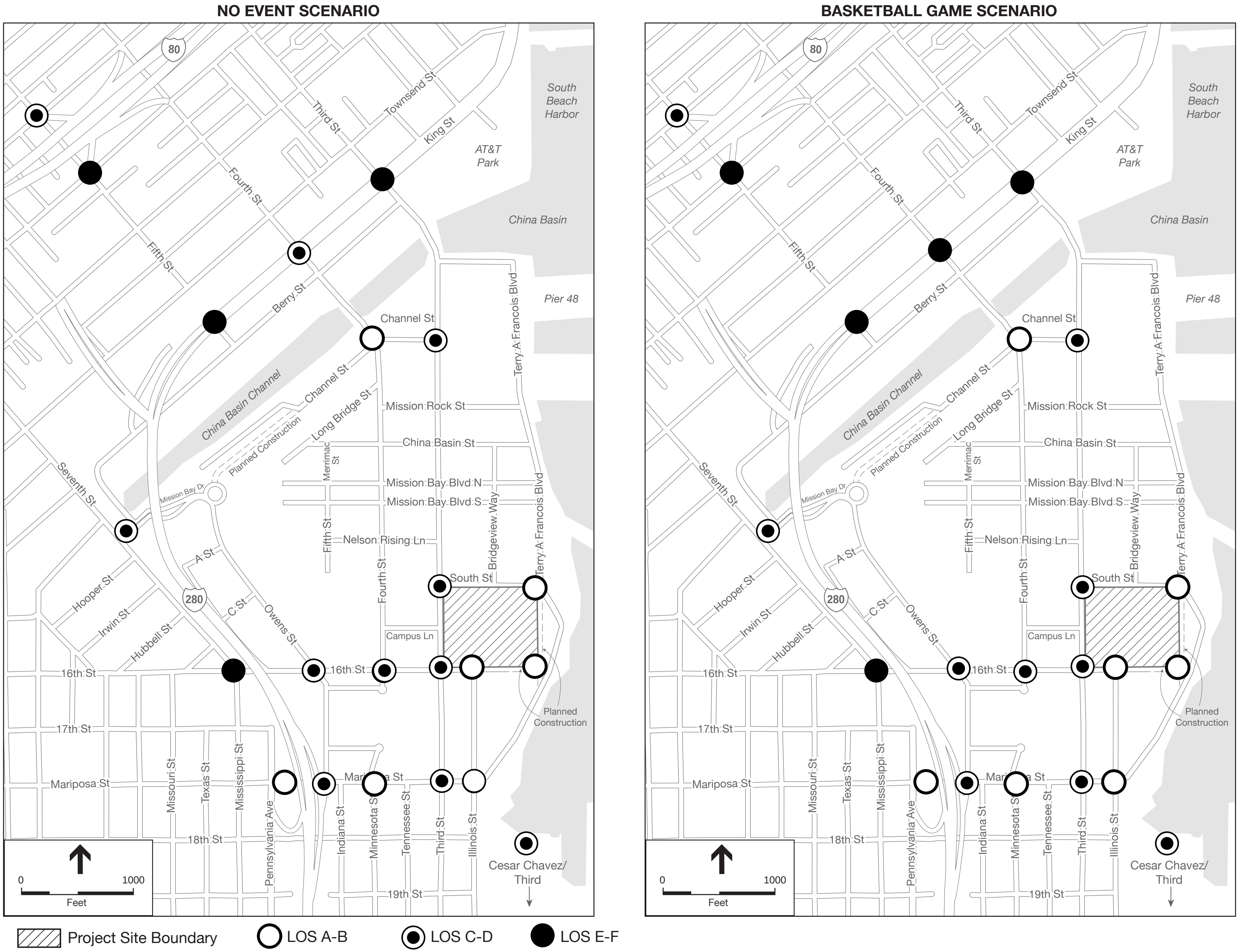
Figure 5.2-15
Existing Plus Project Intersection LOS-Without a SF Giants Game - Weekday PM Peak Hour - No Event and Convention Event Scenarios



SOURCE: SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
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Figure 5.2-16

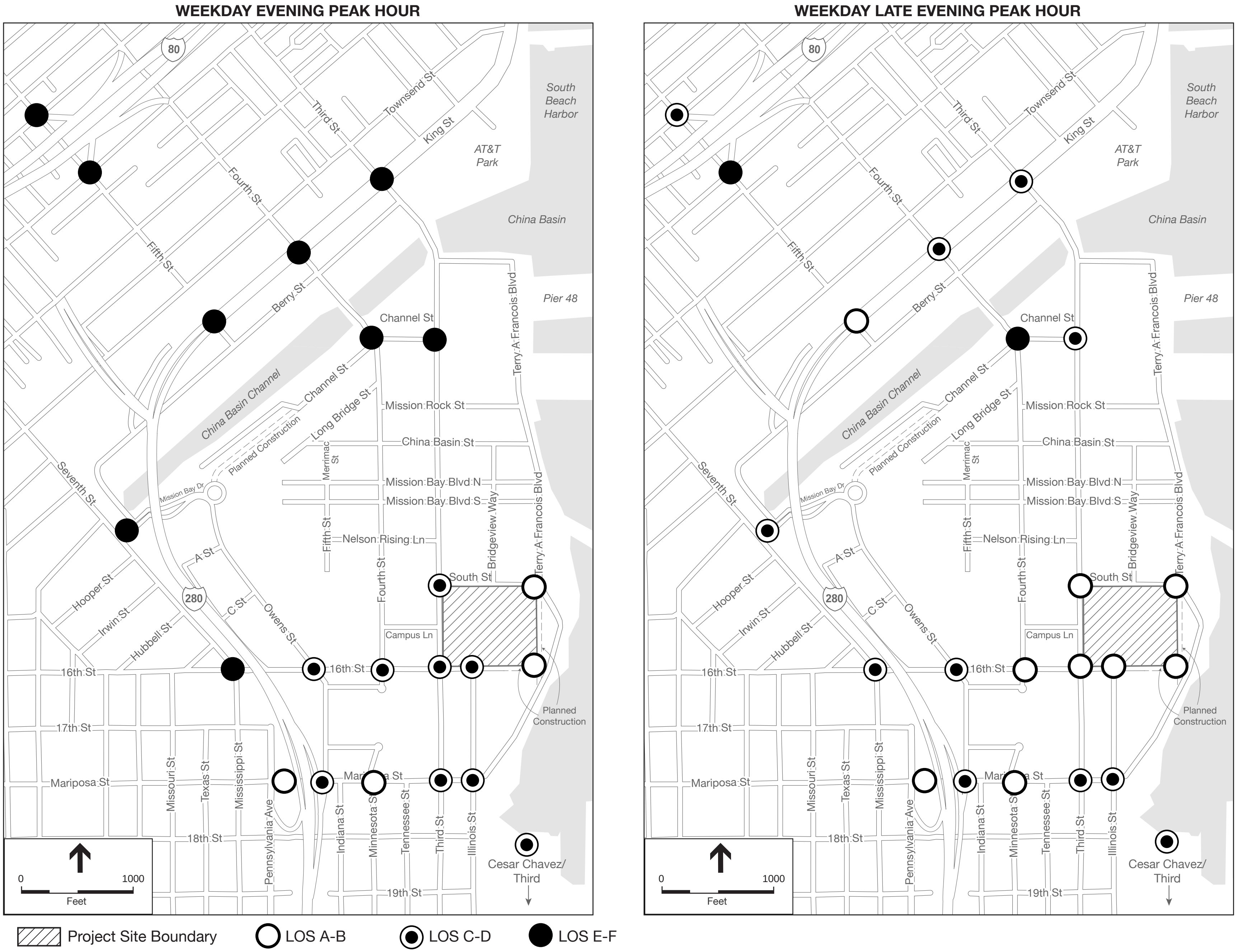
Existing Plus Project Intersection LOS-Without a SF Giants Game - Weekday PM Peak Hour - No Event and Basketball Game Scenarios

TABLE 5.2-35
INTERSECTION LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITHOUT A SF GIANTS GAME - WEEKDAY EVENING AND LATE EVENING PEAK HOURS

			Evening				Late Evening			
			Existing		Existing plus Project - Basketball Game		Existing		Existing plus Project - Basketball Game	
#	**Intersection Location**		**Delay[a]**	**LOS[b]**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
1	King St	Third Street	**58.3**	**E**	**64.6**	**E**	19.0	B	23.6	C
2	King St	Fourth Street	47.9	D	**61.4**	**E**	24.1	C	22.5	C
3	King St/Fifth St	I-280 ramps	**57.2**	**E**	**56.9**	**E**	10.8	B	10.8	B
4	Fifth St/Harrison	I-80 WB off-ramp	49.8	D	**>80**	**F**	22.1	C	22.3	C
5	Fifth St/Bryant St	I-80 EB on-ramp	**>80**	**F**	**>80**	**F**	24.2	C	**>80**	**F**
6	Third Street	Channel Street[f]	33.1	C	**>80**	**F**	< 10	A	37.5	D
7	Fourth Street	Channel Street[f]	< 10	A	**72.5**	**E**	10.6	B	**>80**	**F**
8	Seventh Street	Mission Bay Dr	19.5	B	**>80**	**F**	12.0	B	38.8	D
9	TA Francois Blvd	South Street[c,f]	10.3(eb)	B	< 10	A	< 10 (eb)	A	13.4	B
10	Third Street	South Street[f]	24.7	C	45.1	D	< 10	A	<10	A
11	TA Francois Blvd	16th Street[c,f]	--	--	17.7	B	--	--	16.9	B
12	Illinois Street	16th Street[c,f]	<10(nb)	A	15.7(nb)	C	< 10 (nb)	A	< 10 (sb)	A
13	Third Street	16th Street[e,f]	27.8	C	34.2	C	10.6	B	15.7	B
14	Fourth Street	16th Street[e]	20.6	C	37.0	D	15.3	B	18.0	B
15	Owens Street	16th Street[e,f]	21.0	C	39.0	D	12.2	B	31.2	C
16	7th/Mississippi	16th Street[e]	**60.1**	**E**	**>80**	**F**	15.9	B	24.1	C
17	Illinois Street	Mariposa Street[c,f]	< 10(eb)	A	45.8	D	< 10 (eb)	A	22.6	C
18	Third Street	Mariposa Street[f]	34.8	C	37.1	D	16.2	B	23.6	C
19	Fourth Street	Mariposa Street[f]	10.8	B	13.0	B	< 10	A	<10	A
20	Mariposa Street	I-280 NB off-ramp[f]	20.0	B	32.5	C	15.9	B	24.7	C
21	Mariposa Street	I-280 SB on-ramp[d]	< 10	A	<10	A	< 10	A	14.3	B
22	Third Street	Cesar Chavez St	32.9	C	33.9	C	21.1	C	21.9	C

NOTES:
[a] Delay presented in seconds per vehicle. For unsignalized intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
[b] Intersections operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.
[c] All-way stop-controlled intersection. The existing intersections of Terry A. Francois/South and Illinois/Mariposa would be signalized as part of the proposed project.
[d] The traffic signal at the intersection of Mariposa/I-280 southbound on-ramp is part of the roadway improvements on Mariposa Street between the I-280 northbound off-ramp and I-280 southbound on-ramp and the extension of Owens Street between 16th and Mariposa Streets, and is currently planned to be operational by fall 2015.
[e] Includes implementation of the 22 Fillmore Transit Priority Project, which includes converting one mixed-flow lane in each direction to a side-running transit-only lane.
[f] Under the Basketball Game scenario, a PCO would be stationed at this study intersection during pre-event and/or post-event periods, and, as necessary, would manually direct vehicles, pedestrians, transit, and bicyclists through the intersection. LOS reflects conditions without PCO intervention.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015



SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

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Figure 5.2-17

Existing Plus Project Intersection LOS-Without a SF Giants Game - Weekday Evening and Late Evening Peak Hour - Basketball Game Scenarios

TABLE 5.2-36
INTERSECTION LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITHOUT A SF GIANTS GAME – SATURDAY EVENING PEAK HOUR

#	Intersection Location		Existing		Existing plus Project			
					No Event		Basketball Game	
			Delay[a]	LOS[a]	Delay	LOS	Delay	LOS
1	King St	Third Street	26.6	C	28.4	C	29.0	C
2	King St	Fourth Street	22.6	C	23.0	C	31.8	C
3	King St/Fifth St	I-280 ramps	< 10	A	< 10	A	<10	A
4	Fifth St/Harrison	I-80 WB off-ramp	29.2	C	29.5	C	**64.9**	**E**
5	Fifth St/Bryant St	I-80 EB on-ramp	27.0	C	27.6	C	32.8	C
6	Third Street	Channel Street[f]	< 10	A	< 10	A	**78.9**	**E**
7	Fourth Street	Channel Street[f]	13.6	B	13.0	B	45.7	D
8	Seventh Street	Mission Bay Dr	12.4	B	12.5	B	**>80**	**F**
9	TA Francois Blvd	South Street[c,f]	< 10(eb)	A	< 10	A	<10	A
10	Third Street	South Street[f]	< 10	A	10.1	B	15.3	B
11	TA Francois Blvd	16th Street[f]	--	--	17.4	B	18.2	B
12	Illinois Street	16th Street[g,f]	< 10(nb)	A	12.3 (eb)	B	11.8(nb)	B
13	Third Street	16th Street[e,f]	10.7	B	13.8	B	14.0	B
14	Fourth Street	16th Street[e]	14.3	B	12.9	B	16.2	B
15	Owens Street	16th Street[e]	< 10	A	13.6	B	20.4	C
16	7th/Mississippi	16th Street[e]	18.4	B	29.3	C	40.7	D
17	Illinois Street	Mariposa Street[c,f]	< 10(eb)	A	15.8	B	44.6	D
18	Third Street	Mariposa Street[f]	16.6	B	19.4	B	21.1	C
19	Fourth Street	Mariposa Street[f]	< 10	A	< 10	A	<10	A
20	Mariposa Street	I-280 NB off-ramp,[f]	16.1	B	16.3	B	24.8	C
21	Mariposa Street	I-280 SB on-ramp[d]	< 10	A	< 10	A	<10	A
22	Third Street	Cesar Chavez St	18.4	B	17.5	B	18.2	B

NOTES:
[a] Delay presented in seconds per vehicle. For unsignalized intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
[b] Intersections operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.
[c] All-way stop-controlled intersection. The existing intersections of Terry A. Francois/South and Illinois/Mariposa would be signalized as part of the proposed project.
[d] The traffic signal at the intersection of Mariposa/I-280 southbound on-ramp is part of the roadway improvements on Mariposa Street between the I-280 northbound off-ramp and I-280 southbound on-ramp and the extension of Owens Street between 16th and Mariposa Streets, and is currently planned to be operational by fall 2015.
[e] Includes implementation of the 22 Fillmore Transit Priority Project, which includes converting one mixed-flow lane in each direction to a side-running transit-only lane.
[f] Under the Basketball Game scenario, a PCO would be stationed at this study intersection during the Saturday pre-event period, and, as necessary, would manually direct vehicles, pedestrians, transit, and bicyclists through the intersection. LOS reflects conditions without PCO intervention.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-18

Existing Plus Project Intersection LOS-Without a SF Giants Game - Saturday Evening Peak Hour - No Event and Basketball Game Scenarios

No Event Scenario

The No Event scenario would generate 702 new vehicle trips during the weekday p.m. peak hour (255 inbound and 477 outbound), and 785 vehicle trips during the Saturday evening peak hour (367 inbound and 418 outbound). All project-generated vehicles were assigned to the on-site project garage. Intersection LOS for the No Event scenario are presented in **Table 5.2-34** for the weekday p.m. peak hour, and in **Table 5.2-36** for the Saturday evening peak hour. For both weekday p.m. and Saturday evening peak hour conditions under the No Event scenario, the proposed project would result in a significant impact at the study intersection of Seventh/Mississippi/16th. With the addition of project-generated vehicle trips, the intersection LOS would worsen from LOS E under existing conditions to LOS F. All other study intersections would continue to operate at LOS D or better, with the exception of the three intersections that currently operate at LOS E or LOS F during the weekday p.m. peak hour and would continue to operate at the same LOS with the proposed project (i.e., King/Third, King/Fifth/I-280 ramps, and Fifth/Bryant/ I-80 eastbound on-ramp). At these three intersections, the proposed project’s vehicle trips were reviewed to determine whether the project’s contribution to the intersection’s overall LOS E or LOS F operating conditions would be considerable.

The vehicle trips associated with the No Event scenario was determined not to contribute considerably to the existing LOS E or LOS F conditions, and the project's traffic impacts at these intersections would not be considered significant. Detailed calculations and percent contributions to critical movements[46] operating at LOS E or LOS F conditions are included in **Appendix TR**.

Convention Event Scenario

The Convention Event scenario would generate 919 new vehicle trips during the weekday p.m. peak hour (256 inbound and 663 outbound). Because the on-site garage would not accommodate the daily parking demand associated with a convention event, some vehicles would be expected to park at other public parking facilities, primarily Lot A which would accommodate approximately 50 percent of the overall convention event parking demand. However, the convention event parking demand during the p.m. peak hour represents about one third of the maximum parking demand. This level of parking demand can be accommodated at the project site. In other words, the p.m. peak hour coincides with a period when the on-site parking garage can accommodate all of the parking demand generated by the project under this scenario. For this reason, all of the weekday p.m. peak hour vehicles generated by the convention event were assigned to travel to and from the project garage. Weekday p.m. peak hour intersection LOS for the Convention Event scenario are presented in **Table 5.2-34**. During the weekday p.m. peak hour, with the additional vehicle trips generated under the Convention Event scenario, the LOS

[46] The critical movement with respect to an intersection analysis, is the movement or lane for a given signal phase (for example, northbound/southbound versus eastbound/westbound) that requires the most green time, and is determined for each phase based on flow ratios calculated using the HCM2000 intersection operations methodology. The movement or lane with the highest flow ratio for each phase is the critical movement. The critical movements are determined in the quantitative calculations conducted for the study intersections, taking into consideration the available geometric conditions (for example, number of lanes), signalization conditions (for example, cycle length, green time), and traffic conditions (for example, traffic volumes, pedestrian flows, heavy vehicle percentages). The critical movements, using the HCM2000 methodology, were identified by the Synchro intersection analysis software/traffic model developed for this analysis. Poorly operating critical movements are those operating at LOS E or LOS F conditions.

at the intersection of King/Fourth would worsen from LOS D to LOS E, and at the intersection of Seventh/Mississippi/16th would worsen from LOS E to LOS F, and this would be considered a significant traffic impact. All other study intersections would continue to operate at LOS D or better, with the exception of the three intersections that currently operate at LOS E or LOS F during the weekday p.m. peak hour and would continue to operate at the same LOS (i.e., King/Third, King/Fifth/I-280 ramps, and Fifth/Bryant/I-80 eastbound on-ramp). The Convention Event scenario was determined not to contribute considerably to the LOS E or LOS F conditions, and traffic impacts at these three intersections would not be considered significant.

Basketball Game Scenario

Because the on-site garage would be reserved for attendees with pre-issued on-site parking passes, and would be limited to 950 parking spaces, a substantial portion of the vehicle trips associated with attendees driving to the event center were assigned to other public parking facilities, taking into account their proximity to the project site and existing parking occupancy. For all analysis peak hours, event-related vehicle trips would travel, in addition to the project site garage, to and from other nearby parking facilities such as the 450 South Street garage and Lot A. Approximately 20 percent of the weekday p.m. peak hour vehicles were assigned to the project garage, about 30 percent were assigned to the 450 South Street garage, which was assumed to remain open to the general public on basketball game days, and 35 percent were assigned to Lot A; the remaining 15 percent were assigned to UCSF parking garages and lots. The analysis of conditions prior to and following a basketball game at the project site assumes implementation of the proposed project's TMP, which is described in Section 5.2.5.2. Specifically, the TMP specifies that for all events with more than 14,000 attendees, up to 17 PCOs would be stationed in the project vicinity to manage vehicular, transit, bicycle and pedestrian flows (see **Figure 5.2-11**), including at the intersections of Fourth/Channel, Third/Channel, Third/South, Bridgeview/South, Terry A. Francois/South, Third/16th, Illinois/16th, Terry A. Francois/16th, I-280 northbound ramps/Owens/Mariposa, Fourth/Mariposa, Third/Mariposa, and Illinois/Mariposa.

- During the weekday p.m. peak hour, the Basketball Game scenario would generate 886 new vehicle trips (524 inbound and 362 outbound). Weekday p.m. peak hour intersection LOS for the Basketball Game scenario are presented in **Table 5.2-34**. During the weekday p.m. peak hour, with the additional vehicle trips generated under the Basketball Game scenario, the LOS at the intersection of King/Fourth would worsen from LOS D to LOS E conditions, and the LOS at the intersection of Seventh/Mississippi/16th would worsen from LOS E to LOS F. These changes would be considered significant traffic impacts. All other study intersections would continue to operate at LOS D or better, with the exception of the three intersections that currently operate at LOS E or LOS F during the weekday p.m. peak hour (i.e., King/Third, King/Fifth/I-280 ramps, and Fifth/Bryant/I-80 eastbound on-ramp) and would continue to operate at the same LOS. The Basketball Game scenario was determined not to contribute considerably to the existing LOS E or LOS F conditions, and traffic impacts at these three intersections would not be considered significant.

- No travel lane closures are proposed for the weekday evening pre-event conditions. During the weekday evening peak hour, the Basketball Game scenario would generate 2,752 new vehicle trips (2,553 inbound and 198 outbound). Weekday evening intersection LOS for the Basketball Game scenario are presented in **Table 5.2-35**. During the weekday evening peak hour, with the additional vehicle trips associated with event attendees arriving to the study area parking facilities, average delays at most study intersections would increase from existing conditions. The LOS at the intersections of King/Fourth, Fifth/Harrison/I-80 westbound off-ramp, Third/Channel (PCO location), Fourth/Channel (PCO location), and Seventh/Mission Bay Drive (PCO location) would worsen from LOS D or better to LOS E or LOS F conditions, and would worsen from LOS E to LOS F conditions at the intersection of Seventh/Mississippi/16th, and this would be considered a significant traffic impact. All other signalized study intersections would continue to operate at LOS D or better, with the exception of the three intersections that currently operate at LOS E or LOS F during the weekday p.m. peak hour (i.e., King/Third, King/Fifth/I-280 ramps, and Fifth/Bryant/I-80 eastbound on-ramp) and would continue to operate at the same LOS with the project. The Basketball Game scenario was determined not to contribute considerably to the existing LOS E or LOS F conditions, and traffic impacts at these three intersections would not be considered significant.

- Prior to the end of an event under the Basketball Game scenario, temporary travel lane closures would be implemented on Third Street between Mariposa Street and Mission Bay Boulevard South, on South Street between Third Street and Bridgeview Way, on 16th Street between Third Street and Terry A. Francois Boulevard, and on Illinois Street between Mariposa and 16th Streets. These temporary lane closures are anticipated to be in place for approximately 30 to 45 minutes after the end of the event, or until vehicular traffic dissipates and most event attendees taking transit have boarded. As a result of the northbound lane closures, approximately 140 vehicles currently traveling northbound on Third Street and continuing north of 16th Street during the late evening peak hour would be rerouted westbound onto 16th Street (i.e., left turn only at the northbound approach to 16th Street). The 140 northbound vehicles that would be rerouted are based on existing volumes at the intersection, and the number of vehicles that would need to be diverted would likely be lower since drivers would likely avoid the area after an event (e.g., would use I-280, U.S. 101, or Potrero Avenue instead). Some of the rerouted vehicles would be expected to turn left at Mariposa Street, while others would continue to 16th Street where they would be rerouted. It is not expected that the rerouted vehicles would then travel north via Fourth Street, as it is a one-lane local street, but would instead chose Owens Street, Seventh Street, or other streets to the west to continue north. Southbound traffic flow on Third Street would not be affected by these temporary northbound travel lane closures. Additional details related to the travel lane closure are described in Section 5.2.5.2. During the weekday late evening peak hour, the Basketball Game scenario would generate 3,018 new vehicle trips (134 inbound and 2,883 outbound). Weekday late evening (post-event) intersection LOS for the Basketball Game scenario are presented in **Table 5.2-35**. During the weekday late evening peak hour, the additional vehicle trips would result in the LOS at the intersections of Fifth/Bryant/I-80 eastbound on-ramp, and Fourth Channel (PCO location) worsening from LOS D or better to LOS F conditions. This would be considered a significant traffic impact. All other study intersections would continue to operate at LOS D or better.

- No travel lane closures are proposed for the Saturday evening pre-event conditions. During the Saturday evening peak hour, the Basketball Game scenario would generate 2,815 new vehicle trips (2,687 inbound and 128 outbound). Saturday evening intersection LOS for the Basketball Game scenario is presented in **Table 5.2-36**. During the Saturday evening peak hour, with the additional vehicle trips generated, the intersection LOS at the intersections of Fifth/Harrison/I-80 westbound off-ramp, Third/Channel (PCO location), and Seventh/Mission Bay Drive (PCO location) would worsen from LOS D or better to LOS E or LOS F conditions, and this would be considered a significant traffic impact. All other study intersections would continue to operate at LOS D or better.

Other Events

Intersection LOS operating conditions during other events at the project site would be similar to or better than described above for the Basketball Game scenario which assessed the maximum attendance event for evening conditions, and which would also be representative of conditions for sell-out concert events. Intersection LOS operating conditions for daytime events during the weekday p.m. peak hour would be similar to or better than described above for the Convention Event scenario, which reflects the maximum impact during the weekday p.m. peak hour. TMP measures, such as street closures for events with more than 14,000 attendees, would not be required for many of the other events. See **Table 5.2-16** for the TMP measures associated with various events at the proposed event center.

Overall, under existing plus project conditions without a SF Giants game at AT&T Park, the proposed project would result in *significant* project-specific impacts at seven study intersections:

- King/Fourth (weekday p.m., weekday evening)
- Fifth/Harrison/I-80 westbound off-ramp (weekday evening, Saturday evening)
- Fifth/Bryant/I-80 eastbound on-ramp (weekday late evening)
- Third/Channel (weekday evening, Saturday evening)
- Fourth/Channel (weekday evening, weekday late evening)
- Seventh/Mission Bay Drive (weekday evening, Saturday evening)
- Seventh/Mississippi/16th (weekday p.m., weekday evening)

At the study intersections where project-specific impacts were identified, each intersection was reviewed to determine if mitigation measures could reduce the impact to less-than-significant levels or lessen the severity of the project's contribution to existing LOS E or LOS F conditions. Generally, to mitigate poor operating conditions of study intersections, additional travel lane capacity would be needed on one or more approaches to the intersection, particularly at intersections with the I-80 ramps. The provision of additional travel lane capacity by narrowing sidewalks, removal of on-street parking, and/or removal of transit lanes or bicycle lanes would generally be infeasible and inconsistent with the transit, bicycle, and pedestrian environment encouraged by the City's *Transit First* Policy by removing space dedicated to pedestrians, and/or bicycles and increasing the distances required for pedestrians to cross streets. As noted above, the proposed project includes a TMP for events at the project site, and which would minimize impacts of peak arrivals and departures.

Mitigation Measure M-TR-2a: Additional PCOs during Events

As a mitigation measure to manage traffic flows and minimize congestion associated with events at the project site, the proposed project's TMP shall be modified to include four additional PCOs that shall be deployed to intersections where the proposed project would result in significant impacts, as conditions warrant during events. These could include the intersections of King/Fourth, Fifth/Harrison/I-80 westbound off-ramp, Fifth/Bryant/I-80 eastbound on-ramp, Seventh/Mission Bay Drive, and Seventh/Mississippi/16th. The PCO Supervisor shall make the determination where the additional PCOs would be located, based on field conditions during an event.

Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts

The project sponsor shall work with the City to pursue and implement, if feasible, additional strategies to reduce transportation impacts. In addition, the City shall pursue and implement, if feasible, additional strategies that could be implemented by the City or other public agency (e.g., Caltrans). These strategies could include the following:

Strategies to Reduce Traffic Congestion

- The City to work with Caltrans to install changeable message signs upstream of key entry points onto the street network, such as on I-280 northbound.
- The City to provide coordinated outreach efforts to surrounding neighborhoods to explore the need/desire for new on-street parking management strategies, which could include implementation of time limits and Residential Parking Permit program areas.
- The project sponsor to offer for pre-purchase substantially all available on-site parking spaces not otherwise committed to office tenants, retail customers or season ticket holders, and to cooperate with neighboring private garage operators to pre-sell parking spaces, as well as notify patrons in advance that nearby parking resources are limited and travel by non-auto modes is encouraged.
- The project sponsor to create a smart phone application, or integrate into an existing smart phone application, transportation information that promotes transit first, allows for pre-purchase of parking and designates suggested paths of travel that best avoid congested areas or residential streets such as Bridgeview north of Mission Bay Boulevard and Fourth Street.
- The City and the project sponsor to work to identify off-site parking lot(s) in the vicinity of the event center, if available, where livery and TNC vehicles could stage prior to the end of an event.
- The City to include on-street parking spaces within Mission Bay in the expansion and permanent implementation of SF*park*, including dynamic pricing, and smart phone application providing real-time parking availability and cost.
- The City shall work to include the publicly accessible off-street facilities into the permanent implementation of SF*park*, and incorporate data into its platforms used to disseminate information to the public.
- If necessary to support achievement of non-auto mode shares for the project, the project sponsor shall cooperate with future City efforts for active interventions to effectively manage and price the parking supply in the project vicinity to reduce travel by automobile, thus improving traffic conditions.
- The project sponsor to seek partnerships with car-sharing services.

Strategy to Enhance Non-auto Modes

- The project sponsor to provide a promotional incentive (e.g., show Clipper card or bike valet ticket for concession savings, chance to win merchandise or experience, etc.) for public transit use and/or bicycle valet use at the event center.

Strategies to Enhance Transportation Conditions in Mission Bay and Nearby Neighborhoods

- The project sponsor to participate as a member of the Mission Bay Ballpark Transportation Coordination Committee (MBBTCC) and to notify at least one month prior to the start of any non-GSW event with at least 12,500 expected attendees. If commercially reasonable circumstances prevent such advance notification, the GSW shall notify the MBBTCC within 72 hours of booking.
- The City and the project sponsor to meet to discuss transportation and scheduling logistics following signing any marquee events (national tournaments or championships, political conventions, or tenants interested in additional season runs: NHL, NCAA, etc.).

Strategies to Increase Transit Access

- The City to coordinate with regional providers to encourage increased special event service, particularly longer BART and Caltrain trains, and increased ferry and bus service.
- The City to work in good faith with the Water Emergency Transportation Agency, the project sponsor, UCSF, and other interested parties to explore the possibility of construction of a ferry landing at the terminus of 16th Street, and provision of ferry service during events.

Mitigation Measure M-TR-2a: Additional PCOs during Events would reduce the proposed project's impacts related to event-related traffic conditions, and would not result in secondary transportation-related impacts, but would not reduce impacts to less-than-significant levels. **Mitigation Measure M-TR-2b: Additional Measures to Reduce Transportation Impacts** would require the project sponsor to continue to work with the City to seek additional feasible measures to reduce transportation impacts. The measures identified above would reduce traffic congestion in the project vicinity by providing drivers information on traffic conditions and alternate routes, providing information on on-street and off-street parking conditions, discouraging use of on-street parking through the Residential Permit Parking program, encouraging non-auto modes through parking pricing, and enhancing regional transit access to the area, and would not result in secondary transportation impacts. However, even with implementation of these measures, the arrival and departure peak of vehicle trips to and from the event center through these intersections would continue to occur, and therefore, the proposed project's significant traffic impacts at the seven intersections of King/Fourth, Fifth/Harrison/I-80 westbound off-ramp, Fifth/Bryant/I-80 eastbound on-ramp, Third/Channel, Fourth/Channel, Seventh/Mission Bay Drive, and Seventh/Mississippi/16th would remain *significant and unavoidable with mitigation.*

Comparison of Impact TR-2 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR identified significant and unavoidable traffic impacts at seven intersections, including the proposed project study intersection of Fifth/Bryant/I-80 eastbound on-ramp (which was also identified above as a significant impact for the proposed project). Because the proposed project would result in significant traffic impacts at additional intersections, the project would result in *new significant* impacts not previously identified in the Mission Bay FSEIR.

Mission Bay FSEIR Mitigation Measures 47a - 47c, and 47e – 47i were adopted to encourage use of alternate modes and reduce auto mode. A Mission Bay South Transportation Management Plan has been developed which incorporates these mitigation measures, and it is part of the Mission Bay South Owner Participation Agreement for development within Mission Bay. Because the project sponsor would be subject to the Owner Participation Agreement, these mitigation measures are assumed to be part of the proposed project.

Mission Bay FSEIR Mitigation Measure E.47: Transportation System Management Plan

Prepare a TSM Plan, which could include the following:

FSEIR Mitigation Measure E.47.a: Shuttle Bus - Operate shuttle bus service between Mission Bay and regional transit stops in San Francisco (e.g., BART, Caltrain, Ferry Terminal, Transbay Transit Terminal), and specific gathering points in major San Francisco neighborhoods (e.g., Richmond and Mission Districts).

FSEIR Mitigation Measure E.47.b: Transit Pass Sales - Sell transit passes in neighborhood retail stores and commercial buildings in the Project Area.

FSEIR Mitigation Measure E.47.c: Employee Transit Subsidies - Provide a system of employee transportation subsidies for major employers.

FSEIR Mitigation Measure E.47.e: Secure Bicycle Parking - Provide secure bicycle parking area in parking garages of residential buildings, office buildings, and research and development facilities. Provide secure bicycle parking areas by 1) constructing secure bicycle parking at a ratio of 1 bicycle parking space for each 20 automobile parking spaces, and 2) carry out an annual survey program during project development to establish trends in bicycle use and to estimate actual demand for secure bicycle parking and for sidewalk bicycle racks, increasing the number of secure bicycle parking spaces or racks either in new buildings or in existing automobile parking facilities to meet the estimated demand. Provide secure bicycle racks throughout Mission Bay for the use of visitors.

FSEIR Mitigation Measure E.47.f: Appropriate Street Lighting - Ensure that streets and sidewalks in Mission Bay are sufficiently lit to provide pedestrians and bicyclists with a greater sense of safety, and thereby encourage Mission Bay employees, visitors and residents to walk and bicycle to and from Mission Bay.

FSEIR Mitigation Measure E.47.g: Transit and Pedestrian and Bicycle Route Information - Provide maps of the local and citywide pedestrian and bicycle routes with transit maps and information on kiosks throughout the Project Area to promote multi-modal travel.

FSEIR Mitigation Measure E.47.h: Parking Management Strategies - Establish parking management guidelines for the private operators of parking facilities in the Project Area.

FSEIR Mitigation Measure E.47i: Flexible Work Hours/Telecommuting - Where feasible, offer employees in the Project Area the opportunity to work on flexible schedules and/or telecommute so they could avoid peak hour traffic conditions.

The proposed project would result in significant and unavoidable impacts at intersections not previously identified in the Mission Bay FSEIR due to event-related vehicles that would result in exceedance of the intersection LOS threshold. Mission Bay FSEIR Mitigation Measures 47a - 47c, and 47e – 47i would minimize but not reduce traffic impacts to less-than-significant levels, and traffic impacts would remain *significant and unavoidable with mitigation*.

Impact TR-3: The proposed project would result in significant traffic impacts at freeway ramps that would operate at LOS E or LOS F under Existing plus Project conditions without a SF Giants game at AT&T Park. (Significant and Unavoidable with Mitigation)

Table 5.2-37 presents the weekday p.m. peak hour ramp LOS conditions for the three scenarios, **Table 5.2-38** presents the weekday evening and late evening peak hour conditions for the Basketball Game scenario, and **Table 5.2-39** presents the Saturday evening peak hour ramp LOS conditions for the No Event and Basketball Game scenarios. At ramp locations currently operating at LOS E or LOS F, percent contributions to the freeway ramps were calculated to determine the project contribution to the existing LOS E and LOS F conditions, and are included in **Appendix TR**.

No Event Scenario

For the weekday p.m. peak hour condition, the proposed project would not result in any project-specific impacts at the ramp locations. In addition, under the No Event scenario, the proposed project would not contribute considerably to the three ramps operating at LOS E or LOS F under existing conditions (i.e., the I-80 eastbound on-ramp at Sterling Street during the weekday p.m. peak hour, the I-80 eastbound on-ramp at Fifth/Bryant during the weekday p.m. peak hour and Saturday evening peak hour, and the I-280 southbound on-ramp at Pennsylvania Street during the weekday p.m. peak hour), and therefore, under the No Event scenario, traffic impacts at these freeway ramp locations would be less than significant.

Convention Event Scenario

Similar to the No Event scenario, the Convention Event scenario would not result in any project-specific impacts at the ramp locations. In addition, under the Convention Event scenario, the proposed project would not contribute considerably to the three ramps operating at LOS E or LOS F under existing conditions (i.e., the I-80 eastbound on-ramp at Sterling Street during the weekday p.m. peak hour, the I-280 southbound on-ramp at Pennsylvania during the weekday p.m. peak hour, and the I-80 eastbound on-ramp at Fifth/Bryant during the weekday p.m. and Saturday evening peak hours), and therefore, under the Convention Event scenario, traffic impacts at these freeway ramp locations would be less than significant.

TABLE 5.2-37
FREEWAY RAMP LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITHOUT A SF GIANTS GAME - WEEKDAY PM PEAK HOUR

				Existing plus Project					
		Existing		No Event		Convention Event		Basketball Game	
#	Ramp Location	Density[a]	LOS[b]	Density	LOS	Density	LOS	Density	LOS
1	I-80 EB on-ramp at Sterling	**35**	**E**	**36**	**E**	**36**	**E**	**36**	**E**
2	I-80 EB on-ramp at Fifth/Bryant	**--**	**F**	**--**	**F**	**--**	**F**	**--**	**F**
3	I-80 WB off-ramp at Fifth/Harrison	30	D	30	D	30	D	31	D
4	I-280 SB on-ramp at Pennsylvania	**35**	**E**	**35**	**E**	**36**	**E**	**35**	**E**
5	I-280 NB off-ramp at Mariposa	26	C	26	C	26	C	28	C
6	I-280 SB on-ramp at Mariposa	31	D	32	D	33	D	32	D

NOTES:
[a] Density of vehicles in merge and diverge influence area for on-ramp and off-ramp analysis, respectively. Measured in passenger cars per mile per lane. Density value is not presented for ramp analyses where the demand volume exceeds the capacity.
[b] Ramps operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

TABLE 5.2-38
FREEWAY RAMP LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITHOUT A SF GIANTS GAME - WEEKDAY EVENING AND LATE EVENING PEAK HOURS

		Evening				Late Evening			
		Existing		Existing plus Project - Basketball Game		Existing		Existing plus Project - Basketball Game	
#	Ramp Location	Density[a]	LOS	Density	LOS	Density	LOS	Density	LOS
1	I-80 EB on-ramp at Sterling	28	C	28	C	20	C	23	C
2	I-80 EB on-ramp at Fifth/Bryant	**--**	**F**	**--**	**F**	30	D	34	D
3	I-80 WB off-ramp at Fifth/Harrison	28	D	**36**	**E**	27	C	27	C
4	I-280 SB on-ramp at Pennsylvania	27	C	28	C	15	B	21	C
5	I-280 NB off-ramp at Mariposa	25	C	34	D	13	B	13	B
6	I-280 SB on-ramp at Mariposa	25	C	25	C	13	B	20	B

NOTES:
[a] Density of vehicles in merge and diverge influence area for on-ramp and off-ramp analysis, respectively. Measured in passenger cars per mile per lane. Density value is not presented for ramp analyses where the demand volume exceeds the capacity.
[b] Ramps operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

TABLE 5.2-39
FREEWAY RAMP LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITHOUT A SF GIANTS GAME – SATURDAY EVENING PEAK HOUR

				Existing plus Project			
		Existing		No Event		Basketball Game	
#	Ramp Location	Density[a]	LOS[b]	Density	LOS	Density	LOS
1	I-80 EB on-ramp at Sterling	22	C	22	C	22	C
2	I-80 EB on-ramp at Fifth/Bryant	**35**	**E**	**36**	**E**	**36**	**E**
3	I-80 WB off-ramp at Fifth/Harrison	25	C	26	C	34	D
4	I-280 SB on-ramp at Pennsylvania	13	B	13	B	13	B
5	I-280 NB off-ramp at Mariposa	16	B	17	B	25	C
6	I-280 SB on-ramp at Mariposa	12	B	13	B	12	B

NOTES:
[a] Density of vehicles in merge and diverge influence area for on-ramp and off-ramp analysis, respectively. Measured in passenger cars per mile per lane. Density value is not presented for ramp analyses where the demand volume exceeds the capacity.
[b] Ramps operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

Basketball Game Scenario

The proposed project under the Basketball Game scenario would result in a significant traffic impact at the I-80 westbound off-ramp at Harrison Street during the weekday evening peak hour (i.e., attendees driving to San Francisco from the East Bay). The proposed project would not contribute considerably to the other ramps currently operating at LOS E or LOS F (i.e., the I-80 eastbound on-ramp at Sterling Street during the weekday p.m. peak hour, the I-80 eastbound on-ramp at Fifth/Bryant during the weekday p.m., weekday evening, and Saturday evening peak hours, or the I-280 southbound on-ramp at Pennsylvania Street during the weekday p.m. peak hour), and therefore, traffic impacts at these freeway ramp locations would be less than significant.

Other Events

Ramp LOS operating conditions during other events at the project site would be similar to or better than described above for the Basketball Game scenario, which assessed the maximum attendance event for evening conditions and which would be representative of conditions for sell-out concert events. Intersection LOS operating conditions for daytime events during the weekday p.m. peak hour would be similar to or better than described above for the Convention Event scenario, which reflects the maximum impact during the weekday p.m. peak hour.

Overall, under existing plus project conditions without a SF Giants game at AT&T Park, the proposed project would result in *significant* project-specific impacts at the I-80 westbound off-ramp at Fifth/Harrison during the weekday evening.

No feasible mitigations are available for the freeway ramp impacts because there is insufficient physical space for additional capacity without redesign of the I-80 and I-280 ramps and mainline structures, which may require acquisition of additional right-of-way. Moreover, any changes to the ramps would require approval of Caltrans, which operates the freeways and ramps. Potential demand-oriented measures to that could be applied to improve operations at the I-80 westbound off-ramp at Fifth/Harrison would involve reducing the traffic volumes on westbound I-80 by increasing tolls on the San Francisco-Oakland Bay Bridge, or other means, such as mainline traffic metering at the toll plaza in Oakland. Ramp metering, however, would likely exacerbate congestion on streets leading to the on-ramp, while tolling would need to be implemented as a system-wide improvement in order to prevent concentration of vehicular traffic and increased congestion on non-tolled facilities. **Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts** would encourage non-auto modes of travel to the event center through parking pricing and enhance regional transit access to the area, which would reduce the project traffic increase on regional freeway mainline and ramps. However, the reduction in project-generated vehicle trips would not reduce impacts to less-than-significant levels. Thus, for these reasons, the proposed project's impacts related to freeway ramp operations would be *significant and unavoidable with mitigation.*

> **Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts** (see Impact TR-2, above)

Comparison of Impact TR-3 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR did not address traffic impacts on freeway ramp facilities as a distinct transportation topic. The significant and unavoidable project impact at the I-80 westbound off-ramp at Fifth/Harrison would be a *new significant* effect not identified in the Mission Bay FSEIR. As explained above, no feasible mitigation measures are available to avoid this impact. The impact is therefore *significant and unavoidable with mitigation.*

Impact TR-4: The proposed project would not result in a substantial increase in transit demand that could not be accommodated by adjacent Muni transit capacity such that significant adverse impacts to Muni transit service would occur under Existing plus Project conditions without a SF Giants game at AT&T Park. (Less than Significant)

Capacity Utilization. Table 5.2-40 presents the Muni route analysis and regional screenline analysis for the existing plus project conditions for weekday p.m. peak hour conditions for the No Event, Convention Event, and Basketball Game scenarios. **Table 5.2-41** presents the transit analysis for the weekday evening and weekday late evening peak hours for the Basketball Game scenario, while **Table 5.2-42** presents the transit analysis for the Saturday evening peak hour for the No Event and Basketball Game scenario. It should be noted that depending on the origin and destination of the transit trip, the majority of the transit trips arriving from outside of San Francisco would also be required to take a Muni line to their destination, and these trips were included in the transit analysis. **Table 5.2-43** presents the weekday p.m. peak hour downtown screenlines for the No Event and Basketball Event scenarios.

TABLE 5.2-40
TRANSIT ANALYSIS - EXISTING PLUS PROJECT CONDITIONS – WITHOUT A SF GIANTS GAME – WEEKDAY PM PEAK HOUR

	No Event Outbound			Convention Event outbound			Basketball Game outbound		
Route/Service Provider	**Ridership**	**Capacity**	**Capacity Utilization[a]**	**Ridership**	**Capacity**	**Capacity Utilization**	**Ridership**	**Capacity**	**Capacity Utilization**
San Francisco									
T Third[b]	2,467	3,808	64.8%	3,037	3,808	79.7%	2,441	3,808	64.1%
22 Fillmore[b]	714	942	75.8%	719	942	76.3%	696	942	73.9%
Total	3,181	4,750	67.0%	3,755	4,750	79.1%	3,137	4,750	66.0%
East Bay									
BART	20,160	21,220	95.0%	20,271	21,220	95.5%	20,159	21,220	95.0%
AC Transit	2,297	3,926	58.5%	2,309	3,926	58.8%	2,296	3,926	58.5%
Ferries	813	1,615	50.3%	817	1,615	50.6%	813	1,615	50.3%
Total	23,270	27,761	87.0%	23,398	27,761	87.4%	23,268	27,761	86.9%
North Bay									
Buses	1,399	2,817	49.6%	1,399	2,817	49.7%	1,399	2,817	49.6%
Ferries	976	1,959	49.8%	976	1,959	49.8%	976	1,959	49.8%
Total	2,374	4,776	49.7%	2,375	4,776	49.7%	2,374	4,776	49.7%
South Bay									
BART	8,720	16,963	51.4%	8,729	16,963	51.5%	8,720	16,963	51.4%
Caltrain	2,472	3,100	79.7%	2,498	3,100	80.6%	2,472	3,100	79.4%
SamTrans	147	320	45.9%	147	320	46.0%	147	320	45.9%
Total	11,339	20,383	55.6%	11,375	20,383	55.8%	11,339	20,383	55.6%

NOTES:

[a] For weekday p.m. peak hour conditions, capacity utilization exceeding 85 percent for Muni and 100 percent for regional transit highlighted in **bold.** Significant project impacts shaded.
[b] Ridership and capacity for the T Third and 22 Fillmore reflect implementation of the Central Subway and 22 Fillmore Transit Priority Project.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

TABLE 5.2-41
TRANSIT ANALYSIS - EXISTING PLUS PROJECT CONDITIONS – WITHOUT A SF GIANTS GAME – WEEKDAY EVENING AND LATE EVENING PEAK HOURS

	BASKETBALL GAME SCENARIO WEEKDAY EVENING INBOUND			BASKETBALL GAME SCENARIO WEEKDAY LATE EVENING OUTBOUND		
Route/Service Provider	**Ridership**	**Capacity**	**Capacity Utilization[a]**	**Ridership**	**Capacity**	**Capacity Utilization**
San Francisco						
T Third[b]	4,542	4,886	93.0%	3,763	5,046	74.6%
22 Fillmore[b]	281	628	44.7%	212	252	84.1%
Muni Special Event Shuttles	1,139	1,218	93.5%	942	978	96.3%
Total	5,962	6,732	88.6%	4,916	6,276	78.3%
East Bay						
BART	5,557	15,870	35.0%	5,869	6,095	96.3%
AC Transit	306	520	58.9%	168	200	84.2%
Ferries	101	576	17.5%	0	0	0%
Total	5,964	16,966	35.2%	6,038	6,295	85.9%
North Bay						
Buses	111	120	92.2%	51	80	63.8%
Ferries	468	1,357	34.5%	**918**	**637**	**144.1%**
Total	579	1,477	39.2%	**969**	**717**	**135.2%**
South Bay						
BART	3,980	18,400	21.6%	2,190	5,290	41.4%
Caltrain	**2,641**	**2,600**	**101.6%**	**902**	**650**	**138.8%**
SamTrans	44	160	27.3%	32	40	79.0%
Total	6,664	21,160	31.5%	3,124	5,980	52.2%

NOTES:

[a] For pre-event and post-event conditions, capacity utilization exceeding 100 percent highlighted in **bold.** Significant project impacts shaded.

[b] Ridership and capacity for the T Third and 22 Fillmore reflect implementation of the Central Subway and 22 Fillmore Transit Priority Project.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

TABLE 5.2-42
TRANSIT ANALYSIS - EXISTING PLUS PROJECT CONDITIONS – WITHOUT A SF GIANTS GAME – SATURDAY EVENING PEAK HOURS

	No Event Inbound			Basketball Game Inbound		
Route/Service Provider	**Ridership**	**Capacity**	**Capacity Utilization[a]**	**Ridership**	**Capacity**	**Capacity Utilization**
San Francisco						
T Third[b]	508	1,714	29.6%	3,130	4,332	72.3%
22 Fillmore[b]	317	378	84.0%	257	378	67.9%
Muni Special Event Shuttles	0	0	0%	1,004	1,372	73.2%
Total	825	2,092	39.4%	4,391	6,082	72.2%
East Bay						
BART	2,399	8,740	27.4%	3,968	8,740	45.4%
AC Transit	52	200	25.9%	88	200	43.9%
Ferries	0	0	0%	0	0	0%
Total	2,451	8,940	27.4%	4,056	8,940	45.4%
North Bay						
Buses	80	137	58.6%	115	137	84.0%
Ferries	826	1,594	51.8%	1,186	1,594	74.4%
Total	906	1,731	52.4%	1,301	1,731	75.2%
South Bay						
BART	2,136	11,925	19.5%	2,339	10,925	21.4%
Caltrain	694	1,300	53.4%	**1,307**	**1,300**	**100.5%**
SamTrans	20	80	25.4%	29	80	36.4%
Total	2,850	12,305	23.2%	3,675	12,305	29.9%

NOTE:

[a] For No Event scenario, capacity utilization exceeding 85 percent for Muni and 100 percent for regional transit highlighted in **bold.** For pre-event conditions, capacity utilization exceeding 100 percent highlighted in **bold.** Significant project impacts shaded.

[b] Ridership and capacity for the T Third and 22 Fillmore reflect implementation of the Central Subway and 22 Fillmore Transit Priority Project.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

TABLE 5.2-43
MUNI DOWNTOWN TRANSIT SCREENLINES – EXISTING PLUS PROJECT - NO EVENT AND CONVENTION EVENT SCENARIOS - WEEKDAY P.M. PEAK HOUR

Screenline/Transit Provider[a]		Existing Ridership	Project Trips	Existing plus Project Ridership	Existing Capacity	Capacity Utilization
No Event						
Northeast	Kearny/Stockton Corridor	2,157	35	2,192	3,291	66.6%
	All Other Lines	570	9	579	1,078	53.7%
	Subtotal	*2,728*	*45*	*2,772*	*4,369*	*63.4%*
Northwest	Geary Corridor	1,814	26	1,840	2,526	72.8%
	California	1,366	20	1,386	1,686	82.2%
	Sutter/Clement	470	7	477	630	75.7%
	Fulton/Hayes	965	14	979	1,176	83.2%
	Balboa	637	9	646	929	69.6%
	Subtotal	*5,252*	*76*	*5,328*	*6,949*	*76.7%*
Southeast	Third Street	550	23	573	714	80.2%
	Mission Street	1,529	63	1,592	2,789	57.1%
	San Bruno/Bayshore	1,320	54	1,374	2,134	*64.4%*
	All Other Lines	1,034	42	1,076	1,712	62.9%
	Subtotal	*4,433*	*182*	*4,615*	*7,349*	*62.8%*
Southwest	Subway Lines	4,747	41	4,788	6,294	*76.1%*
	Haight/Noriega	1,105	9	1,114	1,651	67.5%
	All Other Lines	276	2	278	700	39.8%
	Subtotal	*6,128*	*52*	*6,180*	*8,645*	*71.5%*
	Total All Muni Screenlines	***18,541***	***355***	***18,895***	***27,312***	***69.2%***
Convention Event						
Northeast	Kearny/Stockton Corridor	2,158	198	2,357	3,291	71.6%
	All Other Lines	570	52	622	1,078	57.7%
	Subtotal	*2,728*	*251*	*2,979*	*4,369*	*68.2%*
Northwest	Geary Corridor	1,814	28	1,842	2,526	72.8%
	California	1,366	21	1,387	1,686	82.3%
	Sutter/Clement	470	7	477	630	75.8%
	Fulton/Hayes	965	15	980	1,176	83.3%
	Balboa	637	10	647	929	69.6%
	Subtotal	*5,252*	*82*	*5,334*	*6,949*	*76.8%*
Southeast	Third Street	550	21	571	714	80.2%
	Mission Street	1,529	58	1,587	2,789	56.9%
	San Bruno/Bayshore	1,320	50	1,370	2,134	*64.2%*
	All Other Lines	1,034	39	1,073	1,712	62.7%
	Subtotal	*4,433*	*169*	*4,602*	*7,349*	*62.6%*
Southwest	Subway Lines	4,747	54	4,801	6,294	*76.3%*
	Haight/Noriega	1,105	13	1,118	1,651	67.7%
	All Other Lines	276	3	279	700	39.9%
	Subtotal	*6,128*	*70*	*6,198*	*8,645*	*71.7%*
	Total All Muni Screenlines	***18,541***	***572***	***19,112***	***27,312***	***70.0%***

NOTE:
[a] Muni downtown screenlines reflect outbound trips from downtown San Francisco.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

No Event Scenario

Under the No Event scenario (i.e., the office, retail and restaurant uses), the proposed project would generate 881 new transit trips (157 inbound and 724 outbound) during the weekday p.m. peak hour. These new transit trips would utilize the nearby Muni lines and regional transit lines, and would include transfers to other Muni bus and light rail lines, or other regional transit providers. Based on the location of the project site and the anticipated origin/destination of the new employees and visitors to the office, retail and restaurant uses, the transit trips were assigned to Muni and the various regional transit operators.

Table 5.2-40 presents the transit analysis for the T Third light rail line and 22 Fillmore routes serving the project site, as well as the three regional screenlines for the weekday p.m. peak hour. **Table 5.2-42** presents the transit analysis for the Saturday evening peak hour, which typically has less transit capacity than during the weekday p.m. peak hour. During both the weekday p.m. and Saturday evening peak hours, the project-generated trips assigned to the T Third line and 22 Fillmore route would be accommodated during the weekday p.m. and Saturday evening peak hours without exceeding the 85 percent capacity utilization standard.

Table 5.2-43 presents the results of the Muni screenline analysis for the existing plus project conditions for weekday p.m. peak hour conditions for the No Event scenario. Based on the trip distribution patterns, it was estimated that out of the 724 outbound transit trips, about 355 would cross the Muni screenlines, 325 would cross the regional screenlines, and the remaining 44 would not cross any screenlines (i.e., would travel within the downtown area). The analysis of Muni screenlines assesses the effect of project-generated transit-trips on transit conditions in the <u>outbound</u> direction from downtown (and away from the project site) during the weekday p.m. peak hour. Based on the origins/destinations of the transit trips generated by the proposed project, the outbound transit trips within San Francisco were assigned to the four screenlines and the sub-corridors within each screenline. Overall, the addition of the project-generated riders to the four screenlines would not substantially increase the peak hour capacity utilization. Capacity utilization for all screenlines and corridors would remain similar to those under existing conditions, and below the capacity utilization standard of 85 percent.

Convention Event Scenario

During the weekday p.m. peak hour, the Convention Event scenario would generate 1,524 new transit trips (212 inbound and 1,312 outbound). **Table 5.2-40** presents the transit analysis for the T Third light rail line and the 22 Fillmore bus route serving the project site. During the weekday p.m. peak hour, the Convention Event Scenario would generate more outbound transit trips than the No Event scenario, with the majority of the increase using the T Third line. As indicated in **Table 5.2-40**, with the addition of the new transit trips associated with the Convention Event scenario, both the T Third line and 22 Fillmore route would continue to operate at less than the 85 percent capacity utilization standard.

Table 5.2-43 presents the Muni screenline analysis for the Convention Event scenario for weekday p.m. peak hour conditions. Based on the trip distribution patterns, it was estimated that out of the 1,312 outbound transit trips, about 572 would cross the Muni screenlines, 490 would cross the regional screenlines, and the remaining 250 would not cross any screenlines (i.e., would travel within the downtown area). Overall, the addition of the project-generated riders to the four screenlines would not substantially increase the peak hour capacity utilization. Capacity utilization for all screenlines and corridors would remain similar to those under Existing conditions, and below the capacity utilization standard of 85 percent.

Basketball Game Scenario

Capacity Utilization. As indicated in Section 5.2.5.2, in addition to the existing scheduled transit service in the project vicinity, the SFMTA would provide additional service to accommodate peak evening events, including basketball games and concerts with more than 14,000 attendees (see **Table 5.2-15** for the proposed frequencies). Light rail service on the T Third would be increased, and three Muni Special Event Shuttle routes would be implemented. The additional capacity that would be provided during the pre-event and post-event periods was incorporated into the transit analysis presented on **Table 5.2-41** for weekday evening (inbound to the project site) and weekday late evening (outbound from the project site) peak hours, and on **Table 5.2-42** for the Saturday evening peak hour (inbound towards the project site).

- During the weekday p.m. peak hour, the Basketball Game scenario would generate 1,625 new transit trips (944 inbound and 681 outbound). As indicated in **Table 5.2-40**, the additional outbound trips would be accommodated on the T Third line and 22 Fillmore.

- During the weekday evening peak hour, the Basketball Game scenario would generate 4,371 new transit trips (4,138 inbound and 232 outbound). About 64 percent of the inbound transit demand would be on the T Third (2,663 trips), about 28 percent on the Muni Special Event Shuttles (1,139 trips), 8 percent would walk from Caltrain (305 trips), and 1 percent would take the 22 Fillmore route (32 trips). As shown on **Table 5.22-41,** the additional trips would be accommodated within the available capacity. The Muni Special Event Shuttles would operate at about 94 percent, which would be below the 100 percent capacity utilization standard for event conditions.

- During the weekday late evening peak hour, the Basketball Game scenario would generate 4,680 new outbound transit trips. About 67 percent of the outbound transit demand would be on the T Third (3,157 trips), about 24 percent on the Muni Special Event Shuttles (1,133 trips), 8 percent would walk to Caltrain (359 trips), and 1 percent would take the 22 Fillmore route (31 trips). As presented in **Table 5.2-41,** the additional trips generated by the project would be accommodated within the proposed transit service plan.

- During the Saturday evening peak hour, the Basketball Game scenario would generate 4,310 new vehicle trips (4,134 inbound and 176 outbound). About 63 percent of the inbound transit demand would be on the T Third (2,611 trips), about 29 percent on the Muni Special Event Shuttles (1,188 trips), 7 percent would walk from Caltrain (308 trips), and 1 percent would take the 22 Fillmore route (27 trips). As presented in **Table 5.2-42,** the additional trips generated by the proposed project would be accommodated within the proposed transit service plan capacities.

Overall, the proposed Muni Special Event Transit Service Plan developed for large events would accommodate transit riders destined to and from the proposed event center during the weekday p.m., weekday evening, weekday late evening, and Saturday evening peak hour, and therefore, proposed project impacts on transit capacity would be less than significant.

Light Rail Platform Operations Assessment. During pre-event and post-event periods, when surges of Muni Metro riders generated by a high attendance event would be arriving or departing the UCSF/Mission Bay station at South Street, there is the potential for crowding to occur on the two raised platforms, northbound and southbound. Such crowding on the Muni platforms, if it were to occur, would be considered a significant transit impact. Therefore, an assessment of conditions at both platforms at the UCSF/Mission Bay Muni Metro station was conducted for event conditions. Overall, it was determined that the proposed project's impacts on light rail platform conditions would be less than significant.

- **Pre-event Operations.** The assessment of pre-event conditions was conducted by comparing the available effective platform area to the pedestrian density required to accommodate passengers within acceptable conditions during pre-event conditions. The methodology used in the analysis was developed by the Transportation Research Board, and is presented in the platform and waiting areas section of Chapter 10 of the *TCRP Transit Capacity and Quality of Service Manual*.[47] See **Appendix TR** for information on methodology and calculations.

  The majority of attendees taking Muni's T Third Metro line to the project site would travel from downtown and would exit the train at the southbound platform, located in the median of Third Street, immediately south of South Street; they would then proceed down the ramp towards the south crosswalk to cross Third Street and arrive at the project site. Thus, the assessment looked at whether passengers exiting a Muni train and having to stop at the crosswalk for a red signal immediately after their arrival could be accommodated within the available area on the ramp and platform. The Muni Metro southbound rail platform is about 9 feet wide and 160 feet in length, and the ramp is about 4 feet wide and 50 feet in length. Combined, accounting for obstacles and a waiting area buffer (i.e., the buffer zone at the east edge of the platform adjacent to the tracks; a fence is provided at the west edge of the platform), the effective area available to disembarking transit riders to queue would be about 950 square feet. The area required to accommodate the maximum passenger demand arriving on a Muni Metro train (i.e., a two-car train) that would serve the platform was estimated based on the capacity of a full two-car train, plus some additional passengers waiting at the platform for the southbound train (i.e., a total of about 250 passengers). The total number of passengers was then multiplied by the passenger density standard (square feet per passenger) established by the TCRP for queuing area expected to operate at a LOS D. The typical design LOS used for station platforms is LOS C to LOS D, and LOS D is considered an acceptable level of crowding during short periods (e.g., to be reached while passengers move away from the platform, but not for the 10- to 15-minute period while waiting for the next train to arrive), and would be considered acceptable for event conditions. The minimum queuing space required to accommodate the expected number of exiting passengers from a full two-car train is about 750 square feet. Therefore, the existing southbound platform, which has approximately 950 square feet, would be able accommodate the expected demand project at LOS D or better conditions. In the event that a following Muni Metro train arrives at the platform while train riders are still queued on the ramp and/or platform waiting to cross Third Street, per standard operating practice, the train operator would not to open the doors until the queue would be cleared from the ramp. The proposed project's TMP includes PCOs that would be

[47] *TCRP Report 165. Transit Capacity and Quality of Service Manual, Third Edition*, Chapter 10: Station Capacity. Available online at http://www.trb.org/Main/Blurbs/169437.aspx. Accessed May 28, 2015.

stationed at the entrances to the light rail platforms on South Street to facilitate pedestrian crossings, and to minimize conflicts between pedestrians, light rail, and southbound vehicular traffic. Nevertheless, **Improvement Measure I-TR-4: Operational Study of the Southbound Platform at the T Third UCSF/Mission Bay Station**, presented below, is identified to further reduce the proposed project's less than significant impacts related to potential crowding conditions at the platform. This measure would study the feasibility and efficacy of enlarging the southbound platform by extending it south towards 16th Street in order to provide additional queuing area for passengers on the platform.

- **Post-event Operations.** As described above in Section 5.2.5.2, as part of the proposed project, the elevated northbound passenger platform at the UCSF/Mission Bay T Third line stop would be extended to the north of South Street. The existing northbound platform located in the median of Third Street immediately north of South Street would be extended to the north from 160 feet in length to 320 feet in length. This extension would allow for two, two-car light rail trains to simultaneously board or alight passengers along the platform prior to or following a large event at the project site. Passenger access to the expanded northbound platform would continue to be provided from a single point, the end of the platform closest to South Street. The existing painted median area adjacent to the northbound track between South and 16th Streets would be raised 6 inches. This improvement would allow for staging of two, two-car northbound light rail trains.

  Following an event, northbound Third Street would be closed to vehicular traffic between 16th Street and Mission Bay Boulevard South. As noted above, PCOs would also be stationed at the entrances to the light rail platforms on South Street to facilitate pedestrian crossings, and to minimize conflicts between pedestrians, light rail, and southbound vehicular traffic. PCOs would stage passengers at a defined passenger waiting area within the closed portion of Third Street, and would allow them to enter the northbound platform as soon as a train departs until the platform becomes reasonably full. Passenger loading onto the trains would be monitored by SFMTA Transit Fare Inspectors and Passenger Assistance Program Staff, who would be stationed at the light rail platforms. This technique is currently employed at AT&T Park following SF Giants games to ensure that no overcrowding of transit riders occurs near the train tracks, and would be effective following events at the proposed project site. For these reasons, the platforms would not become too crowded.

Other Events

Transit conditions during other events at the project site would be similar to or better than described above for the Basketball Game scenario which assessed the maximum attendance event for evening conditions, and which would also be representative of conditions for sell-out concert events. The proposed Muni Special Event Transit Service Plan would be provided for other large events (i.e., with more than 14,000 attendees), and the service levels of the additional service would be adjusted to reflect the anticipated attendance level.

Summary of Impact TR-4, Muni Transit Impacts

Overall, the proposed Muni Special Event Transit Service Plan developed for large events would accommodate transit riders destined to and from the proposed event center during the weekday p.m., weekday evening, weekday late evening, and Saturday evening peak hours. In addition, with implementation of the TMP, operations at the T Third light rail platforms would not become overcrowded during events. For these reasons, the proposed project's impacts on transit would be *less than significant.*

Mitigation: Not required

While the proposed project's transit impacts would be less than significant, the following improvement measure may be recommended for consideration by City decision makers to further reduce the proposed project's less-than-significant transit impacts.

Improvement Measure I-TR-4: Operational Study of the Southbound Platform at the T Third UCSF/Mission Bay Station

As an improvement measure to enhance T Third operations at the UCSF/Mission Bay station for pre-event arrivals, the project sponsor shall fund a study of the effects of pedestrian flows on Muni's safety and operations prior to an event as well as the feasibility and efficacy of enlarging the southbound platform by extending it south towards 16th Street. The study shall include an assessment of exiting pedestrian flows from a fully occupied two-car light rail train on the platform and ramp to the crosswalk at South Street across Third Street, also taking into consideration the presence of non-event transit riders waiting to board the train, service frequency, and current traffic signal operations. The study shall be performed by a qualified transportation professional approved by SFMTA.

Implementation of **Improvement Measure I-TR-4: Operational Study of the Southbound Platform at the T Third UCSF/Mission Bay Station** would study the need for and feasibility of physical improvements to the existing light rail platform, and would not result in any secondary transportation-related impacts.

Comparison of Impact TR-4 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR did not identify any significant impacts related to transit within Mission Bay, and did not require any mitigation measures. Consequently, no new or different mitigation measures or alternatives to reduce project impacts related to transit impacts are identified or required with respect to the currently proposed project. On the basis of the facts discussed above, the project would result in no new or substantially more severe significant effects than those identified in the Mission Bay FSEIR related to transit impacts.

Impact TR-5: The proposed project would result in a substantial increase in transit demand that could not be accommodated by regional transit capacity such that significant adverse impacts to regional transit service would occur under Existing plus Project conditions without a SF Giants game at AT&T Park. (Significant and Unavoidable with Mitigation)

Table 5.2-40 above presents the regional screenline analysis for the existing plus project conditions for weekday p.m. peak hour conditions for the No Event, Convention Event, and Basketball Game scenarios. **Table 5.2-41** above presents the regional screenline analysis for the weekday evening and weekday late evening peak hours for the Basketball Game scenario, while **Table 5.2-42** above presents the regional screenline analysis for the Saturday evening peak hour for the No Event and Basketball Game scenario.

No Event Scenario

Similar to the Muni screenline analysis presented in Impact TR-4, the analysis of regional transit screenlines assess the effect of project-generated transit-trips on transit conditions in the outbound direction during the weekday p.m. peak hour. Under the No Event scenario, the proposed project would generate 349 new transit trips (24 inbound and 325 outbound) during the weekday p.m. peak hour and 163 new transit trips (41 inbound and 122 outbound) during the Saturday evening peak hour. Of the 325 outbound trips during the weekday p.m. peak hour, 218 would be destined to the East Bay, 17 to the North Bay, and 90 to the South Bay. Of the 41 inbound trips during the Saturday evening peak hour, 35 would be arriving from the East Bay and 6 from the South Bay. **Table 5.2-40** presents the existing plus project screenline analysis for the regional transit carriers for the weekday p.m. peak hour, while **Table 5.2-42** presents the analysis for the Saturday evening peak hour. In general, the additional project-related passengers would not have a substantial effect on the regional transit providers during the analysis hours, as the capacity utilization for all screenlines would remain similar to those under existing conditions. In addition, the capacity utilization for all regional transit providers would be under their capacity utilization standards of 100 percent.

Convention Event Scenario

During the weekday p.m. peak hour, the Convention Event scenario would generate 545 new transit trips (56 inbound and 489 outbound) to and from outside of San Francisco. Based on the trip distribution patterns, it was estimated that during the weekday p.m. peak hour there would be 346 transit trips destined to the East Bay, 18 transit trips to the North Bay, and 126 transit trips to the South Bay. **Table 5.2-40** presents the existing plus project screenline analysis for the regional transit carriers. In general, the addition of the 489 project-related passengers would not have a substantial effect on the regional transit providers during the weekday p.m. peak hour, as the capacity utilization for all screenlines would remain similar to those under existing conditions. In addition, the capacity utilization for all regional transit providers would be under their capacity utilization standards of 100 percent.

Basketball Game Scenario

The proposed project's TMP does not include any provisions for additional regional transit service during events at the project site. Therefore, the regional screenline analysis conducted for the project assumes existing capacities, as identified by the regional transit service providers.

- During the weekday p.m. peak hour, the Basketball Game scenario would add 324 outbound trips to the regional screenlines. As indicated in **Table 5.2-40** above, the additional outbound trips would not substantially affect the capacity utilization of the regional service providers.

- During the weekday evening peak hour, the Basketball Game scenario would add 2,697 new transit trips to the regional screenlines (i.e., about 59 percent destined to the East Bay, 11 percent to the North Bay, and 30 percent to the South Bay). While the majority of trips would be from the East Bay, the additional trips on Caltrain would increase the capacity utilization to more than 100 percent, and this would be considered a significant impact. See **Table 5.2-41,** above.

- During the weekday late evening peak hour, the Basketball Game scenario would add about 5,496 new outbound transit trips to the regional screenlines (i.e., about 57 percent destined to the East Bay, 14 percent to the North Bay, and 29 percent to the South Bay). As presented in **Table 5.2-41** above, this additional demand would exceed the capacity of the existing service provided on the Golden Gate Transit and WETA buses and ferries to the North Bay, and on Caltrain to the South Bay, and this would be considered a significant impact.

- During the Saturday evening peak hour, the Basketball Game scenario would add about 2,867 new inbound transit trips to the regional screenlines (i.e., about 57 percent from the East Bay, 14 percent from the North Bay, and 29 percent from the South Bay). As presented in **Table 5.2-42** above, this additional demand would exceed the capacity of the existing service provided on Caltrain from the South Bay, and this would be considered a significant impact.

Other Events

Conditions for the regional transit operators during other events at the project site would be similar to or better than described above for the Basketball Game scenario, which assessed the maximum attendance event for evening conditions, and which would also be representative of conditions for sell-out concert events.

Summary of Impact TR-5, Regional Transit Impacts

Overall, under existing plus project conditions without a SF Giants game at AT&T Park, the proposed project would result in *significant* project-specific regional transit impacts, as follows:

- On Caltrain to and from the South Bay during the weekday evening, weekday late evening, and Saturday evening peak hours for the Basketball Game scenario.

- On WETA and Golden Gate Transit service to the North Bay during the weekday late evening peak hours.

In order to accommodate the additional transit demand to the South Bay during weekday and Saturday evening conditions, one additional train car (average capacity of 130 passengers per car) on at least one inbound train per hour would be needed. For the weekday late evening period, two additional train cars (average capacity of 130 passengers per car) on at least one outbound train per hour would be needed. Alternatively, the transit demand could be accommodated within one special outbound train (total capacity up to 650 passengers) at the end of the basketball game, similar to the service currently being offered for SF Giants home games (two special outbound trains).

In order to accommodate the additional transit demand to the North Bay, four additional Golden Gate Transit buses (40 passengers per bus) plus one ferry boat (250 to 320 passengers per boat) per hour, or alternatively seven additional buses per hour would need to be provided.

Implementation of **Mitigation Measure M-TR-5a: Additional Caltrain Service** and **Mitigation Measure M-TR-5b: Additional North Bay Ferry and/or Bus Service** would reduce or minimize the severity of the capacity utilization exceedances for the regional transit service providers, and would not result in secondary transportation impacts. However, since the provision of additional

South Bay and North Bay service is uncertain and full funding for the service has not yet been identified, implementation of both mitigation measures remain uncertain. Accordingly, the proposed project's significant impacts to Caltrain, Golden Gate Transit and WETA transit capacity would remain *significant and unavoidable with mitigation.*

Mitigation Measure M-TR-5a: Additional Caltrain Service

As a mitigation measure to accommodate transit demand to and from the South Bay for weekday and weekend evening events, the project sponsor shall work with the Ballpark/Mission Bay Transportation Coordinating Committee to coordinate with Caltrain to provide additional Caltrain service to and from San Francisco on weekdays and weekends. The need for additional service shall be based on surveys of event center attendees conducted as part of the TMP.

Mitigation Measure M-TR-5b: Additional North Bay Ferry and/or Bus Service

As a mitigation measure to accommodate transit demand to the North Bay following weekday and weekend evening events, the project sponsor shall work with the Ballpark/Mission Bay Transportation Coordinating Committee to coordinate with Golden Gate Transit and WETA to provide additional ferry and/or bus service from San Francisco following weekday and weekend evening events. The need for additional service shall be based on surveys of event center attendees conducted as part of the TMP.

Comparison of Impact TR-5 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR did not identify any significant regional transit impacts for existing plus project conditions, and did not require any mitigation measures. Because the proposed project would result in significant impacts to Caltrain, Golden Gate Transit, and WETA transit capacity, the project would result in *new significant* impacts not previously identified in the Mission Bay FSEIR.

Pedestrian Impacts

Impact TR-6: The proposed project could result in a substantial overcrowding on public sidewalks, or create potentially hazardous conditions for pedestrians, or otherwise interfere with pedestrian accessibility on the site and adjoining areas under Existing plus Project conditions without a SF Giants game at AT&T Park. (Less than Significant with Mitigation)

Pedestrian Improvements

The proposed project includes numerous sidewalk network and traffic control improvements that would improve and define the pedestrian environment adjacent to the project site. Specifically, the proposed project includes construction of new sidewalks along the perimeter of the project site on South Street (12.5 feet wide), on Terry A. Francois Boulevard (12.5 feet wide), on 16th Street (15 feet wide), and widening of the existing sidewalk on Third Street from 12 to 16 feet. A 20-foot wide setback would generally be provided along the 16th Street frontage, and a 5-foot wide setback would be provided for buildings fronting South Street, Third Street, and

Terry A. Francois Boulevard. These setbacks, as well as additional ground floor building setbacks on all four corners as shown on **Figure 3-5** in the Project Description, and additional midblock queuing area on 16th Street in the vicinity of the proposed Muni Special Event Van Ness Avenue Shuttle stop (see **Appendix TR**), would allow for additional queuing space at the corners for pedestrians waiting to cross the street and for pedestrians waiting to load onto shuttle buses on 16th Street.

Additional project pedestrian improvements include signalization of the intersections of Terry A. Francois Boulevard/16th Street, Terry A. Francois Boulevard/South Street, and Illinois Street/Mariposa Street, including installation of pedestrian countdown signals. New pedestrian crosswalks, consistent with the continental design recommendations in the *Better Streets Plan*, would be installed at the intersections of Bridgeview Way/South Street, Terry A. Francois Boulevard/South Street, Terry A. Francois Boulevard/16th Street, Illinois Street/16th Street, Terry A. Francois Boulevard/16th Street, and Illinois/Mariposa. In addition, the existing crosswalks at the signalized intersections of Third Street/South Street and Third Street/16th Street would be restriped to the continental design.

As part of the light rail station improvements that would be made as part of the proposed project, fencing would be placed adjacent to the light rail tracks in such a manner as to discourage pedestrian crossings midblock between the intersection of Campus Way with southbound Third Street and the event center on the east side of the street, directly across from Campus Way. The exact location of the fencing (i.e., either the east side or west side of the light rail tracks) and the configuration of the fencing have not been identified.

Pedestrian Access

Figure 3-14 in Chapter 3 presents the proposed pedestrian circulation at the project site. Pedestrian access to the project site uses, including buildings and plazas, would be available from multiple locations along all four perimeter streets. Within the project site, a 40-foot wide curving pedestrian path would lead from the elevated Third Street Plaza around the north and east sides of the event center, past retail uses and a proposed bayfront overlook, and terminate on the southeast side of the event center. An outdoor, glass covered passageway would extend from ground level on 16th Street curving around the southwest side of the event center to the Third Street Plaza.

The primary pedestrian access to the event center for large-attendance events would be on the northwest side of the event center via the elevated Third Street Plaza. A secondary access point to the event center for large-attendance events would be on the southeast side of the event center via the elevated pedestrian path. The primary pedestrian access to the event center for smaller-attendance events would be at the ground-level theater entrance on the southeast side of the event center, via the Southeast Plaza. As noted above, ground floor building setbacks would be provided on all four corners of the project site to allow for additional queuing space at the corners.

Pedestrian access to the two office and retail building lobbies and the ground-floor retail/restaurant uses would be from South and 16th Streets and from the Third Street Plaza. The food hall in the northeast corner of the site would be accessed directly via Terry A. Francois Boulevard and South Street, and also from the elevated pedestrian path within the project site.

Pedestrian Demand

Pedestrians trips generated by the proposed project would include walk trips to and from the project site, walk trips to and from transit stops (e.g., the Caltrain station at Fourth/King and Muni bus and light rail transit stops), and walk trips between the project site and nearby parking facilities. As noted above, pedestrians would access the buildings on the project site from multiple streets, with the greatest proportion of pedestrians traveling through the intersection of Third/South.

- No Event – During the weekday p.m. peak hour, the No Event scenario would add about 1,452 new pedestrian trips to the surrounding streets, which includes 882 person trips to and from nearby transit stops and 570 walk/other trips. During the Saturday evening peak hour, the No Event scenario would add about 1,423 new pedestrian trips to the surrounding streets, which includes 673 person trips to and from nearby transit stops and 750 walk/other trips.
- Convention Event – During the weekday p.m. peak hour, the Convention Event scenario would add about 4,396 new pedestrian trips to the surrounding streets, which includes 1,524 person trips to and from nearby transit stops, 774 person trips to and from nearby parking facilities and 2,098 walk/other trips. The Convention Event scenario would add the greatest number of pedestrian trips to the adjacent street network during the weekday p.m. peak hour (i.e., attendees leaving the convention event during the weekday p.m. peak hour).
- Basketball Game – During the weekday p.m. peak hour, the Basketball Game scenario would add about 3,531 new pedestrian trips to the surrounding streets, which includes 1,625 person trips to and from nearby transit stops, 1,316 person trips to and from nearby parking facilities and 590 walk/other trips.

  During the weekday evening peak hour (i.e., per-game), the Basketball Game scenario would add about 10,976 new pedestrian trips to the surrounding streets, which includes 4,371 person trips to and from nearby transit stops, 5,237 person trips to and from nearby parking facilities, and 1,368 walk/other trips. During the weekday late evening peak hour (i.e., post-game), the Basketball Game scenario would add about 11,762 new pedestrian trips to the surrounding streets, which includes 4,680 person trips to and from nearby transit stops, 5,824 person trips to and from nearby parking facilities and 1,258 walk/other trips.

  During the Saturday evening peak hour (i.e., pre-game), the Basketball Game scenario would add about 10,800 new pedestrian trips to the surrounding streets, which includes 4,310 person trips to and from nearby transit stops, 5,809 person trips to and from nearby parking facilities and 681 walk/other trips.

The new pedestrian peak hour trips were distributed to the streets in the project vicinity based on the location of the transit/event shuttle stops, location of parking facilities (for event scenarios when associated parking demand would not be accommodated within the on-site garage), and nearby attractions. The resulting project-generated pedestrian trips were then added to the existing sidewalk and crosswalk volumes (i.e., as described in Section 5.2.3.3, the existing pedestrian volumes counted in 2014 were adjusted to reflect to reflect the recent completion of the UCSF Medical Center Phase 1 and Public Safety Building projects) to determine the existing plus project pedestrian volumes at the study locations.

Pedestrian LOS at Crosswalks and Sidewalks

Table 5.2-44 presents the existing plus project pedestrian LOS conditions for the weekday p.m. peak hour for the three analysis scenarios. **Table 5.2-45** presents the existing plus project pedestrian LOS for the weekday evening and late evening conditions for the Basketball Game scenario, while **Table 5.2-46** presents the pedestrian LOS for Saturday evening No Event and Basketball Game scenarios.

TABLE 5.2-44
PEDESTRIAN LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITHOUT A SF GIANTS GAME - WEEKDAY PM PEAK HOUR

			Existing plus Project					
	Existing		No Event		Convention Event		Basketball Game	
Analysis Location	**MOE[a]**	**LOS[b]**	**MOE**	**LOS**	**MOE**	**LOS**	**MOE**	**LOS**
Crosswalks								
Third St/South St								
North	472	A	198	A	76	A	194	A
South	216	A	48	B	25	C	17	D
East	1,093	A	95	A	27	C	52	B
Third St/16th St								
North	868	A	104	A	44	B	69	A
South	432	A	214	A	122	A	63	A
East	1,338	A	239	A	73	A	124	A
West	424	A	251	A	156	A	85	A
Terry A. Francois Blvd/South St								
North	--	--	529	A	102	A	126	A
South	--	--	676	A	121	A	73	A
West	--	--	728	A	62	A	96	A
Sidewalks								
Third St between South & 16th Streets								
East	0.2	A	0.6	B	1.7	B	0.7	B
West	0.2	A	0.3	A	0.5	A	0.3	A
South Street – South Side	--	--	0.6	B	1.9	B	0.8	B
16th Street – North Side	--	--	0.5	B	1.7	B	0.8	B

NOTES:
[a] MOE – Measure of Effectiveness. Circulation area measured in average square feet per pedestrian for crosswalk analysis, and pedestrian unit flow measured in average pedestrians per minute per foot for sidewalk analysis.
[b] Crosswalks operating at LOS E or LOS F highlighted in **bold.**

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

TABLE 5.2-45
PEDESTRIAN LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITHOUT A SF GIANTS GAME - WEEKDAY EVENING AND LATE EVENING PEAK HOURS

	Evening				Late Evening			
	Existing		Existing plus Project - Basketball Game		Existing		Existing plus Project - Basketball Game	
Analysis Location	**MOE**[a]	**LOS**[b]	**MOE**	**LOS**	**MOE**	**LOS**	**MOE**	**LOS**
Crosswalks								
Third St/South St[c]								
North	793	A	**10**	**E**	--	--	**4**	**F**
South	313	A	**3**	**F**	--	--	**5**	**F**
East	2,333	A	19	D	--	--	**10**	**E**
Third St/16th St[c]								
North	1,131	A	41	B	--	--	30	C
South	618	A	39	C	--	--	33	C
East	2,180	A	29	C	--	--	51	B
West	564	A	59	B	--	--	76	A
Terry A. Francois Blvd/South St[c]								
North	--	--	36	C	--	--	33	C
South	--	--	18	D	--	--	16	D
West	--	--	24	D	--	--	21	D
Sidewalks								
Third St between South & 16th Streets								
East	0.1	A	1.4	B	--	--	1.8	B
West	0.2	A	0.5	A	--	--	0.7	B
South Street – South Side	--	--	1.7	B	--	--	2.3	B
16th Street – North Side	--	--	2.0	B	--	--	1.9	B

NOTES:
a MOE – Measure of Effectiveness. Circulation area measured in average square feet per pedestrian for crosswalk analysis, and pedestrian unit flow measured in average pedestrians per minute per foot for sidewalk analysis.
b Crosswalks operating at LOS E or LOS F highlighted in **bold.** Significant project impacts shaded.
c Under the Basketball Game scenario, a PCO would be stationed at this study intersection during the pre-event and post-event periods, and, as necessary, would manually direct vehicles, pedestrians, transit, and bicyclists through the intersection. LOS reflects conditions without PCO intervention.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

TABLE 5.2-46
PEDESTRIAN LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITHOUT A SF GIANTS GAME – SATURDAY EVENING PEAK HOUR

			Existing plus Project			
	Existing		No Event		Basketball Game	
Analysis Location	**MOE[a]**	**LOS[b]**	**MOE**	**LOS**	**MOE**	**LOS**
Crosswalks						
Third St/South St[c]						
North	1,285	A	237	A	**11**	**E**
South	875	A	66	A	**3**	**F**
East	1,909	A	62	A	21	D
Third St/16th St[c]						
North	2,024	A	115	A	40	C
South	896	A	194	A	34	C
East	3,079	A	124	A	20	D
West	1,424	A	225	A	40	B
Terry A. Francois Blvd/South St[c]						
North	--	--	532	A	34	C
South	--	--	745	A	16	D
West	--	--	732	A	22	D
Sidewalks						
Third St between South & 16th Streets						
East	0.1	A	0.6	B	0.9	B
West	0.1	A	0.2	A	0.3	A
South Street – South Side	--	--	0.7	B	1.2	B
16th Street – North Side	--	--	0.6	B	1.5	B

NOTES:
a MOE – Measure of Effectiveness. Circulation area measured in average square feet per pedestrian for crosswalk analysis, and pedestrian unit flow measured in average pedestrians per minute per foot for sidewalk analysis.
b Crosswalks operating at LOS E or LOS F highlighted in **bold**. Significant project impacts shaded.
c Under the Basketball Game scenario, a PCO would be stationed at this study intersection during the Saturday pre-event period, and, as necessary, would manually direct vehicles, pedestrians, transit, and bicyclists through the intersection. LOS reflects conditions without PCO intervention.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

No Event Scenario. As shown on **Table 5.2-44** and **Table 5.2-46**, with the addition of the new pedestrian trips associated with the office, retail and restaurant uses during the weekday p.m. and Saturday evening peak hours, the pedestrian LOS conditions for the No Event scenario would be LOS A or LOS B at the crosswalk and sidewalk locations.

Convention Event Scenario. As shown on **Table 5.2-44**, with the addition of the new pedestrian trips during the weekday p.m., the pedestrian LOS conditions for the Convention Event scenario would be LOS C or better at the crosswalk and sidewalk locations. The greatest number of new pedestrians would be at the intersection of Third/South, accessing the light rail platform within the median of Third Street. During convention events, PCOs would be stationed at the intersections of

Third/South and Third/16th to facilitate pedestrian travel through these intersections and to minimize conflicts. During convention events when Moscone Center event shuttle buses would be used to transport attendees between the event center and downtown locations, a shuttle bus zone would be provided along the north curb of 16th Street between Illinois Street and Terry A. Francois Boulevard. The proposed 15 foot wide sidewalk, with additional midblock setbacks along 16th Street, would be adequate to accommodate pedestrians walking to and from the shuttle buses, as well as pedestrians waiting for shuttle buses and pedestrians traveling along 16th Street.

Basketball Game Scenario. Analysis of pedestrian conditions for the Basketball Game scenario was conducted for the weekday p.m. peak hour, as well as for the peak arrival (weekday evening) and peak departure (late evening) hours for a weekday evening game, and for the Saturday evening peak hour for peak arrivals for a Saturday evening game. During the weekday p.m. peak hour, the number of pedestrians on crosswalks and sidewalks would increase over the No Event scenario, as basketball game attendees would start arriving to the event center during the p.m. peak hour for an evening event which would typically start at 7:30 p.m. With the increase in pedestrians, the pedestrian LOS conditions would be LOS A or LOS B at all study locations, with the exception of the south crosswalk at the intersection of Third/South, which would operate at LOS D. The LOS D conditions for the south crosswalk reflect the increased number of pedestrians traveling to the event center via the T Third during the p.m. peak hour, and getting off at the UCSF/Mission Bay station.

During the weekday evening peak hour, pedestrians in the project vicinity would increase substantially (i.e., about 11,000 new pedestrians during the weekday evening peak hour, as compared to 3,500 new pedestrians during the weekday p.m. peak hour), and include arrivals via the existing T Third light rail line and 22 Fillmore bus route as well as attendees arriving via the Muni Special Event Shuttles. For pre-event conditions, the Muni Special Event Shuttle stops would be located adjacent to the project site on South Street (i.e., the Muni Special Event Ferry Building/Transbay Terminal Shuttle) and on the south side of 16th Street between Third and Illinois Streets (i.e., the Muni Special Event Van Ness Avenue Shuttle and the Muni Special Event 16th Street BART Station Shuttle). During the weekday evening peak hour, pedestrian LOS conditions would worsen from weekday p.m. peak hour, however, the sidewalks and crosswalks would be able to accommodate the increased pedestrian volumes.

During the weekday evening and Saturday evening peak hours during pre-event conditions, all analysis locations would operate at LOS D or better, except for the north (LOS E) and south (LOS F) crosswalks at the intersection of Third/South. These poor operating conditions would be due to the high volume of transit riders leaving the T Third light rail platforms and crossing Third Street. Post-event, Muni Special Event Shuttle stops would be located adjacent to the project site on 16th Street, and on the east side of Illinois Street south of 16th Street and on the east side of Third Street north of South Street.

During the weekday late evening, reflecting conditions with pedestrians leaving the event center, crosswalks and sidewalks would also operate at LOS D or better, with the exception of all three crosswalks at the intersection of Third/South which would operate at LOS E or LOS F. The LOS E and LOS F conditions at the intersection of Third/South during the weekday evening and late evening, and Saturday evening peak hours would be considered a significant pedestrian impact. Following an event, the proposed 15-foot wide sidewalk, with additional setbacks along 16th Street to provide for midblock queuing area in the vicinity of the proposed Muni Special Event Van Ness Avenue Shuttle stop, would be adequate to accommodate pedestrians walking to the Muni Special Event Van Ness Avenue Shuttle, as well as pedestrians waiting for shuttle buses and pedestrians traveling along 16th Street.

Mitigation Measure M-TR-6: Active Management of Pedestrian Flows at the Intersection of Third/South (presented below) would implement strategies to facilitate pedestrian travel to and from the light rail platforms, including extending the green time for pedestrians crossing the street, manually overriding the traffic signal and directing pedestrians to cross, and allowing use of the closed Third Street as a pedestrian access route. These strategies would complement the proposed project's TMP protocols for event operations that include posting of PCOs at this and other nearby intersections (see **Figure 5.2-11**) for pre-event and post-event to facilitate pedestrian flows and minimize conflicts. With the travel lane closures and active management of pedestrian flows, pedestrians would be able to cross outside of the designated crosswalk (i.e., disperse over a greater crossing area) and pedestrian crossing conditions would improve to LOS D or better. For these reasons, implementation of **Mitigation Measure M-TR-6: Active Management of Pedestrian Flows at the Intersection of Third/South** would mitigate the significant pedestrian impacts for the crosswalks at the intersection of Third/South to less than significant.

At the intersection of Illinois/16th Street, PCOs would manage alternating flows of vehicle traffic exiting the garage with pedestrian and bicycle flows along and crossing 16th Street, manage alternating flows of vehicle traffic exiting the garage with the Muni Special Event 16th Street BART shuttles accessing 16th Street eastbound from Illinois Street northbound and with the Muni Special Event Van Ness Avenue shuttles traveling westbound on 16th Street, and coordinate with PCOs along 16th Street that would be managing pedestrian flows across 16th Street.

Other Events

Pedestrian LOS conditions at the sidewalk and crosswalk locations during other smaller events at the project site would be similar to or better than described above for the Convention Event and Basketball Game scenarios, which assessed the maximum attendance event, and which would be representative of conditions for sell-out concert events (i.e., the Basketball Game scenario), and a daytime event with about 9,000 attendees (i.e., the Convention Event scenario). Pedestrian travel associated with smaller events would be accommodated within the nearby sidewalks and crosswalks without requiring temporary lane closures to accommodate pedestrian flows, however, similar to large events, during smaller events PCOs would be posted at nearby intersections to manage pedestrian flows and reduce conflicts (see **Table 5.2-16** for a list of the TMP transportation management strategies by event type).

Pedestrian Corner Conditions

The three buildings on the project site (i.e., the South Street Tower, the 16th Street Tower, and the event center) would be set back at all four corners of the project site to provide for corner queuing area to accommodate pedestrians waiting during the red signal phase, and for an area for pedestrians to congregate. These areas are shown on **Figure 3-5** in the Project Description, and the additional on-site areas that would be provided would be about 11,000 gsf at the northwest corner of the site (at the intersection of Third/South), 4,700 gsf would at the northeast corner of the site (at the intersection of Terry A. Francois/South), 2,700 gsf at the southwest corner of the site (at the intersection of Third/16th), and 13,200 gsf at the southeast corner of the site (at the intersection of Terry A. Francois/16th). These building setbacks would provide generous queuing space for pedestrians exiting the project site and waiting to cross either South Street or Third Street (e.g., the on-site area at the northeast corner could accommodate about 3,700 pedestrians queuing at one time), and therefore, it is not anticipated that pedestrians would spill out into the adjacent travel lanes.

Pedestrian Safety

Under the No Event scenario, there would be an increased potential for pedestrian-vehicle and pedestrian-bicycle conflicts as traffic, pedestrian, and bicycle volumes would increase from existing conditions. There are a number of factors that contribute to increased pedestrian-vehicle and pedestrian-bicycle conflicts, and the number of collisions at an intersection is a function of the vehicle and bicycle volumes, traffic control, vehicle speeds, types of pedestrian facilities, surrounding land uses, location, and the number of pedestrians. The project's numerous pedestrian network improvements described above, including new sidewalks, building setbacks, continental crosswalks, and new traffic signals with pedestrian countdown signals, would define the pedestrian network and would offset risks associated with increased pedestrian-vehicle and pedestrian-bicycle conflicts. The enhanced roadway, bicycle and pedestrian network, as well as an increased pedestrian presence, would cause drivers to expect and adapt to increased interactions with pedestrians.

As described in Impact TR-4, when a full two-car T Third light train arrives at the southbound platform prior to an event, exiting pedestrians on the southbound platform and ramp would experience queued conditions, and more than one signal cycle may be needed to clear the platform of pedestrians. While queuing on the platform and ramp would occur, this condition would be expected for peak arrivals to the event center, and would not be considered a significant pedestrian impact.

As noted above, the proposed project includes installation of fencing along the existing light rail right-of-way in the center of Third Street to deter pedestrians from crossing southbound Third Street near Campus Way.

During event days at the event center there would be increased potential for pedestrian-vehicle and pedestrian-bicycle conflicts compared to the No Event scenario. However, as described above, the proposed project's TMP would be in effect, and PCOs would be posted at key nearby locations to manage pedestrian flows and minimize potential conflicts with vehicles and bicycles, and proposed project impacts related to pedestrian safety would be less than significant.

Summary of Impact TR-6, Pedestrian Impacts

Overall, the proposed project would implement numerous improvements that would enhance pedestrian conditions and safety in the project vicinity. The existing and proposed pedestrian facilities would be adequate to meet the pedestrian demand associated with the project uses. The exception would be the crosswalks at the intersection of Third/South, which would operate at LOS E or LOS F conditions during the weekday evening and late evening, and Saturday evening conditions for sell-out events (i.e., the Basketball Game scenario). **Mitigation Measure M-TR-6: Active Management of Pedestrian Flows at the Intersection of Third/South** and the proposed project's TMP protocols for events would manage short-term peak pedestrian flows at adjacent intersections and would mitigate pedestrian impacts to less-than-significant levels. At all other locations and project conditions, the addition of project-generated pedestrian trips would not substantially affect pedestrian flows, create potentially hazardous conditions for pedestrians or otherwise interfere with pedestrian accessibility to the site and adjoining areas.

Mitigation Measure M-TR-6: Active Management of Pedestrian Flows at the Intersection of Third/South

As a mitigation measure to accommodate pedestrians traveling to and from the event center through the intersection of Third/South, PCOs stationed at this location shall implement strategies to allow pedestrians to cross the street safely. The strategies and level of active management shall be tailored to the event size, and could include extending the green time for pedestrians crossing the street, manually overriding the traffic signal and directing pedestrians to cross, erecting temporary pedestrian crossing barriers, allowing use of the closed Third Street as a pedestrian access route, providing a defined passenger waiting area within the closed Third Street, shielding passengers waiting to board light rail from adjacent pedestrian traffic, and deploying additional PCOs to this intersection.

Mitigation Measure M-TR-6: Active Management of Pedestrian Flows at the Intersection of Third/South[48] would reduce the proposed project's pedestrian impacts at the intersection of Third/South to less-than-significant levels, and would not result in secondary transportation-related impacts. Therefore, the proposed project's impact on pedestrians would be *less than significant with mitigation.*

Comparison of Impact TR-6 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR did not identify any significant impacts related to pedestrians within Mission Bay, and did not require any mitigation measures. Because the proposed project would result in significant pedestrian impacts at the crosswalks at the intersection of Third/South, the project would result in *new significant impacts* not previously identified in the Mission Bay FSEIR.

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[48] As an example, PCOs actively manage pedestrian flows at the intersections of Third/King and Second/King prior to and following a SF Giants game at AT&T Park.

Bicycle Impacts

Impact TR-7: The proposed project would not result in potentially hazardous conditions for bicyclists, or otherwise substantially interfere with bicycle accessibility to the site and adjoining areas under Existing plus Project conditions without a SF Giants game at AT&T Park. (Less than Significant)

Bicycle Improvements

The proposed project would provide bicycle storage rooms accommodating 111 Class 1 bicycle parking spaces within the proposed office and retail/restaurant buildings (i.e., 55 bicycle parking spaces in the South Street office and retail building, 52 spaces in the 16th Street office and retail building, and 4 spaces in the Food Hall).[49] In addition, an enclosed bicycle parking center would be provided at the southeast plaza area near 16th Street, and would accommodate up to 300 Class 2 bicycle parking spaces for employees and visitors on days without an event. This bicycle parking center would be conveniently located and easily accessible from the bicycle lanes on 16th Street and Terry A. Francois Boulevard. On event days, this facility would be valet staffed, which would then convert the 300 spaces to Class 1; an additional 100 Class 1 bicycle parking spaces would be provided when necessary in a temporary bicycle corral within the main plaza or southeast plaza areas, for a total of 400 Class 1 bicycle parking spaces on event days. The bicycle valet is proposed to be staffed by a partner such as the San Francisco Bicycle Coalition for evening uses during peak events, such as NBA games and concerts, and may also be staffed during smaller events. The entrance to the valet parking would face east to direct departing bicyclists towards the signalized intersection of Terry A. Francois/16th Street, where they can safely mount their bicycles. The valet parking would be attended from two hours prior to the start of the event, to approximately an hour after the event ends. The proposed project would also provide 75 Class 2 bicycle parking spaces via bicycle racks on adjacent sidewalks and on-site at key locations. **Figure 3-15** in Chapter 3 presents the general location of the proposed bicycle parking spaces.

The proposed project would include sponsorship of a Bay Area Bike Share station on or near the project site. The location of the station would be determined through coordination between the project sponsor, the SFMTA, the Port of San Francisco, and the bicycle share operator.

With implementation of the proposed project, and as part of the Mission Bay Infrastructure Plan, 16th Street would be built out between Illinois Street and Terry A. Francois Boulevard. Class II bicycle lanes on 16th Street would be extended in both directions east of Third Street to Terry A. Francois Boulevard. On both sides of 16th Street between Third and Illinois Streets, a 6-foot wide bicycle lane would be located adjacent to the 8-foot wide curb parking lane. On both sides of 16th Street between Illinois Street and Terry A. Francois Boulevard a 6-foot wide bicycle lane would

[49] Per Planning Code Section 155.1, Bicycle Parking Definitions and Standards, Class 1 bicycle parking facilities are those that protect the entire bicycle and accessories against theft and inclement weather. Examples of Class 1 facilities include lockers, check-in facilities, monitored parking, restricted access parking, and personal storage. Class 2 bicycle racks permit the bicycle frame and one wheel to be locked in the rack (with one u-shaped lock), and provide support to bicycles without damage to the wheels, frame, or components. Available online at http://planning.sanfranciscocode.org/1.5/155.1/. Accessed May 28, 2015.

be provided adjacent to the curb, and a 4-foot wide buffer would separate the bicycle lane from the adjacent 8-foot wide parking lane. The extension of the bicycle lanes on 16th Street to the intersection of Terry A. Francois Boulevard/16th Street would facilitate access to the planned cycle track and the Bay Trail that runs along the shoreline parallel to Terry A. Francois Boulevard. The incorporation of appropriate bicycle crossing markings and signals to transition between bicycle lanes on 16th Street and cycle track on Terry A. Francois Boulevard would ensure efficient operation of the intersection and would reduce potential conflicts between bicycles, pedestrians, and automobiles.

The relocation of Terry A. Francois Boulevard as part of the Mission Bay Infrastructure Plan (and constructed by the master developer) will include replacing the existing bicycle lane in each direction with a 13-foot wide two-way separated bicycle lane (i.e., a cycle track) on the east side of the street, and the existing bicycle lane on the west side of Terry A. Francois Boulevard will be removed. A 4-foot wide raised buffer will separate the bicycle lane from the adjacent 8-foot wide parking lane. With the provision of a cycle track, and as Mission Bay gets built out along Terry A. Francois Boulevard to the north and south of the project site, it is anticipated that some bicyclists currently traveling on Third Street would instead travel on the improved bicycle facility on Terry A. Francois Boulevard (Third Street is not a designated bicycle route, and on Third Street bicyclists share the travel lane with vehicles).

Bicycle Conditions

No Event Scenario. With implementation of the proposed project, bicycle volumes would increase on the adjacent roadways and bicycle facilities. A portion of the walk/other trips generated by the proposed project uses, as presented in **Table 5.2-24**, would be bicycle trips. The bicycle demand would be accommodated within the 111 Class 1 and 375 Class 2 bicycle parking spaces (i.e., the 300 Class 2 spaces within an enclosed bicycle parking center for employees, and 75 spaces on the adjacent sidewalks) that would be available on the project site and adjacent sidewalks. During the weekday p.m. peak hour, about 150 of the 570 walk/other trips would be bicycle trips, and during the Saturday evening peak hour, about 230 of the 750 walk/other trips would be bicycle trips.

Proposed Class II bicycle lanes on 16th Street between Third Street and Terry A. Francois Boulevard would connect to existing bicycle lanes to the west, as well as to the planned bicycle track on Terry A. Francois Boulevard. The entrance to the project's parking garage and loading area on 16th Street would be located at the all-way stop-controlled intersection of Illinois/16th, which would minimize the potential for conflicts between bicyclists traveling on 16th Street and vehicles entering and exiting the garage.

Convention Event Scenario. Similar to the No Event scenario, bicycle parking demand would be accommodated within the proposed 111 Class 1 and 375 Class 2 bicycle parking spaces. During the weekday p.m. peak hour, a portion of the 2,098 walk/other person trips would be bicycle trips, with 1,484 of these being convention event shuttle/taxi trips, 614 being walk trips, and 265 being other trips, including bicycles, with the majority being bicycle trips**.** Depending on the size of the convention event, the enclosed bicycle parking center may be staffed, and therefore the

300 bicycle parking spaces within the enclosed bicycle parking center would be considered Class 1 spaces. Bicycle circulation and access would be similar to the No Event scenario. For convention events, when Moscone Center event shuttle buses are anticipated to transport attendees to and from the project site, passenger loading/unloading would occur on 16th Street between Illinois Street and Terry A. Francois Boulevard, adjacent to the north curb within the westbound bicycle lane. When the north curb of 16th Street is used for passenger loading/unloading, the on-street parking located between the curb bicycle lane and the travel lane would be subject to tow-away restrictions, and bicyclists would travel between the stopped buses and the travel lane (i.e., within the area designated for parking) and bicyclists would be permitted full use of the adjacent travel lane.

Basketball Game Scenario. The number of bicycle trips was estimated for the basketball game (i.e., bicycle modes as a separate mode is not available for other project uses). For weekday evening basketball games, there would be about 360 attendees accessing the site by bicycling, while on Saturdays, there would be about 270 attendees accessing the site by bicycling. This would be in addition to the bicycle trips generated by the office, retail, and restaurant uses (about 50 to 80 person trips during the peak hours).

Prior to an event, bicycle access to the project site would be similar to the No Event scenario, and would occur primarily from Terry A. Francois Boulevard and 16th Street. A basketball game would result in an increase in vehicles, bicycles, and pedestrians in the project area, which would result in an increased potential for conflicts. Implementation of the TMP strategies, such as posting of PCOs, would reduce potential conflicts. Nevertheless, prior to and following events, bicycle access may become more difficult due to heavier vehicle and pedestrian volumes, and some bicyclists may shift to other streets (e.g., from Third Street to Fourth Street or to the planned cycle track on Terry A. Francois Boulevard), however, bicycle access would be maintained. During events, PCOs would be stationed at key intersections adjacent to the project site to facilitate vehicle, bicycle, and pedestrian flows. Specifically, PCOs are proposed to be stationed at the intersection of 16th Street at Third, Illinois and Terry A. Francois Boulevard, and on South Street at Third, Bridgeview Way and Terry A. Francois Boulevard.

Before the end of the game, temporary lane or street closures would be implemented on Third Street and 16th Street that would affect bicycle access. The northbound travel lanes on Third Street would be closed to vehicles and bicycles in order to facilitate pedestrian access to the Third Street light rail platforms within the median, and to reduce conflicts between vehicles on Third Street and the Muni Special Event shuttles traveling on 16th Street from the project site. Bicyclists traveling on northbound Third Street would need to detour to Terry A. Francois Boulevard or Fourth Street to continue northbound.

Sixteenth Street between Third Street and Terry A. Francois Boulevard would be closed to vehicular traffic to facilitate Muni Special Event Shuttle operations. On-street parking would not be permitted, with the exception of media trucks on the north curb of 16th Street between Third and Illinois Streets. As bicycle valet parking would be accessed from the north sidewalk along this segment of 16th Street, a plan would be developed to direct departing bicyclists towards the signalized intersection of Terry A. Francois/16th Street, where they can safely mount their bicycles. On the section of 16th Street between Illinois Street and Terry A. Francois Boulevard, the north curb (i.e., the proposed bicycle lane) would be utilized for staging of the Muni Special Event Van Ness Avenue Shuttle, and therefore bicyclists traveling westbound on 16th Street in this section would not have access to the bicycle lane. On these event days, a temporary bicycle lane would be provided within the street, delineated with cones, that would provide a clear path of travel for bicyclists on this section of 16th Street.

At the intersection of Illinois/16th, vehicles would be exiting the project garage and would be continuing southbound on Illinois Street or turning right onto westbound 16th Street, the Muni Special Event Van Ness Avenue Shuttle would be traveling westbound on 16th Street, and the Muni Special Event 16th Street BART Shuttle would be turning left from northbound Illinois Street onto 16th Street westbound (passenger loading for the Muni Special Event 16th Street BART Shuttle would occur on the east side of Illinois Street south of 16th Street). A PCO would be stationed at this location to facilitate these vehicle movement, as well as direct pedestrians across 16th Street. At the approach to Third Street, all transit shuttles, vehicles, and bicyclists would be directed to continue westbound across Third Street (i.e., no left or right turns would be permitted). Bicyclists traveling in this section between Illinois and Third Streets would be within the bicycle lane, and would continue through into the existing bicycle lane on 16th Street west of Third Street. As noted above, vehicles and bicyclists would not be permitted to turn right into the closed portion of Third Street north of 16th Street. It is not anticipated that the media trucks parked within the north curb parking lane between Third and Illinois Streets during events would affect bicycle lane operations in this section as media trucks typically leave the event center between 11:30 p.m. and midnight (i.e., after most attendees would have departed the event center). As noted above, on this segment of 16th Street between Third and Illinois Streets, the 6-foot wide bicycle lane would be located adjacent to the 8-foot wide curb parking lane. Media trucks would likely depart the staging area after most event attendees depart the event center.

Other Events. Bicycle conditions during other events at the project site would be similar to or better than described above for the Basketball Game scenario, which assessed the maximum attendance event, and which is also representative of conditions for sell-out evening concert events. TMP measures, such as street closures for events with more than 14,000 attendees, would not be required for many of the other events. For small events when charter buses are anticipated to bring attendees to the project site, charter bus loading/unloading would occur on the north curb of 16th Street between Illinois Street and Terry A. Francois Boulevard. On-street parking would be restricted in this segment, and bicyclists would travel within the parking lane, or would share the adjacent travel lane with vehicles. Bicycle travel in the project vicinity would be accommodated within the existing, planned, and proposed bicycle facilities. As for large events, during smaller events PCOs would be posted at nearby intersections to manage vehicle, bicycle, and pedestrian flows and reduce conflicts.

Overall, it is anticipated that the existing, planned, and proposed bicycle facilities would be well utilized, and it is not expected that the additional vehicle, bicycle or pedestrian trips associated with the proposed project would result in significant impacts on bicyclists. It is possible that increased congestion associated with the proposed project, primarily during post-event conditions, could result in an increased potential for vehicular-bicycle and pedestrian-bicycle conflicts, however, it would not increase to a level that would adversely affect bicycle facilities in the area. At some locations, bicycle access may become more difficult due to heavier vehicle and pedestrian volumes, however bicycle access would be maintained. Implementation of proposed TMP measures during events would facilitate bicycle access and minimize conflicts. Thus, for these reasons, the impacts of the proposed project on bicycle facilities and circulation would be *less than significant.*

Mitigation: Not required

Comparison of Impact TR-7 to Mission Bay FSEIR Impact Analysis
The Mission Bay FSEIR did not identify any significant impacts related to bicycles within Mission Bay, and did not require any mitigation measures. Consequently, no new or different mitigation measures or alternatives to reduce project impacts related to bicycle conditions are identified or required with respect to the currently proposed project. On the basis of the facts discussed above, the project would result in no new or substantially more severe significant effects than those identified in the Mission Bay FSEIR related to bicycle impacts.

Loading Impacts

Impact TR-8: The proposed project's loading demand would be accommodated within the proposed on-site loading facilities or proposed adjacent on-street commercial loading spaces, and would not create potentially hazardous conditions or significant delays for traffic, transit, bicyclists, or pedestrians under Existing plus Project conditions. (Less than Significant)

Truck Freight and Service Vehicle Loading/Unloading
Proposed project truck and service vehicle loading impacts would be the same for conditions without and with an overlapping SF Giants evening game at AT&T Park.

Loading Supply. The proposed project includes 13 truck loading spaces with a loading area in the first below-grade level of the garage, separate from the vehicle parking garage, as shown on **Figure 3-7** in Chapter 3. The loading area would be accessed via a dedicated 24-foot wide driveway on 16th Street at Illinois Street (adjacent to the driveway into the vehicle parking garage). Four loading spaces would serve the two commercial towers (i.e., two loading spaces per tower), two loading spaces would serve the retail and restaurant uses, and seven loading spaces would serve the event center. The loading spaces would be 10 feet wide by 35 feet in length and with a 14-foot vertical clearance, with the exception of five of the seven event center loading spaces that would be 75 feet in length to accommodate semi-trailer trucks. The number and size of the loading spaces for the event center was based on experience at the existing arena in Oakland. Separate trash compactor areas for the various components of the project would be provided within the loading area.

Trucks, including semi-trailer trucks, would access the driveway to the below-grade loading area from eastbound or westbound 16th Street, or from northbound Illinois Street. A truck turnaround area would be provided at the northern portion of the below-grade loading area to allow for trucks to maneuver and back into the event center loading spaces, as well as to turn around to readily exit the project site head first onto 16th Street.

In addition to the on-site below-grade loading area, 17 on-street commercial loading spaces would be provided on South Street (eight spaces), on Terry A. Francois Boulevard south of South Street (eight spaces), and on 16th Street (one space) to serve the office uses and the restaurant and retail uses at the Market Hall. Overall, the proposed project would have 30 commercial loading spaces serving the project uses.

Loading Demand. As indicated in **Table 5.2-27**, the proposed project would generate about 400 truck trips per day, with the majority of the trips related to the office and restaurant uses. The office, retail, and restaurant uses would generate a loading space demand of 17 loading spaces during an average hour, and 21 loading spaces during the peak hour. The peak loading space demand would be met by the six on-site loading spaces dedicated to office, retail and restaurant uses, and the 17 on-street commercial loading spaces on South Street (eight spaces), on Terry A. Francois Boulevard (eight spaces), and on 16th Street (one space).

During events, the event center would generate an additional demand for seven loading spaces during the average and peak hour of loading activities. As noted in **Table 5.2-27,** this loading demand is for non-Golden State Warriors events, which would generate a greater number of delivery and service vehicle trips. Based on information obtained from the project sponsor for the existing Oracle arena, truck deliveries would occur a day before a game, and would be distributed over the entire day. Television trucks would arrive in advance of events to allow for appropriate set-up and to avoid peak travel periods. Television trucks staging would be located on the north curb (i.e., within the parking lane) of 16th Street adjacent to the project side, between Third Street and the driveway into the project garage. The staging area would be used for loading/unloading on the days leading to a game.

The loading demand would be accommodated within the seven loading spaces dedicated to the event center. The majority of these delivery trucks would make their deliveries in advance of events to avoid peak travel periods. Vendors would be notified by the arena management of appropriate delivery times.

As noted above, separate trash, recycling and compost areas for the various components (e.g., South Street Tower, 16th Street Tower, event center, Market Hall) of the project would be provided within the below-grade loading area in the vicinity of the loading spaces. Trash associated with all land uses, including the ground floor retail and restaurant uses, would be accommodated within these on-site trash area, and Recology collection trucks would access the on-site loading area for pickup (i.e., no trash bins would be taken to the edge of the sidewalk).

During the daytime hours when most loading activities occur, pedestrian and bicycle volumes on 16th Street adjacent to the project site are expected to be relatively low, except around midday, and truck access into and out of the below-grade loading area is not anticipated to substantially conflict with pedestrians on the sidewalk or bicyclists within the bicycle lane on the north side of 16th Street between Third Street and Terry A. Francois Boulevard. No Muni bus routes would operate on 16th Street between Third Street and Terry A. Francois Boulevard, and therefore truck access into and out of the project site would not affect Muni operations. The majority of event-related loading would occur in advance of events, and therefore would not overlap with pre-event or post-event vehicle, pedestrians, bicycle, and Muni Special Event Shuttles circulation on 16th Street.

The proposed loading facilities would be sufficient to accommodate projected demand, and would not result in significant delays affecting traffic, transit, bicycles, or pedestrians, and therefore, the impacts related to loading would be *less than significant.*

Passenger Loading/Unloading

Proposed accommodation for passenger loading/unloading for conditions without and with an event at the project site are included in the proposed project's TMP. **Figure 5.2-9** presents the curb regulations for No Event conditions. In general, the curb adjacent to the project site on South Street, Terry A. Francois Boulevard, and 16th Street would have metered on-street parking, with areas reserved for the Mission Bay TMA shuttle stop, taxi zones, commercial loading/unloading spaces, and a paratransit stop. On days with events at the project site, on-street parking would be restricted at certain locations prior the start of the event to accommodate the Muni Special Event Transit Service Plan and passenger loading/unloading demand.

No Event. Under the No Event scenario, passenger loading/unloading would be accommodated within a taxi zone approximately 100 feet in length on South Street east of the parking garage entrance/exit. The Mission Bay TMA shuttle stop (about 60 feet in length) would also be located on South Street east of Third Street.

Convention and Small Events. During conventions and small events, passenger loading/ unloading would be accommodated in multiple locations: taxi zones would be provided adjacent to the project site on South Street between Bridgeview Way and Terry A. Francois Boulevard (about 300 feet in length) and on Terry A. Francois Boulevard south of South Street (about 200 feet in length). On Terry A. Francois Boulevard, a dedicated passenger loading/unloading zone about 140 feet in length would be provided midblock for private auto drop-off and pick-up. The designated Moscone Center event shuttle bus loading/unloading, and charter buses loading/unloading for other events, would be on the north curb of 16th Street between Illinois Street and Terry A. Francois Boulevard (about 600 feet in length). About six buses could be accommodated within this zone at any one time. The Moscone Center event shuttle buses operate on a "bump system" in which a waiting bus leaves the curb when another bus from the same route arrives. Six event shuttle bus routes currently serve the Moscone Center. It is not anticipated that more than the maximum level of event shuttle buses for the Moscone Center would be required to accommodate attendees arriving by event shuttle buses. In the event that additional curb is needed for event shuttle bus or charter bus loading/unloading activities, additional curb frontage on 16th Street between Third and Illinois Streets could be made available by temporarily restricting on-street parking.

Basketball Game and Large Events. During large events, the roadway and curb management controls depicted on **Figure 5.2-12** for pre-event condition, and **Figure 5.2-13** for post-event conditions would be implemented. In particular, the following temporary curb regulations would be implemented about two hours prior to the event to accommodate the projected passenger loading/unloading demand:

- Two taxi zones would be provided: on South Street between Bridgeview Way and Terry A. Francois Boulevard (300 feet), and on Terry A. Francois Boulevard south of South Street (200 feet).
- Passenger loading/unloading zone approximately 340 feet in length would be provided on Terry A. Francois Boulevard for passenger loading/unloading. The proposed permanent paratransit stop (75 feet in length) on Terry A. Francois Boulevard would not be affected during events.
- Prior to an event, the Muni Special Event Transbay Terminal/Caltrain/Ferry Building Shuttle stop would be on South Street adjacent to the project site, west of the proposed Mission Bay TMA shuttle stop, while the shuttle stop for the Muni Special Event 16th Street BART and Van Ness Avenue shuttle routes would be on the south side of 16th Street (i.e., across the street from the project site) between Third and Illinois Streets.
- A pedicab passenger loading/unloading area would be provided on the east side of Terry A. Francois Boulevard adjacent to the planned two-way cycletrack and immediately south of 16th Street.

Before the end of an event, temporary travel lane closures would be implemented on northbound Third Street between Mariposa Street and Mission Bay Boulevard South, on South Street between Third Street and the entry to the 450 South Street parking garage, on 16th Street between Third Street and Terry A. Francois Boulevard, and on northbound Illinois Street between Mariposa and 16th Streets. The temporary lane closures are anticipated to be in place for approximately 30 to 45 minutes after the end of the event, or until vehicular traffic dissipates and most event attendees taking transit have boarded.

The proposed traffic lane closures would facilitate passenger transit boardings on Third Street (Muni Metro and Muni bus shuttles), South Street (TMA bus shuttles), Illinois Street (Muni bus shuttles), and 16th Street (Muni bus shuttles) in a safe and expeditious manner, avoiding conflicts with vehicles.

Thus, passenger loading/unloading demand would be distributed to Third Street (including the two northbound traffic lanes at the end of an event), South Street, Terry A. Francois Boulevard, and 16th Street, which would reduce potential for crowding at the adjacent sidewalks and walkways. As noted in **Impact TR-6,** the proposed project would include setbacks along all four sides of the project site that would further reduce the potential for pedestrian crowding. Therefore, impacts on passenger loading/unloading would be less than significant.

Summary of Impact TR-8, Loading Impacts

Overall, the proposed project would implement numerous improvements that would facilitate freight/service vehicle and pedestrian loading/unloading conditions and promote safety in the project vicinity. The number of proposed on-site loading spaces would be adequate to meet the expected freight/service vehicle demand associated with the project uses, and would not result in significant delays affecting traffic, transit, bicycles, or pedestrians. The proposed project TMP for event conditions would manage pre- and post-event pedestrian loading/unloading operations along Third, South, 16th and Illinois Streets, as well as along Terry A. Francois Boulevard. As a result, the proposed project's impact related to freight/service vehicles and passenger loading/unloading operations would be *less than significant*.

Mitigation: Not required

While the proposed project's impacts related to freight/service vehicles and passenger loading/unloading operations would be less than significant, **Improvement Measure I-TR-8, Truck and Service Vehicle Loading Operations Plan** is provided for consideration by City decision makers to further reduce the proposed project's less-than-significant impacts related to potential conflicts between proposed project-generated loading/unloading activities and pedestrians, transit, bicyclists, and autos.

Improvement Measure I-TR-8: Truck and Service Vehicle Loading Operations Plan

As an improvement measure to reduce potential conflicts between driveway operations, including loading activities, and pedestrians, bicycles and vehicles on South Street, Terry A. Francois Boulevard, and 16th Street, the project sponsor shall prepare a Loading Operations Plan, and submit the plan for review and approval by the OCII, or its designee, and the SFMTA. As appropriate, the Loading Operations Plan shall be periodically reviewed by the sponsor, the OCII or its designee, and SFMTA and revised if feasible to more appropriately respond to changes in street or circulation conditions.

The Loading Operations Plan shall include a set of guideline related to the operation of the on-site and on-street loading facilities, as well as large truck curbside access guidelines; it shall also specify driveway attendant responsibilities to minimize truck queuing and/or substantial conflicts between project-generated loading/unloading activities and pedestrians, bicyclists, transit and autos. Elements of the Loading Operations Plan shall include:

- Commercial loading activities within on-street commercial loading spaces on South Street, Terry A. Francois Boulevard, and 16th Street should comply with all posted time limits and all other posted restrictions.
- Double parking or any form of illegal parking or truck loading/unloading should not be permitted on any streets adjacent to the project site, and particularly on 16th Street which would include a bicycle lane. Working with the SFMTA Parking Control Officers, building management should ensure that no truck loading/unloading activities occur within the bicycle lanes on 16th Street.
- All move-in and move-out activities for commercial office uses should be coordinated by building management, and, in the event that moving trucks cannot be accommodated within the below-grade loading area, building management should obtain a reserved curbside permit from the SFMTA in advance of move-in or move-out activities.

Implementation of **Improvement Measure I-TR-8: Truck and Service Vehicle Loading Operations Plan** would reduce the potential for conflicts between proposed project-generated loading/unloading activities and pedestrians, bicyclists, transit and autos, and would not result in any secondary transportation-related impacts.

Comparison of Impact TR-8 to Mission Bay FSEIR Impact Analysis
The Mission Bay FSEIR did not identify any significant impacts related to loading within Mission Bay, and did not require any mitigation measures. Because the project was determined to have a less-than-significant impact related to freight/service vehicles or passenger loading impacts, no new or different mitigation measures or alternatives to reduce project impacts related to loading are identified or required with respect to the currently proposed project. On the basis of the facts discussed above, the project would result in no new or substantially more severe significant effects than those identified in the Mission Bay FSEIR.

Impacts on UCSF Helipad Operations

Impact TR-9a to TR-9d: The proposed project could result in significant impacts on UCSF Helipad operations under Existing plus Project conditions. (Less than Significant with Mitigation)

See Section 5.2.6, Project Impacts on UCSF Helipad Operations regarding impacts of the proposed project on the UCSF helipad operations.

Emergency Vehicle Access Impacts

Impact TR-10: The proposed project would not result in significant impacts on emergency vehicle access under Existing plus Project conditions without a SF Giants game at AT&T Park. (Less than Significant)

No Event
Emergency vehicle access to the project site would remain similar to existing conditions. With implementation of the proposed project, 16th Street would be extended from Illinois Street to Terry A. Francois Boulevard (generally two westbound and two eastbound lanes), and emergency vehicle access from the west and south to the project site would be enhanced. In addition, as part of the Mission Bay Infrastructure Plan, Terry A. Francois Boulevard will be relocated to the west, to be directly adjacent to the project (two northbound and two southbound travel lanes, a two-way cycle track on the east side of the street, and on-street parking on both sides of the street), which would also enhance emergency vehicle access to the site. Emergency vehicles would continue to access the site from Third Street from north and south of the site, including from the new fire station at Mission Rock Street via either Third Street or Terry A. Francois Boulevard, as well as from the west via 16th Street. With implementation of the

22 Fillmore Transit Priority Project, one of the two mixed-flow lanes in each direction on 16th Street between Seventh and Third Streets will be converted to a curbside transit-only lane, and emergency vehicles are permitted to use transit-only lanes, if needed.

Development of the project site, and associated increases in vehicles, pedestrians, and bicycle travel would not substantially affect emergency vehicle access to other buildings and areas within Mission Bay, including the UCSF campus. The new UCSF Medical Center Phase 1 opened in February 2015, and contains an emergency room and urgent care center for the UCSF Children's Hospital at the southern end of the hospital complex, with access from Fourth Street, north of Mariposa Street. Access to the Fourth Street urgent care center is directly from Mariposa Street, or from Owens Street via the Southern Connector Road (an internal road within the Medical Center campus site that provides access between the south Medical Center entrance and the parking facilities). Owens Street can be accessed from 16th Street, the I-280 northbound off-ramp, and Mariposa Street. As part of Phase 1 of the UCSF Medical Center, a number of roadway improvements were implemented, that will enhance access to UCSF and the critical hospital services, including extending Owens Street between Mariposa and 16th Streets, widening of Mariposa Street to five lanes, installation of a new signal at the Mariposa Street and Owens Street intersection, an additional lane on the I-280 northbound off-ramp at Mariposa Street, and a new signal at Mariposa Street at the I-280 northbound off-ramp. On Mariposa Street, if necessary, emergency vehicles and other persons accessing the emergency room and urgent care center in their personal vehicles during an emergency would be able to travel within the center left-turn lane to access the intersection of Fourth/Mariposa. As described in **Impact TR-2**, under existing plus project conditions for the No Event scenario, the majority of the study intersections in the vicinity of the project site and the UCSF Medical Center Phase 1 are projected to operate at the same LOS as under existing conditions, and would operate at LOS D or better (the exception would be the intersection of Seventh/Mississippi/16th which would change from LOS E to LOS F conditions). Therefore, for these reasons, the proposed project would not result in a substantial increases in vehicle delay for emergency vehicles or other persons accessing the emergency room and urgent care center in their personal vehicles.

With Event

Pre-event and post-event vehicular traffic destined to the on-site garage containing 950 parking spaces would be managed to minimize impacts on UCSF facilities. The TMP for the event center includes strategies to provide attendees with suggested driving routes to and from the garage. Examples of strategies include website, emails, and smart phone applications. For example, during pre-game conditions, attendees driving from the south of the project site exiting at the I-280 northbound off-ramp would be directed to use Mariposa Street, rather than Owens Street and 16th Street, to reduce congestion during UCSF's shift changes. For post-event, attendees destined to the south would be encouraged to use Mariposa, Illinois or Third Streets, and not 16th or Owens Streets, to access the I-280 southbound on-ramp. As specified in the TMP, the pre-event and post-event recommended routes would be subject to revision based on monitoring during the first year of operation.

Event attendees driving to the site would park within the on-site parking garage containing 950 spaces, as well as in multiple parking facilities in the vicinity of the project site. The majority of the parking spaces available to event attendees would be located to the north of the project site, with the majority located in Lot A. However, it is anticipated that event attendees may also park within UCSF facilities to the west and southwest of the project site. Thus, travel to and from the event center would be dispersed over a broader area, reducing the effect of traffic associated with an event, particularly following an event.

During pre-event and post-event conditions, up to 17 PCOs would be stationed at up to 17 locations to direct and facilitate vehicular and pedestrian travel. Locations where PCOs would be stationed in the vicinity of the UCSF Children's Hospital emergency room and urgent care facility include the intersections of Third/16th, Mariposa/I-280 northbound off-ramp/Owens (pre-game only), Mariposa/Third, Mariposa/Illinois, and 16th/Owens (post-game only). No roadway closures are proposed for pre-event conditions for any events. For events that necessitate closure of the northbound travel lanes of Third Street between 16th and South Streets (generally events with 14,000 or more attendees) for post-game conditions for a period of one to two hours depending on the size of the event, emergency vehicles traveling on Third Street southbound would not be affected, and if necessary, emergency vehicles traveling northbound on Third Street would be permitted to continue through the closed segment between 16th and South Streets, as PCOs would be able to remove the temporary barriers. If necessary, emergency vehicles would also be able to travel on Muni's light rail right-of-way in the median or northbound within the southbound lanes on Third Street. The Event Center Transportation Coordinator would provide emergency service providers, including the fire stations and UCSF facilities, with a list of dates and times during which temporary closure of Third Street would be required following an event. Furthermore, all drivers must comply with the California Vehicle Code § 21806, which requires that drivers yield right-of-way to authorized emergency vehicles, drive to the right road curb or edge, stop, and remain stopped until the emergency vehicle has passed.

In addition, as described above, with implementation of the planned 22 Fillmore Transit Priority Project, transit-only lanes will be implemented adjacent to the curb on 16th Street west of Third Street, and emergency vehicles will be permitted use of the transit-only lanes. The transit-only lanes on 16th Street would have fewer vehicles in them than the adjacent mixed-flow lanes, and would not be subject to any turn restrictions. Persons accessing the UCSF Medical Center emergency room and urgent care center in their personal vehicles during an emergency would, if necessary, also be able to utilize the transit-only lanes to bypass congested segments on 16th Street. As described above, on Mariposa Street, emergency vehicles and other persons accessing the emergency room and urgent care center in their personal vehicles during an emergency would be able to travel within the center left-turn lane to access the intersection of Fourth/Mariposa. For smaller events, PCOs would be stationed at key intersections, monitoring traffic conditions, and could be reassigned to respond to conflicts between event center traffic and UCSF hospital access. In addition, when PCOs are deployed for an event, they would have the capability to radio ahead to other PCOs down the street regarding the approaching vehicle requiring emergency access.

Also see **Impact TR-2** regarding traffic conditions at study intersections for pre-game and post-game conditions.

Summary of Impact TR-10, Emergency Vehicle Access Impacts
Roadway improvements adjacent to the project site would facilitate emergency vehicle access to the site. Before and after events emergency vehicle access to the project site and nearby hospital uses would be maintained, as would emergency access for persons traveling to the emergency room and urgent care center in their personal vehicles. For these reasons, the proposed project would not inhibit emergency vehicles access to the project site and nearby vicinity; therefore, the proposed project impact on emergency vehicle access would be *less than significant.*

Mitigation: Not required

While the proposed project's impact on emergency vehicle access would be less than significant, the following improvement measures are provided for consideration by City decision makers to further reduce the proposed project's less-than-significant impacts related to emergency vehicle access.

Improvement Measure I-TR-10a: **UCSF Emergency Vehicle Access and Garage Signage Plan**

As an improvement measure to enhance access for emergency vehicles and other visitors to the UCSF Children's Hospital emergency room and parking facilities at the UCSF Medical Center, the project sponsor shall work with UCSF to develop and implement a UCSF emergency vehicle access and garage signage plan for I-280 and Mariposa, Owens, and 16th Streets to reflect desirable access routes for UCSF and event center access.

Improvement Measure I-TR-10b: Mariposa Street Restriping Study

As an improvement measure to enhance access to the UCSF Medical Center Children's Hospital, the project sponsor shall retain a qualified transportation professional approved by SMTA to conduct a traffic engineering study to evaluate potential changes to the travel lane configuration and related signage on Mariposa Street between the I-280 ramps and Fourth Street. The study, to be conducted in coordination with UCSF and SFMTA, would determine if the eastbound left turn lane into Fourth Street/UCSF passenger loading/unloading and emergency vehicle entrance to the UCSF Children's Hospital could be extended west from its existing length of about 150 feet to provide for additional queuing area.

Implementation of **Improvement Measure I-TR-10a: UCSF Emergency Vehicle Access and Garage Signage Plan** and **Improvement Measure I-TR-10b: Mariposa Street Restriping** would provide advance direction for drivers and would reduce the potential for conflicts between vehicles destined to the emergency room and vehicles traveling eastbound on Mariposa Street, and would not result in any secondary transportation-related impacts.

Comparison of Impact TR-10 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR did not address emergency vehicle access as a distinct transportation topic. However, as discussed in the Initial Study, the Mission Bay FSEIR Community Services and Utilities impacts section determined that the Mission Bay Plan would potentially significantly increase demand for fire protection services in the Mission Bay Plan area, and that a new fire station and additional fire department personnel and equipment, including a Hazardous Materials Unit, would be required in the Mission Bay South Plan area at build-out in order to facilitate access in the event of a major emergency, and maintain adequate levels of service. The Mission Bay FSEIR also indicated the Mission Bay Plan would increase demand for a new police station and additional police protection personnel. The Mission Bay Plan included the provision of land at the corner of Third Street and Mission Rock Street in the Mission Bay Plan area for a new police/fire station. The Mission Bay FSEIR determined that with implementation of Mitigation Measures M.6a (Construct New Fire Station) and M.6b (Provide New Engine Company) to ensure funding for additional fire protection personnel, equipment and fire station, impacts to fire protection services would be less than significant. Construction of the new Public Safety Building at Third and Mission Rock Streets is complete and the facility began operations in early 2015, which satisfies the requirements of these mitigation measures.

Also please refer to Initial Study Impact HZ-3 regarding the project's impact on the City's Emergency Response Plan in an event of a catastrophic event (e.g., and earthquake), and Section 5.12, Public Services, in this SEIR regarding potential impacts on law enforcement and fire protection services.

Conditions With a SF Giants Evening Game at AT&T Park

Impacts TR-11 through TR-17 present the impact evaluation for traffic, transit, pedestrian, bicycle, and emergency vehicle access for conditions with an event at the proposed event center overlapping with a SF Giants evening game at AT&T Park. At the time of preparation of the Mission Bay FSEIR, the San Francisco Giants ballpark was under construction, and therefore, the Mission Bay FSEIR did not include a separate analysis of conditions with baseball games. Instead, the Mission Bay FSEIR summarized the transportation impact analysis as contained within the San Francisco Giants Ballpark at China Basin EIR. The Mission Bay FSEIR indicated that the Ballpark EIR determined that the mitigation measures to address significant transportation impacts before and after games would be defined as part of a Ballpark Transportation Management Plan prepared by the Giants in coordination with a Ballpark Transportation Coordinating Committee. Therefore, this group of impacts does not include a comparison of impact conclusions with the Mission Bay FSEIR.

The proposed project would result in an increase in the number of large events occurring in the Mission Bay area, and some of these events would overlap with the SF Giants baseball games at AT&T Park that occur generally between April and the end of September. This would result in about 32 days per year—and up to about 40 days under rare circumstances— with intersection LOS as described below for weekday and Saturday conditions (the SF Giants season has

46 weekday and 6 weekend evening games scheduled for the 2015 season). Based on league schedules and concert scheduling as described above and in Chapter 3, Project Description, Table 3-3, it is estimated that in a typical year, on average, about nine *large* events at the event center (i.e., two basketball games and seven concerts with average attendance of 12,500 or more attendees) could overlap with a SF Giants evening game at AT&T Park. If either or both teams make it to their respective championships, the number of large events overlapping could moderately increase; however, it is unlikely that this scenario would occur on a regular basis. See Section 5.2.5.3 above for discussion of potential overlap of proposed project events with a SF Giants evening game.

Traffic Impacts

Impact TR-11: The proposed project would result in significant traffic impacts at multiple intersections that would operate at LOS E or LOS F under Existing plus Project conditions with an overlapping SF Giants evening game at AT&T Park. (Significant and Unavoidable with Mitigation)

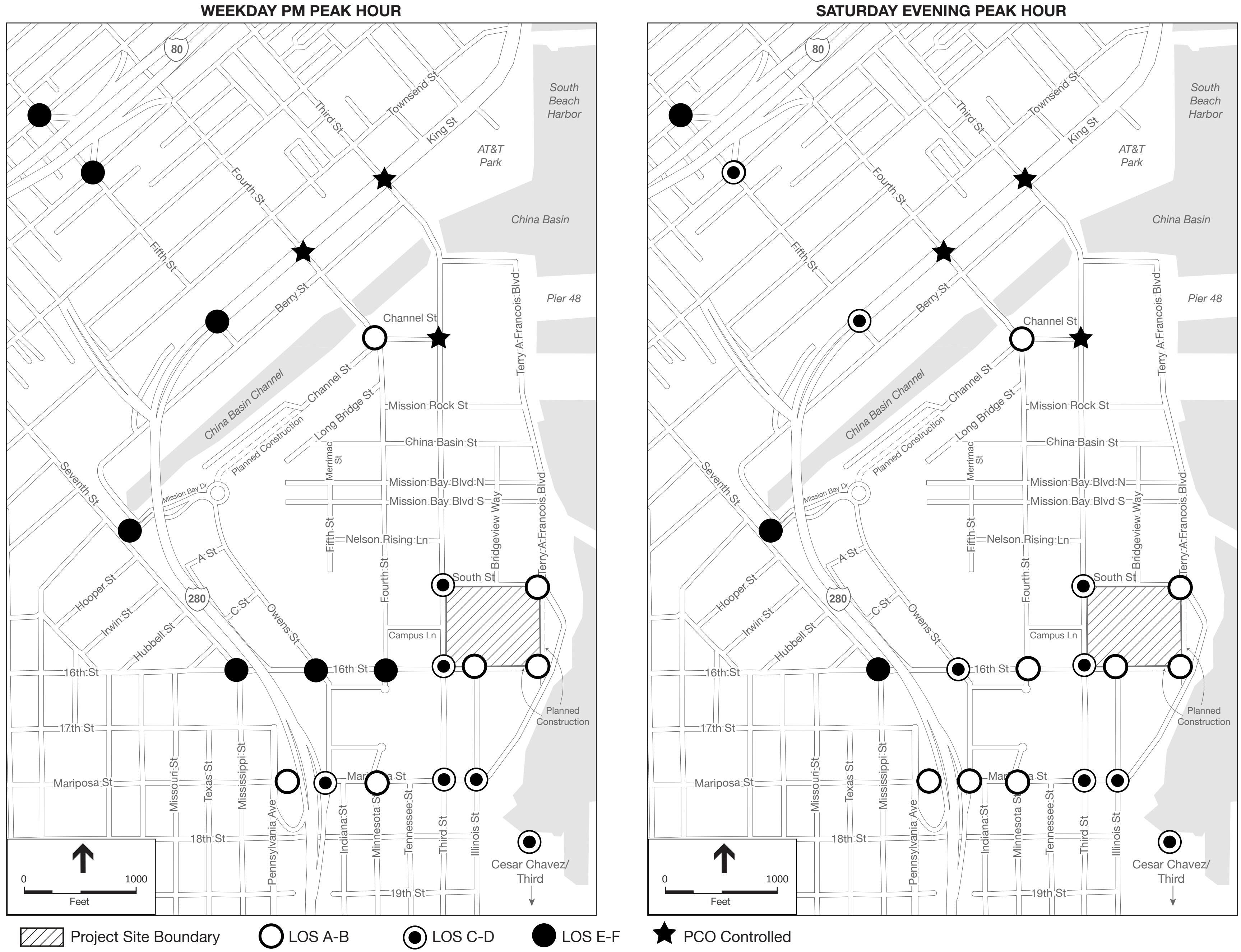
Because a portion of the events at the proposed event center would overlap with SF Giants evening games, the traffic impact analysis at the study intersections was also conducted for the Basketball Game scenario for conditions with an overlapping SF Giants evening game at AT&T Park for the four analysis hours. The analysis represents conditions for high attendance events at both the proposed event center and at AT&T Park, which are estimated to occur, an average of nine times a year. For the remaining 23 days during which events at both facilities could overlap, the average attendance levels for the event center events is anticipated to be less than 12,500 attendees, and therefore, the number of vehicle trips generated by the smaller event would be less, as would the impact on intersection operating conditions. **Table 5.2-47** and **Figure 5.2-19** present the weekday p.m. and Saturday evening intersection LOS conditions, while **Table 5.2-48** and **Figure 5.2-20** present the weekday evening and late evening peak hours. As indicated in the tables and figures, a number of intersections currently are controlled by PCOs pre-game and post-game, and it is assumed that these intersections would continue to be PCO controlled during SF Giants games. These would be in addition to the PCOs that are currently deployed during SF Giants games. See Section 5.2.3.8 for a description of the existing transportation management measures that are in force during SF Giants games. Due to the restricted access on the Third and Fourth Street bridges, no project-generated vehicles were assumed to travel northbound on the Third and Fourth Street bridges during overlapping events. Project-generated vehicles would instead be directed west and south to avoid roadway closures and congestion on Third Street near Lot A and AT&T Park. During overlapping events, the TMP indicates that a PCO would be stationed at the intersection of Fourth/16th to discourage use of this street except for local access.

TABLE 5.2-47
INTERSECTION LEVEL OF SERVICE – EXISTING PLUS PROJECT CONDITIONS – WITH A SF GIANTS EVENING GAME – WEEKDAY PM AND SATURDAY EVENING PEAK HOURS

			Weekday PM				Saturday Evening			
			Existing		Existing plus Project – Basketball Game		Existing		Existing plus Project – Basketball Game	
#	Intersection Location		Delay[a]	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	King St	Third Street	**PCO controlled**		**PCO controlled**		**PCO controlled**		**PCO controlled**	
2	King St	Fourth Street	**PCO controlled**		**PCO controlled**		**PCO controlled**		**PCO controlled**	
3	King St/Fifth St	I-280 ramps	**60.7**	**E**	**60.7**	**E**	41.1	D	54.3	D
4	Fifth St/Harrison	I-80 WB off-ramp	**62.4**	**E**	**66.7**	**E**	33.1	C	**> 80**	**F**
5	Fifth St/Bryant St	I-80 EB on-ramp	**>80**	**F**	**>80**	**F**	51.7	D	50.0	D
6	Third Street	Channel Street[f]	**PCO controlled**		**PCO controlled**		**PCO controlled**		**PCO controlled**	
7	Fourth Street	Channel Street[f]	11.5	B	11.4	B	< 10	A	10.3	B
8	Seventh Street	Mission Bay Dr	26.5	C	**56.9**	**E**	15.0	B	**> 80**	**F**
9	TA Francois Blvd	South Street[c,f]	11.4 (eb)	B	< 10	A	10.4 (eb)	B	< 10	A
10	Third Street	South Street[f]	25.1	C	27.3	C	< 10	A	22.5	C
11	TA Francois Blvd	16th Street[f]	--	--	16.9	B	--	--	18.3	B
12	Illinois Street	16th Street[c,f]	14.1 (nb)	B	13.8 (nb)	B	< 10 (nb)	A	12.5 (nb)	B
13	Third Street	16th Street[e,f]	34.4	D	39.3	D	12.8	B	24.7	C
14	Fourth Street	16th Street[e]	28.7	C	**70.9**	**E**	14.0	B	18.0	B
15	Owens Street	16th Street[e]	49.2	D	**71.6**	**E**	10.1	B	22.2	C
16	7th/Mississippi	16th Street[e]	**> 80**	**F**	**> 80**	**F**	28.0	C	**69.2**	**E**
17	Illinois Street	Mariposa Street[c,f]	27.6 (eb)	D	26.8	C	< 10 (eb)	A	51.7	D
18	Third Street	Mariposa Street[f]	35.4	C	44.9	D	26.9	C	34.6	C
19	Fourth Street	Mariposa Street[f]	14.4	B	16.0	B	< 10	A	< 10	A
20	Mariposa Street	I-280 NB off-ramp[f]	21.6	C	22.1	C	16.2	B	19.7	B
21	Mariposa Street	I-280 SB on-ramp[d]	< 10	A	10.9	B	10.5	B	< 10	A
22	Third Street	Cesar Chavez St	44.6	D	47.6	D	32.3	C	31.9	C

NOTES:
[a] Delay presented in seconds per vehicle. For unsignalized intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
[b] Intersections operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.
[c] All-way stop-controlled intersection. The intersections of Terry A. Francois/South and Illinois/Mariposa would be signalized as part of the proposed project.
[d] The traffic signal at the intersection of Mariposa/I-280 southbound on-ramp is part of the roadway improvements on Mariposa Street between the I-280 northbound off-ramp and I-280 southbound on-ramp and the extension of Owens Street between 16th and Mariposa Streets, and is currently planned to be operational by fall 2015.
[e] Includes implementation of the 22 Fillmore Transit Priority Project, which includes converting one mixed-flow lane in each direction to a side-running transit-only lane.
[f] Under the Basketball Game scenario, a PCO would be stationed at this study intersection during the Saturday pre-event period, and, as necessary, would manually direct vehicles, pedestrians, transit, and bicyclists through the intersection. LOS reflects conditions without PCO intervention.

OURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015



SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-19

Existing Plus Project Intersection LOS-With a SF Giants Evening Game - Weekday PM and Saturday Evening Peak Hour - Basketball Game Scenarios

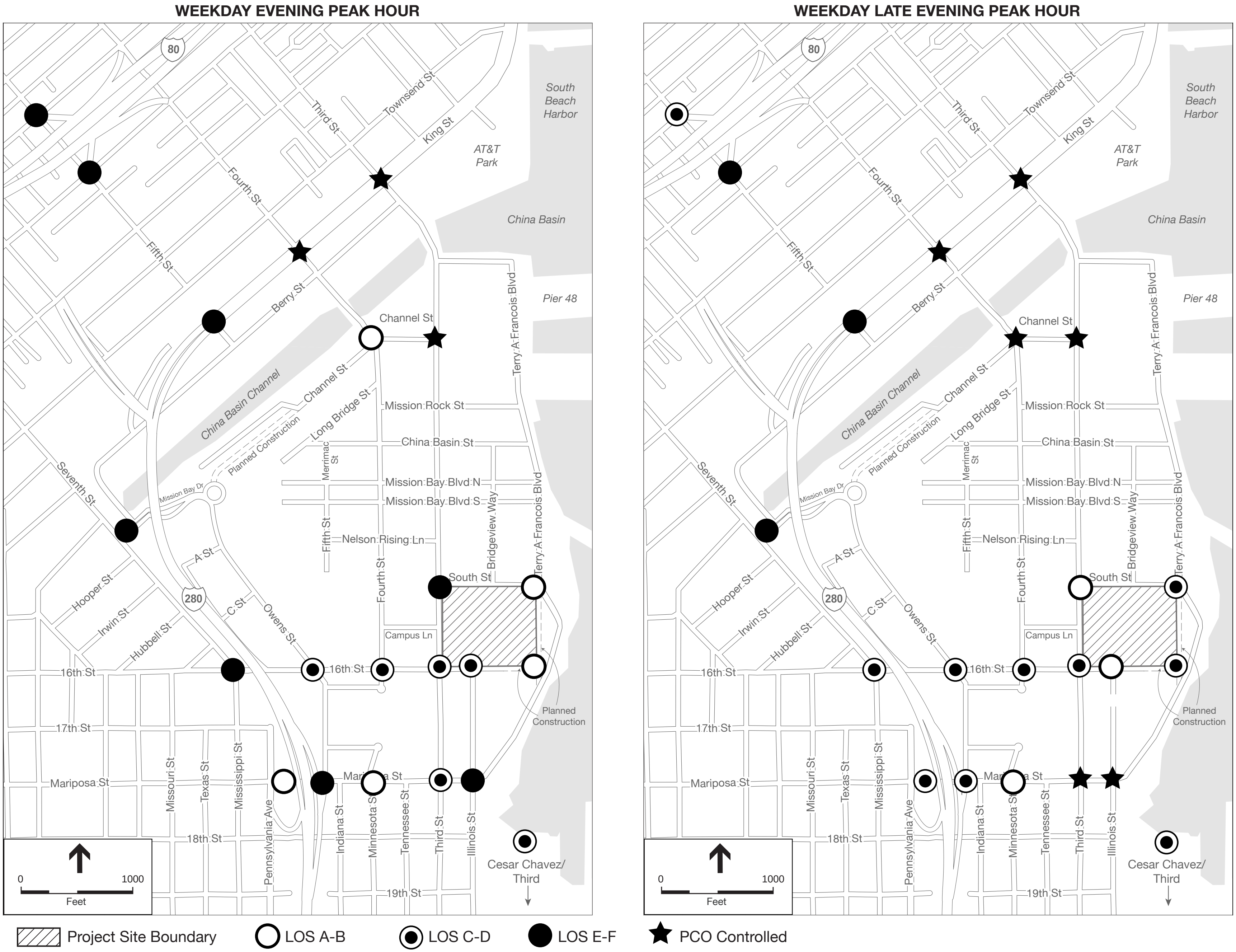
TABLE 5.2-48
INTERSECTION LEVEL OF SERVICE – EXISTING PLUS PROJECT CONDITIONS – WITH A SF GIANTS EVENING GAME – WEEKDAY EVENING AND LATE EVENING PEAK HOURS

			Evening				Late Evening			
			Existing		Existing plus Project – Basketball Game		Existing		Existing plus Project – Basketball Game	
#	Intersection Location		Delay[a]	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	King St	Third Street	**PCO controlled**		**PCO controlled**		**PCO controlled**		**PCO controlled**	
2	King St	Fourth Street	**PCO controlled**		**PCO controlled**		**PCO controlled**		**PCO controlled**	
3	King St/Fifth St	I-280 ramps	**77.1**	**E**	**>80**	**F**	**>80**	**F**	**> 80**	**F**
4	Fifth St/Harrison	I-80 WB off-ramp	47.3	D	**>80**	**F**	22.2	C	22.2	C
5	Fifth St/Bryant St	I-80 EB on-ramp	**>80**	**F**	**>80**	**F**	24.9	C	**> 80**	**F**
6	Third Street	Channel Street[f]	**PCO controlled**		**PCO controlled**		**PCO controlled**		**PCO controlled**	
7	Fourth Street	Channel Street[f]	< 10	A	11.5	B	**PCO controlled**		**PCO controlled**	
8	Seventh Street	Mission Bay Dr	21.2	C	**>80**	**F**	12.5	B	**> 80**	**F**
9	TA Francois Blvd	South Street[c,f]	11.5 (eb)	B	< 10	A	12.9 (eb)	B	41.2	D
10	Third Street	South Street[f]	21.8	C	**>80**	**F**	11.5	B	< 10	A
11	TA Francois Blvd	16th Street[f]	--	--	19.4	B	--	--	22.2	C
12	Illinois Street	16th Street[c,f]	11.7 (nb)	B	19.7 (nb)	C	< 10 (nb)	A	< 10 (sb)	A
13	Third Street	16th Street[e,f]	27.0	C	28.9	C	18.3	B	33.5	C
14	Fourth Street	16th Street[e]	19.7	B	23.7	C	15.1	B	22.3	C
15	Owens Street	16th Street[e]	22.0	C	54.8	D	11.5	B	33.6	C
16	7th/Mississippi	16th Street[e]	**75.6**	**E**	**>80**	**F**	25.6	C	29.6	C
17	Illinois Street	Mariposa Street[c,f]	15.1 (eb)	B	**75.6**	**E**	**PCO controlled**		**PCO controlled**	
18	Third Street	Mariposa Street[f]	34.9	C	47.6	D	**PCO controlled**		**PCO controlled**	
19	Fourth Street	Mariposa Street[f]	12.0	B	17.2	B	< 10	A	< 10	A
20	Mariposa Street	I-280 NB off-ramp[f]	20.2	C	**59.9**	**E**	17.2	B	24.4	C
21	Mariposa Street	I-280 SB on-ramp[d]	< 10	A	< 10	A	13.2	B	24.6	C
22	Third Street	Cesar Chavez St	32.2	C	33.0	C	35.3	D	35.1	D

NOTES:

[a] Delay presented in seconds per vehicle. For unsignalized intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
[b] Intersections operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.
[c] All-way stop-controlled intersection. The intersections of Terry A. Francois/South and Illinois/South signalized as part of the proposed project.
[d] The traffic signal at the intersection of Mariposa/I-280 southbound on-ramp is part of the roadway improvements on Mariposa Street between the I-280 northbound off-ramp and I-280 southbound on-ramp and the extension of Owens Street between 16th and Mariposa Streets, and is currently planned to be operational by fall 2015.
[e] Includes implementation of the 22 Fillmore Transit Priority Project, which includes converting one mixed-flow lane in each direction to a side-running transit-only lane.
[f] Under the Basketball Game scenario, a PCO would be stationed at this study intersection during pre-event and/or post-event periods, and, as necessary, would manually direct vehicles, pedestrians, transit, and bicyclists through the intersection. LOS reflects conditions without PCO intervention.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015



SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-20

Existing Plus Project Intersection LOS-With a SF Giants Evening Game - Weekday Evening and Late Evening Peak Hour - Basketball Game Scenarios

During the weekday p.m. peak hour with an overlapping SF Giants evening game, the additional vehicle trips generated under the Basketball Game scenario would worsen the intersection LOS conditions at the intersections of Seventh/Mission Bay Drive, Fourth/16th, and Owens/16th from LOS D or better to LOS E conditions, and this would be considered a significant traffic impact. All other study intersections would continue to operate at LOS D or better, with the exception of the four intersections that currently operate at LOS E or LOS F during the weekday p.m. peak hour with a SF Giants evening game (i.e., Fifth/King/I-280, Fifth/Harrison/I-80 westbound off-ramp, Fifth/Bryant/I-80 eastbound on-ramp, and Seventh/Mississippi/16th). At the intersections of King/Fifth/I-280 and Fifth/Bryant/I-80 eastbound on-ramp, the Basketball Game scenario was determined not to contribute considerably to the existing LOS E or LOS F conditions, and project-related traffic impacts at these intersections would be considered less than significant. At the intersections of Fifth/Harrison/I-80 westbound off-ramp and Seventh/Mississippi/16th, the proposed project would contribute to the LOS E or LOS F conditions, and this would be considered a significant traffic impact.

During the weekday evening peak hour with overlapping evening events, the additional vehicle trips associated with the proposed project would worsen the intersection LOS at the intersections of King/Fifth/I-280 ramps, Fifth/Harrison/I-80 westbound off-ramp, and Seventh/Mission Bay Drive, Third/South, Seventh/Mississippi/16th, Mariposa/I-280 northbound off-ramp from LOS D or better to LOS E or LOS F conditions, or from LOS E to LOS F conditions, and this would be considered a significant traffic impact. All other study intersections would continue to operate at LOS D or better, with the exception of the intersection of Fifth/Bryant/I-80 eastbound on-ramp that currently operates at LOS F during the weekday evening peak hour with a SF Giants evening game; at this intersection, the Basketball Game scenario would not contribute considerably to the existing LOS F conditions, and project-related traffic impacts at this intersection would be considered less than significant.

During the weekday late evening peak hour with overlapping evening events, the additional project vehicle trips would worsen the intersection LOS at the intersections of Fifth/Bryant/I-80 eastbound on-ramp and Seventh/Mission Bay Drive from LOS D or better to LOS F conditions, and this would be considered a significant traffic impact. All other study intersections would continue to operate at LOS D or better, with the exception of the intersection of Fifth/Bryant/I-80 eastbound on-ramp which currently operate at LOS F during the weekday late evening peak hour with a SF Giants evening game; at this intersection, the Basketball Game scenario would not contribute considerably to the existing LOS F conditions, and project-related traffic impacts at this intersection would be considered less than significant

During the Saturday evening peak hour with overlapping evening events, with the additional vehicle trips generated, the intersection LOS at the intersections of Fifth/Harrison/I-80 westbound off-ramp, Seventh/Mission Bay Drive, and Seventh/Mississippi/16th would worsen from LOS D or better to LOS F conditions, and this would be considered a significant traffic impact. All other signalized study intersections would continue to operate at LOS D or better.

Thus, with overlapping evening events, additional study intersections from those identified in Impact TR-2 for conditions without an overlapping SF Giants game, would operate at LOS E or LOS F conditions. Existing plus project conditions for the Basketball Game scenario with a SF Giants evening game at AT&T Park would result in *significant* traffic impacts at ten study intersections not currently subject to PCO control during a SF Giants evening game. These intersections are:

- King/Fifth/I-280 ramps (weekday evening)
- Fifth/Harrison/I-80 westbound off-ramp (weekday p.m., weekday evening, Saturday evening)
- Fifth/Bryant/I-80 eastbound on-ramp (weekday late evening)
- Third/South (weekday evening)
- Seventh/Mission Bay Drive (weekday p.m., weekday evening, weekday late evening, Saturday evening)
- Fourth/16th (weekday p.m.)
- Owens/16th (weekday p.m.)
- Seventh/Mississippi/16th Street (weekday p.m., weekday evening, and Saturday evening)
- Illinois/Mariposa (weekday evening)
- Mariposa/I-280 northbound off-ramp (weekday evening)

The four study intersections of Fifth/Harrison/I-80 westbound off-ramp, Fifth/Bryant/I-80 eastbound on-ramp, Seventh/Mission Bay Drive, and Seventh/Mississippi/16th were identified as project-specific impacts in **Impact TR-2** for existing plus project conditions without an overlapping evening event, while the six intersections of King/Fifth/I-280 ramps, Third/South, Fourth/16th, Owens/16th, Illinois/Mariposa, and Mariposa/I-280 northbound off-ramp would be additional significant impacts resulting from overlapping evening events. The proposed project's TMP identifies PCOs at the intersections of Third/South, Owens/16th, Illinois/Mariposa, and Mariposa/I-280 ramps for pre-event and post-event conditions to manage traffic (see **Figure 5.2-11**).

Overall, on days with overlapping evening events at the project site and at AT&T Park, intersections in the project vicinity would become more congested prior to and following the events, and the proposed project would result in significant traffic impacts at the following ten study intersections: King/Fifth/I-280 ramps, Fifth/Harrison/I-80 westbound off-ramp, Fifth/Bryant/I-80 eastbound on-ramp, Third/South, Seventh/Mission Bay Drive, Fourth/16th, Owens/16th, Seventh/Mississippi/16th Street, Illinois/Mariposa, Mariposa/I-280 northbound off-ramp. Implementation of **Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts, Mitigation Measure M-TR-11a: Additional PCOs During Overlapping Events** and **Mitigation Measure M-TR-11b: Regular Participation in Ballpark/Mission Bay Transportation Coordinating Committee** would minimize the severity of traffic impacts at these intersections and would not result in secondary transportation impacts, but would not improve intersection LOS to LOS D or better. Thus, traffic impacts at the ten study intersections would remain *significant and unavoidable with mitigation.*

In addition to the mitigation measures describe above, **Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events,** would require the project sponsor to continue to work with the City to seek additional feasible mitigation measures to reduce transportation impacts. The feasibility of these measures has not been determined. One strategy involves using off-site parking lot(s) south of the event center and providing shuttles to the event center if the location of off-site parking is not within walking distance to the event center. If this strategy were to become feasible, the City would identify one or more off-site parking lot(s) on Port of San Francisco or other lands to the south of the event center to provide approximately 250 additional parking spaces for all events and up to an approximately 750 additional parking spaces (for a total of approximately 1,000 spaces) during dual events of 12,500 or more event center attendees or for other circumstances if needed, and the project sponsor shall provide free shuttles from such off-site parking lot(s) to the event center on a maximum 10-minute headway (i.e., six shuttles per hour) before and after events. Preliminary discussions with the Port have identified potential parking lot locations at an area northwest of Pier 70 in the vicinity of the intersection of Illinois/19th and an area near Pier 80 referred to as the Western Pacific site. These locations are approximate only and subject to change based on a variety of factors including, but not limited to, proximity to the event center, infrastructure and development cost, and availability. In addition, any specific locations identified for this purpose would be subject to subsequent review, design, and approvals that may involve both local and State agencies.

Given the current uncertainties regarding the availability, location, and size of one or more off-site parking lots, the effectiveness of this strategy cannot be quantified at this time. If such an off-site parking lot(s) were to be determined to be feasible, it is possible that use of this off-site parking could reduce traffic impacts in the project vicinity. However, drivers who may use these potential additional parking facilities could travel along different routes, which could result in significant traffic impacts south of the project site such as along Third Street, Cesar Chavez Street, 25th Street or other streets that may be used as access to or from affected freeway on-ramps and off-ramps and approaches in the vicinity of the parking lot(s). Mitigation for such traffic impacts may be available depending on the areas affected. Standard mitigation techniques that could be employed involve temporary or permanent removal of on-street parking to accommodate traffic flow, addition of stop signs or traffic signals, adjustment to signal timing where signals exist, addition of dedicated turn lanes or turning lane traffic indicators if the physical constraints of the intersection or adjoining streets could accommodate such changes, and other available traffic control devices. These measures could be implemented where feasible to maintain a LOS D or better. Similar physical or geometric constraints to fully mitigating traffic impacts may also be applicable at affected freeway on-ramps, off-ramps and approaches. However, due to the physical limitations of the City's street grid, land may not be available for City purchase that would allow for the expansion of street width to accommodate additional travel lanes or other design techniques to achieve the standard of LOS D or better, and City policies disfavor expansion of roadway capacity in order to achieve the City's Transit First and other goals that attempt to limit private vehicle use. Consequently, until a site-specific analysis of the identified parking lot(s) is conducted, it cannot be determined what mitigation measures may be available for affected areas, and then whether the measures would be feasible given the physical constraints of the street network and the availability of funding to implement the measures. Under the circumstances, the City would implement those measures that it deems feasible to achieve a LOS D or better in the affected areas, but regardless, secondary traffic impacts associated with Mitigation Measure M-TR-11c, Additional Strategies to Reduce Transportation Impacts of Overlapping Events, involving the use of one or more off-site parking lot(s) at this time would be considered potentially *significant and unavoidable with mitigation.*

Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts (see Impact TR-2, above)

Mitigation Measure M-TR-11a: Additional PCOs during Overlapping Events

As a mitigation measure to manage traffic flows and minimize congestion associated with overlapping events, the proposed project's TMP shall be expanded to include additional PCOs that shall be deployed to the following intersections where the proposed project would result in significant traffic impacts, as conditions warrant during events: King/Fifth/I-280 ramps, Fifth/Harrison/I-80 westbound off-ramp, Fifth/Bryant/I-80 eastbound on-ramp, Seventh/Mission Bay Drive, Fourth/16th, and Seventh/Mississippi/16th. The PCO Supervisor shall make the determination where the additional PCOs would be located, based on field conditions during an event. This measure shall be implemented in coordination with Mitigation Measure M-TR-2a: Additional PCOs during Events.

Mitigation Measure M-TR-11b: Participation in the Ballpark/Mission Bay Transportation Coordinating Committee

As a mitigation measure to optimize effectiveness of the transportation management strategies for day-to-day operations and events in the Mission Bay area, at AT&T Park, UCSF Mission Bay campus, and the proposed project, the project sponsor shall actively participate as a member of the Ballpark/Mission Bay Transportation Coordinating Committee in order to evaluate and plan for operations of all three facilities (i.e., AT&T Park, UCSF Mission Bay Campus, and the proposed event center). This committee would, among other roles, serve as a single point for coordination of transportation management strategies.

The Transportation Coordinating Committee shall consult on changes to and expansion of transit services, and for developing and implementing strategies within their purview that address transportation issues and conflicts as they arise. In addition, the committee shall serve as a liaison for operation of the facilities, monitoring conditions, and addressing community issues related to events and the project sponsor shall make good faith efforts to notify the committee regarding events.

Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events

The project sponsor shall work with the City to pursue and implement, if feasible, additional strategies to reduce transportation impacts associated with overlapping events at AT&T Park and the proposed event center. These strategies could include the following:

- The project sponsor shall exercise commercially reasonable efforts to avoid scheduling non-Golden State Warriors events of 12,500 or more event center attendees that start within 60 minutes of the start (respectively) of events at AT&T Park.
- When overlapping non-Golden State Warriors events of 12,500 or more event center attendees and evening SF Giants games cannot be avoided through commercially reasonable efforts, the project sponsor shall negotiate with the event promoter as feasible to stagger start times such that the event headliner starts no earlier than 8:30 p.m.
- The City shall identify one or more off-site parking lot(s) on Port of San Francisco or other lands to the south of the event center to provide approximately 250 additional parking spaces for all events and up to approximately 950 additional parking spaces for use during dual events of 12,500 or more event center attendees (for a total of approximately 1,000 additional off-site parking spaces). The project sponsor shall: (1) acquire sufficient rights for the use of such parking lot(s) through lease, purchase, or other means as necessary; (2) pay its fare-share contribution towards any improvements required for the use of such parking lot(s), including but not limited to grading, paving, striping, fencing, lighting, drainage, stormwater pollution prevention measures, curb cuts, and ramps; and (3) provide free shuttles to the event center from such off-site parking lot(s) that are more than ¼-mile from the event center on a maximum 10-minute headway before and after events.

Impact TR-12: The proposed project would result in significant traffic impacts at freeway ramps that would operate at LOS E or LOS F under Existing plus Project conditions with an overlapping SF Giants evening game at AT&T Park. (Significant and Unavoidable with Mitigation)

Table 5.2-49 presents the ramp LOS conditions for the Basketball Game scenario for the weekday p.m. and Saturday evening peak hours for conditions with an overlapping SF Giants evening game at AT&T Park, while **Table 5.2-50** presents the weekday evening and late evening peak hour conditions. The analysis represents conditions for high attendance events at both the proposed event center and at AT&T Park, which are estimated to occur, an average of nine times a year. For the remaining 23 days during which events at both facilities could overlap, the average attendance levels for the event center events is anticipated to be less than 12,500 attendees, and therefore, the number of vehicle trips generated by the smaller event would be less, as would the impact on intersection operating conditions.

TABLE 5.2-49
FREEWAY RAMP LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITH A SF GIANTS EVENING GAME - WEEKDAY PM AND SATURDAY EVENING PEAK HOURS

		Weekday PM				Saturday Evening			
		Existing		Existing plus Project - Basketball Game		Existing		Existing plus Project - Basketball Game	
#	Ramp Location	Density[a]	LOS[b]	Density	LOS	Density	LOS	Density	LOS
1	I-80 EB on-ramp at Sterling	**35**	**E**	**36**	**E**	25	C	25	C
2	I-80 EB on-ramp at Fifth/Bryant	**--**	**F**	**--**	**F**	**--**	**F**	**--**	**F**
3	I-80 WB off-ramp at Fifth/Harrison	31	D	32	D	27	C	**35**	**E**
4	I-280 SB on-ramp at Pennsylvania	**36**	**E**	**36**	**E**	17	B	17	B
5	I-280 NB off-ramp at Mariposa	29	D	31	D	18	B	26	C
6	I-280 SB on-ramp at Mariposa	31	D	32	D	14	B	15	B

NOTES:
[a] Density of vehicles in merge and diverge influence area for on-ramp and off-ramp analysis, respectively. Measured in passenger cars per mile per lane. Density value is not presented for ramp analyses where the demand volume exceeds the capacity.
[b] Ramps operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

TABLE 5.2-50
FREEWAY RAMP LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITH A SF GIANTS EVENING GAME - WEEKDAY EVENING AND LATE EVENING PEAK HOURS

		Evening				Late Evening			
		Existing		Existing plus Project - Basketball Game		Existing		Existing plus Project - Basketball Game	
#	Ramp Location	Delay[a]	LOS[b]	Delay	LOS	Delay	LOS	Delay	LOS
1	I-80 EB on-ramp at Sterling	28	D	28	D	23	C	27	**C**
2	I-80 EB on-ramp at Fifth/Bryant	**--**	**F**	**--**	**F**	32	D	**--**	**F**
3	I-80 WB off-ramp at Fifth/Harrison	29	D	**37**	**E**	27	C	27	C
4	I-280 SB on-ramp at Pennsylvania	28	D	26	D	21	C	27	C
5	I-280 NB off-ramp at Mariposa	30	D	**--**	**F**	13	B	13	B
6	I-280 SB on-ramp at Mariposa	26	C	27	C	18	B	24	C

NOTES:
[a] Density of vehicles in merge and diverge influence area for on-ramp and off-ramp analysis, respectively. Measured in passenger cars per mile per lane. Density value is not presented for ramp analyses where the demand volume exceeds the capacity.
[b] Ramps operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

The proposed project under the Basketball Game scenario with an overlapping SF Giants evening game at AT&T Park would result in a significant impact at the I-80 westbound off-ramp at Fifth/Harrison Street during the weekday evening and Saturday evening peak hours (i.e., attendees driving to San Francisco from the East Bay), and at the I-280 northbound off-ramp at Mariposa Street during the weekday evening peak hour (i.e., attendees driving to the event center and AT&T Park from the south of the project site). The proposed project would also result in a significant impact at the I-80 eastbound on-ramp at Fifth/Bryant Street during the weekday late evening peak hour (i.e., attendees returning to the East Bay).

The proposed project would not contribute considerably to the other ramps operating at LOS E or LOS F under existing conditions (i.e., the I-80 eastbound on-ramp at Sterling Street during the weekday p.m. peak hour, the I-280 southbound on-ramp at Pennsylvania Street during the weekday p.m. peak hour, or the I-80 eastbound on-ramp at Fifth/Bryant during the weekday p.m., weekday evening, and Saturday evening peak hours), and therefore, traffic impacts at these ramp locations would be considered less than significant.

Overall, under existing plus project conditions with a SF Giants evening game at AT&T Park, the proposed project would result in *significant* project-specific impacts at the following three freeway ramp locations:

- I-80 eastbound on-ramp at Fifth/Bryant (weekday late evening)
- I-80 westbound off-ramp at Fifth/Harrison (weekday evening, Saturday evening)
- I-280 northbound off-ramp at Mariposa Street (weekday evening)

As discussed in **Impact TR-3** for conditions without an overlapping SF Giants evening game, no feasible mitigations are available for the freeway ramp impacts because there is insufficient physical space for additional capacity without redesign of the I-80 and I-280 ramps and mainline structures, and which may require acquisition of additional right-of-way, and other potential measures would not adequately address the short-term peak travel patterns associated with special events. **Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts** and **Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events** would encourage non-auto modes of travel to the event center through parking pricing, provide additional off-site parking facilities to the south of the project site, and enhance regional transit access to the area, which would reduce the project traffic increase on regional freeway mainline and ramps. However, the feasibility of **Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events** is uncertain, and the reduction in vehicle trips would not reduce impacts related to freeway ramp operations to less-than-significant levels. Thus, for these reasons, the proposed project's impacts related to freeway ramp operations would be *significant and unavoidable with mitigation*.

Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts (see Impact TR-2, above)

Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events (see Impact TR-11, above)

Transit Impacts

Impact TR-13: The proposed project could result in a substantial increase in transit demand that could not be accommodated by adjacent Muni transit capacity such that significant adverse impacts to Muni transit service would occur under Existing plus Project conditions with an overlapping SF Giants evening game at AT&T Park. (Less than Significant with Mitigation)

The transit analysis represents conditions for overlapping high attendance events at both the proposed event center and at AT&T Park, which are estimated to occur, an average of nine times a year. For the remaining 23 days during which events at both facilities could overlap, the average attendance levels for the event center events is anticipated to be less than 12,500 attendees, and therefore, the number of transit trips generated by the smaller event would be less, as would the impact on transit ridership and capacity utilization conditions. With overlapping evening events at the event center and AT&T Park, additional capacity on the T Third would be provided pre-game as currently occurs for SF Giants games, but overlapping evening events at both venues would cause the weekday evening capacity utilization of 93 percent for the Basketball Game scenario without a SF Giants game (see Impact TR-4) to increase further, and would exceed the 100 percent capacity utilization standard for special events, and this would be considered a significant impact. With overlapping evening events, the Muni Special Event Shuttles to the event center would continue to accommodate project demand as these shuttles would exclusively serve the proposed event center attendees.

During the weekday evening peak hour with overlapping evening events, it is anticipated that if overlapping events end at similar times, the demand for T Third service would exceed the available capacity, and this would be an additional impact for overlapping events (Impact TR-4 did not identify a significant impact on light rail operations during the weekday late evening).

During the Saturday evening peak hour with overlapping events, similar peak arrivals for similar start times (e.g., 7:15 p.m. for a SF Giants evening game, and 7:30 p.m. for a Golden State Warriors game), would result in the ridership demand exceeding the capacity of the T Third, and this would be considered a significant impact. While the analysis identifies a capacity shortfall during the Saturday evening peak hour for inbound trips, additional capacity would need to be provided for the late evening period for trips departing the event center and AT&T Park post-event.

Overall, on days with overlapping evening events at the project site and at AT&T Park, transit demand would exceed the capacity prior to and following the events, and the proposed project would result in significant transit impacts. Implementation of **Mitigation Measure M-TR-13: Additional Muni Transit Service During Overlapping Events** would minimize transit impacts. The additional Muni capacity would generally be within what is currently provided for SF Giants games and the additional capacity provided as part of the Muni Special Event Transit Service Plan for the proposed project. Implementation of the mitigation measure would ensure that Muni service would be provided to accommodate the T Third demand via Muni bus shuttles to AT&T Park and/or the proposed event center, and would not result in secondary transportation impacts. Thus, with implementation of this mitigation measure, the proposed project's transit impacts would be *less than significant with mitigation.*

Mitigation Measure M-TR-13: Additional Muni Transit Service during Overlapping Events

As a mitigation measure to accommodate Muni transit demand to and from the project site and AT&T Park on the T Third light rail line during overlapping evening events, the project sponsor shall work with the Ballpark/Mission Bay Transportation Coordinating Committee to coordinate with the SFMTA to provide additional shuttle buses between key Market Street locations and the project. Examples of the additional service include Muni bus shuttles between Union Square and/or Montgomery BART/Muni station and the project site. The need for additional Muni service shall be based on characteristics of the overlapping events (e.g., projected attendance levels, and anticipated start and end times).

Impact TR-14: The proposed project would result in a substantial increase in transit demand that could not be accommodated by regional transit such that significant adverse impacts to regional transit service would occur under Existing plus Project conditions with an overlapping SF Giants evening game at AT&T Park. (Significant and Unavoidable with Mitigation)

In general, during the weekday p.m. peak hour, because the peak direction of travel on regional transit operators is in the outbound direction (i.e., workers leaving downtown San Francisco), transit capacity would generally be available to accommodate inbound riders associated with the overlapping evening events. The number of attendees arriving for 7:15 or 7:30 p.m. start times during the weekday p.m. peak hour is low, as most attendees for both SF Giants and Golden State Warriors games arrive within an hour of the start time. As presented in **Table 5.2-40** and **Table 5.2-41** above, additional capacity is available on transit service providers from the East Bay and North Bay during the weekday p.m. and weekday evening peak hours, respectively.

As determined in Impact TR-5, during the weekday evening peak hour, the proposed project would exceed the Caltrain northbound capacity, and result in a significant transit impact. With a basketball game without an overlapping SF Giants game, the capacity utilization of Caltrain would exceed the 100 percent capacity utilization standard. With overlapping evening events, the transit demand from the South Bay would further increase, and thus increase the capacity utilization. Thus, similar to Impact TR-5, overlapping evening events would result in a significant impact to Caltrain capacity.

During the weekday late evening period, Caltrain currently provides an additional train for SF Giants evening games, and it is anticipated that this service would continue. The proposed project would add about 720 transit trips to Caltrain during the weekday late evening peak hour, which would not be accommodated within the existing and proposed special event service during overlapping evening events. Similar, as identified in Impact TR-5, overlapping evening events would further increase the capacity utilization of the North Bay service providers, resulting in significant impacts on Golden Gate Transit and WETA. During the weekday late evening following the end of a SF Giants evening game, BART occasionally provides additional capacity to accommodate the SF Giants post-game demand. With overlapping events, additional capacity would be required to accommodate the combined BART East Bay transit demand. Thus, the Basketball Game scenario, with an overlapping SF Giants evening game, would result in a significant transit impact at one additional regional transit service provider (i.e., BART) than for conditions without an overlapping evening event. Overall, under existing plus project conditions with an overlapping SF Giants evening game at AT&T Park, the proposed project would result in *significant* project-specific transit impacts on BART, Caltrain, Golden Gate Transit, and WETA.

Implementation of **Mitigation Measure M-TR-5a: Additional Caltrain Service, Mitigation Measure M-TR-5b: Additional North Bay Ferry and Bus Service, and Mitigation Measure M-TR-14: Additional BART Service to the East Bay during Overlapping Events** would reduce or minimize the severity of the capacity utilization exceedances for the regional transit service providers, and would not result in secondary transportation impacts. However, since the provision of additional East Bay, South Bay, and North Bay service is uncertain and full funding for the service has not yet been identified, implementation of these mitigation measures remain uncertain. Accordingly, the proposed project's significant impacts to BART, Caltrain, Golden Gate Transit and WETA transit capacity would be *significant and unavoidable with mitigation*.

Mitigation Measure M-TR-5a: Additional Caltrain Service during Events (see Impact TR-5, above)

Mitigation Measure M-TR-5b: Additional North Bay Bus and Ferry Service during Events (see Impact TR-5, above)

Mitigation Measure M-TR-14: Additional BART Service to the East Bay during Overlapping Events

As a mitigation measure to accommodate transit demand to the East Bay following weekday and weekend evening events, the project sponsor shall work with the Ballpark/Mission Bay Transportation Coordinating Committee to coordinate with BART to provide additional service from San Francisco following weekday and weekend evening events. The additional East Bay BART service could be provided by operating longer trains. The need for additional BART service shall be based on characteristics of the overlapping events (e.g., event type, projected attendance levels, and anticipated start and end times).

Pedestrian Impacts

Impact TR-15: The proposed project could result in a substantial overcrowding on public sidewalks, or create potentially hazardous conditions for pedestrians, or otherwise interfere with pedestrian accessibility on the site and adjoining areas under Existing plus Project conditions with an overlapping SF Giants evening game at AT&T Park. (Less than Significant with Mitigation)

A quantitative pedestrian analysis was conducted for the Basketball Game scenario assuming an overlapping SF Giants evening game at AT&T Park. Proposed project impacts on pedestrians for other evening events at the event center (e.g., concerts, family shows) would be similar to or less than those identified in this analysis for a basketball game, as the Basketball Game scenario reflects the maximum attendance level for evening events. In addition, as noted in **Impact TR-6** and **Table 5.2-16**, for small and large events at the proposed event center, PCOs would be posted at nearby intersections to manage pedestrian flows and reduce conflicts. **Table 5.2-51** presents the results of the pedestrian LOS analysis for overlapping SF Giants and basketball evening game conditions for the weekday p.m. and Saturday evening peak hours, while **Table 5.2-52** presents this information for the weekday evening and late evening peak hours.

TABLE 5.2-51
PEDESTRIAN LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITH A SF GIANTS EVENING GAME - WEEKDAY PM AND SATURDAY EVENING PEAK HOURS

	Weekday PM				Saturday Evening			
	Existing		Existing plus Project - Basketball Game		Existing		Existing plus Project - Basketball Game	
Analysis Location	**MOE[a]**	**LOS[b]**	**MOE**	**LOS**	**MOE**	**LOS**	**MOE**	**LOS**
Crosswalks								
Third St/South St[c]								
North	294	A	155	A	714	A	**11**	**E**
South	144	A	16	D	421	A	**3**	**F**
East	1,045	A	52	B	1,502	A	20	D
Third St/16th St[c]								
North	814	A	68	A	1,594	A	40	C
South	370	A	61	A	973	A	34	C
East	1,296	A	124	A	2,472	A	20	D
West	351	A	81	A	1,102	A	40	C
Terry A. Francois Blvd/South St[c]								
North	--	--	126	A	--	--	34	C
South	--	--	73	A	--	--	16	D
West	--	--	96	A	--	--	22	D
Sidewalks								
Third St between South & 16th Streets								
East	0.1	A	0.7	B	0.1	A	1.0	B
West	0.3	A	0.4	A	0.1	A	0.3	A
South Street – South Side	--	--	0.8	B	--	--	1.2	B
16th Street – North Side	--	--	0.8	B	--	--	1.5	B

NOTES:
[a] MOE – Measure of Effectiveness. Circulation area measured in average square feet per pedestrian for crosswalk analysis, and pedestrian unit flow measured in average pedestrians per minute per foot for sidewalk analysis.
[b] Crosswalks operating at LOS E or LOS F highlighted in **bold**. Significant project impacts shaded.
[c] Under the Basketball Game scenario, a PCO would be stationed at this study intersection during the Saturday pre-event period, and, as necessary, would manually direct vehicles, pedestrians, transit, and bicyclists through the intersection. LOS reflects conditions without PCO intervention.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

TABLE 5.2-52
PEDESTRIAN LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITH A SF GIANTS EVENING GAME - WEEKDAY EVENING AND LATE EVENING PEAK HOURS

	Evening				Late Evening			
	Existing		Existing plus Project - Basketball Game		Existing		Existing plus Project - Basketball Game	
Analysis Location	MOE[a]	LOS[b]	MOE	LOS	MOE	LOS	MOE	LOS
Crosswalks								
Third St/South St[c]								
North	401	A	**10**	**E**	--	--	**4**	**F**
South	150	A	**3**	**F**	--	--	**5**	**F**
East	1,253	A	19	D	--	--	**10**	**E**
Third St/16th St[c]								
North	764	A	40	C	--	--	30	C
South	590	A	39	C	--	--	33	C
East	1,479	A	29	C	--	--	51	B
West	313	A	54	B	--	--	76	A
Terry A. Francois Blvd/South St[c]								
North	--	--	36	C	--	--	32	C
South	--	--	18	D	--	--	16	D
West	--	--	24	D	--	--	21	D
Sidewalks								
Third St between South & 16th Streets								
East	0.1	A	1.4	B	--	--	1.8	B
West	0.3	A	0.6	A	--	--	0.7	B
South Street – South Side	--	--	1.7	B	--	--	2.3	B
16th Street – North Side	--	--	2.0	A	--	--	1.9	B

NOTES:
a MOE – Measure of Effectiveness. Circulation area measured in average square feet per pedestrian for crosswalk analysis, and pedestrian unit flow measured in average pedestrians per minute per foot for sidewalk analysis.
b Crosswalks operating at LOS E or LOS F highlighted in **bold**. **Significant project impacts shaded.**
c Under the Basketball Game scenario, a PCO would be stationed at this study intersection during pre-event and post-event periods, and, as necessary, would manually direct vehicles, pedestrians, transit, and bicyclists through the intersection. LOS reflects conditions without PCO intervention.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

The pedestrian analysis for overlapping events represents conditions for high attendance events at both the proposed event center and at AT&T Park, which are estimated to occur an average of nine times a year. For the remaining 23 days during which events at both facilities could overlap, the average attendance levels for the event center events is anticipated to be less than 12,500 attendees, and therefore, the number of pedestrian trips generated by the smaller event would be less, as would the impact on pedestrian conditions.

Pedestrian conditions in the vicinity of the project site for the Basketball Game scenario with an overlapping SF Giants evening game at AT&T Park would be similar to conditions without a SF Giants game presented above in **Impact TR-6**. The existing parking lots on the project site are currently available for SF Giants evening game parking, and, with implementation of the proposed project, would no longer be available (existing overall parking utilization at the two lots in the study area on a SF Giants evening game day is below 50 percent). SF Giants game attendees currently parking at those two lots would seek parking elsewhere, or would switch modes. The pedestrian analysis of conditions with overlapping evening events assumes that SF Giants attendees currently parking at the project site would seek parking in other nearby facilities (e.g., at the UCSF garage at 1650 Third Street, which currently has available capacity during SF Giants evening games), and would continue to walk along Third Street and through the crosswalks at adjacent intersections.

As presented in **Table 5.2-51**, during the weekday p.m. peak hour, LOS conditions on crosswalks and sidewalks in the project vicinity would remain at LOS D or better. Similarly, as pedestrian volumes associated with the event center increase during the weekday evening and Saturday evening peak periods, the pedestrian LOS at the north and south crosswalks at the intersection of Third/South would operate at LOS E or LOS F conditions. During the weekday late evening peak hour, as pedestrians leave the event center, all three crosswalks at this intersection would operate at LOS E or LOS F (as for the Basketball Game scenario without an overlapping evening event at AT&T Park). The LOS E and LOS F conditions would be considered a significant pedestrian impact. All other analysis locations would operate at LOS D or better.

As discussed in **Impact TR-6**, with implementation of **Mitigation Measure M-TR-6: Active Management of Pedestrian Flows at the Intersection of Third/South**, these significant pedestrian impacts would be reduced to less than significant levels. During post-event conditions, the northbound travel lanes on Third Street between 16th Street and Mission Bay Boulevard South, and South Street between Third Street and the entrance/exit to the 450 South Street Garage, would be closed to vehicular traffic in order to facilitate pedestrian egress from the event center and access to the light rail platforms within the Third Street median. With implementation of **Mitigation Measure M-TR-6: Active Management of Pedestrian Flows at the Intersection of Third/South**, PCOs stationed at this location would implement strategies to allow pedestrians to cross the street safely, including extending the green time for pedestrians crossing the street, manually overriding the traffic signal and directing pedestrians to cross, erecting temporary pedestrian crossing barriers, allowing use of the closed Third Street as a pedestrian access route, providing a defined passenger waiting area within the closed Third Street, and shielding passengers waiting to board light rail from adjacent pedestrian traffic.

Overall, on days with overlapping evening events at the project site and at AT&T Park, pedestrian conditions would become more crowded prior to and following the events, however, with the TMP transportation management strategies and implementation of **Mitigation Measure M-TR-6: Active Management of Pedestrian Flows at the Intersection of Third/South**, the impact of the proposed project on pedestrians during overlapping evening events would be *less than significant with mitigation.*

Mitigation Measure M-TR-6: Active Management of Pedestrian Flows at the Intersection of Third/South (See Impact TR-6, above)

Bicycle Impacts

Impact TR-16: The proposed project would not result in potentially hazardous conditions for bicyclists, or otherwise substantially interfere with bicycle accessibility to the site and adjoining areas under Existing plus Project conditions with an overlapping SF Giants evening game at AT&T Park. (Less than Significant)

A qualitative assessment of bicycle conditions was conducted for the Basketball Game scenario assuming an overlapping SF Giants evening game at AT&T Park. Bicycle conditions in the vicinity of the project site for the Basketball Game scenario with an overlapping SF Giants evening game at AT&T Park would be similar to conditions without a SF Giants game presented above in **Impact TR-7**. It is anticipated that bicyclists traveling to both facilities would be accommodated with the existing, planned and proposed bicycle lanes. However, with overlapping evening events, traffic volumes on streets leading to and from the off-site parking facilities would be greater, which could result in increased potential for bicycle-vehicle conflicts. During overlapping evening events, transportation management strategies for the proposed event center and AT&T Park would be coordinated to minimize congestion and conflicts between modes. Proposed project impacts on bicycle access and circulation for other evening events at the event center (e.g., concerts, family shows) would also be similar to or less than that for the Basketball Game scenario.

Overall, on days with overlapping evening events at the project site and at AT&T Park, the number of bicyclists traveling in the project vicinity would increase prior to and following the events, however, the coordinated TMP transportation management strategies for the proposed event center and AT&T Park, including posting of PCOs, would ensure that the impact of the proposed project on bicyclists during overlapping evening events would be *less than significant.*

Mitigation: Not required

Emergency Vehicle Access Impacts

Impact TR-17: The proposed project would not result in significant impacts on emergency vehicle access under Existing plus Project conditions with an overlapping SF Giants evening game at AT&T Park. (Less than Significant)

Emergency vehicle access impacts under existing plus project conditions with a SF Giants evening game at AT&T Park would be similar to those described above in Impact TR-10 for conditions with an event but without an overlapping SF Giants evening game. The proposed project's TMP includes measures to manage pre-event and post-event vehicle traffic destined to the project parking garage and other parking facilities serving the event center, in order to minimize congestion and reduce potential conflicts between event center traffic and nearby UCSF hospital operations. During overlapping evening events, the 17 PCOs that would be stationed to direct and facilitate vehicular, bicycle, transit, and pedestrian traffic during large events at the project site would be supplemented by the PCOs that are currently deployed during SF Giants evening games. For smaller events, PCOs would be stationed at key intersections and would be monitoring conditions, and could be reassigned to respond to conflicts between event center traffic and UCSF hospital access. With implementation of the planned 22 Fillmore Transit Priority Project, transit-only lanes will be implemented on 16th Street, and emergency vehicles will be permitted use of the transit-only lanes. The transit-only lanes on 16th Street would have fewer vehicles in them than the adjacent mixed-flow lanes, and would not be subject to any turn restrictions. Persons accessing the UCSF Medical Center emergency room and urgent care center in their personal vehicles during an emergency would, if necessary, also be able to utilize the transit-only lanes to bypass congested segments on 16th Street. On Mariposa Street, if needed, emergency vehicles and other persons accessing the emergency room and urgent care center in their personal vehicles during an emergency would be able to travel within the left-center turn lane to access the intersection of Fourth/Mariposa. When PCOs are deployed for an event, they would have the capability to radio ahead to other PCOs down the street regarding the approaching vehicle requiring emergency access. In addition, the transportation management measures currently implemented during SF Giants games would minimize congestion on area roadways. Implementation of **Mitigation Measure M-TR-11a: Additional PCOs During Overlapping Events** and **Mitigation Measure M-TR-11b: Participation in Ballpark/Mission Bay Transportation Coordinating Committee** would minimize the severity of traffic congestion prior to and following events. As discussed in Impact TR-10, implementation of **Improvement Measure I-TR-10a: UCSF Emergency Vehicle Access and Garage Signage Plan** and **Improvement Measure I-TR-10b: Mariposa Street Restriping** would enhance emergency vehicle access to UCSF emergency facilities.

Furthermore, all drivers must comply with the California Vehicle Code § 21806, which requires that drivers yield right-of-way to authorized emergency vehicles, drive to the right road curb or edge, stop, and remain stopped until the emergency vehicle has passed.

Overall, roadway improvements adjacent to the project site would facilitate emergency vehicle access to the site. Before and after events emergency vehicle access to the project site and nearby hospital uses would be maintained with overlapping evening events at the project site and AT&T Park. For these reasons, the proposed project would not inhibit emergency vehicles access to the project site and nearby vicinity; therefore, the proposed project impact on emergency vehicle access even with overlapping basketball and SF Giants evening games would be *less than significant.*

Mitigation: Not required

Improvement Measure I-TR-10a: UCSF Emergency Vehicle Access and Garage Signage Plan (see Impact TR-10, above)

Improvement Measure I-TR-10b: Mariposa Street Restriping (see Impact TR-10, above)

Conditions Without Implementation of the Special Events Transit Service Plan

As described in Section 5.2.5.3, the project sponsor is working with the City to secure funding for the Muni Special Event Transit Service Plan as part of the project improvements, and which would be implemented by the SFMTA during large evening events with more than 14,000 attendees at the project site. The transportation impact analysis presented in **Impact TR-2** through **Impact TR-17** assumes that the special event transit service would be provided during basketball games to accommodate the transit demand. **Impact TR-18** through **Impact TR-24** below present a qualitative assessment of potential transportation impacts of the proposed project without implementation of the Muni Special Events Transit Service Plan.

Impact TR-18: Without implementation of the Muni Special Event Transit Service Plan, the proposed project would result in additional significant traffic impacts at intersections that would operate at LOS E or LOS F under Existing plus Project conditions. (Significant and Unavoidable with Mitigation)

In the event that the SFMTA would not be able to provide all or a portion of the Muni Special Event Transit Service Plan, it is expected that transit would be less convenient for event attendees, and, therefore, that fewer attendees would travel to the site by transit. Because the Muni Special Event Transit Service Plan was assumed only for analysis of a basketball game at the event center (i.e., the analysis did not assume that additional service would be provided for the Convention Event or No Event analysis scenarios), the transportation impact assessment focuses on the Basketball Game scenario for the weekday p.m., evening and late evening and for Saturday evening hours of analysis, but would be applicable for all large events (i.e., concerts, other sporting events, and conventions/corporate events) for which the Muni Special Event Transit Service Plan would be needed to serve attendees traveling to the event center.

Without implementation of the Muni Special Event Transit Service Plan for a basketball game, during the weekday p.m. peak hour the number of project-generated vehicle trips would increase by 54 trips. During the weekday and Saturday evening peak hours (i.e., the peak hour of arrivals to the event center), the number of vehicle trips would increase by 697 vehicles, while during the weekday late evening peak hour (i.e., departures from the event center), the number of vehicle trips would increase by 742 vehicles. During the weekday p.m. peak hour, the additional 54 vehicle trips could increase delay at some study intersections, however, it is anticipated that the intersection LOS would remain the same as presented in **Impact TR-2** for weekday p.m. peak hour conditions, and would not result in additional significant traffic impacts at intersections during the weekday p.m. peak hour.

Table 5.2-53 and **Table 5.2-54** present a comparison of the intersection LOS conditions for the Basketball Game scenario with and without the Muni Special Event Transit Service Plan for the weekday p.m. and Saturday evening peak hours (Table 5.2-53) and for the weekday evening and weekday late evening (Table 5.2-54) peak hours, respectively. During the weekday evening and late evening, and Saturday evening peak hours, the additional 700 to 750 vehicle trips could increase or exacerbate delay at intersection such that the intersection LOS becomes unacceptable (i.e., LOS E or LOS F), or could substantially worsen existing LOS E or LOS F conditions, beyond those identified in **Impact TR-2**.

TABLE 5.2-53
INTERSECTION LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITHOUT A SF GIANTS GAME – WITHOUT IMPLEMENTATION OF THE MUNI SPECIAL EVENT TRANSIT SERVICE PLAN - WEEKDAY PM AND SATURDAY EVENING PEAK HOURS

			BASKETBALL GAME SCENARIO WEEKDAY PM				BASKETBALL GAME SCENARIO SATURDAY EVENING			
			With Muni Special Event Transit Service Plan		*Without* Muni Special Event Transit Service Plan		With Muni Special Event Transit Service Plan		*Without* Muni Special Event Transit Service Plan	
#	Intersection Location		Delay[a]	LOS[b]	Delay	LOS	Delay	LOS	Delay	LOS
1	King St	Third Street	**72.7**	**E**	**72.9**	**E**	29.0	C	30.7	C
2	King St	Fourth Street	**60.2**	**E**	**60.1**	**E**	31.8	C	34.4	C
3	King St/Fifth St	I-280 ramps	**59.2**	**E**	**59.2**	**E**	<10	A	< 10	A
4	Fifth St/Harrison	I-80 WB off-ramp	49.8	D	50.3	D	**64.9**	**E**	**>80**	**F**
5	Fifth St/Bryant St	I-80 EB on-ramp	**>80**	**F**	**>80**	**F**	32.8	C	36.7	D
6	Third Street	Channel Street[f]	46.0	D	46.9	D	**78.9**	**E**	**>80**	**F**
7	Fourth Street	Channel Street[f]	11.3	B	11.5	B	45.7	D	**59.9**	**E**
8	Seventh Street	Mission Bay Dr	52.3	D	53.8	D	**>80**	**F**	**>80**	**F**
9	TA Francois Blvd	South Street[c,f]	< 10	A	< 10	A	<10	A	< 10	A
10	Third Street	South Street[f]	27.4	C	28.4	C	15.3	B	28.0	C
11	TA Francois Blvd	16th Street[c,f]	16.8	B	16.8	B	18.2	B	18.5	B
12	Illinois Street	16th Street[c,f]	11.5(nb)	B	11.5(nb)	B	11.8(nb)	B	13.3(nb)	B
13	Third Street	16th Street[e,f]	33.6	C	33.9	C	14.0	B	14.4	B
14	Fourth Street	16th Street[e]	28.0	C	28.3	C	16.2	B	16.8	B
15	Owens Street	16th Street[e]	44.2	D	45.4	D	20.4	C	24.3	C
16	7th/Mississippi	16th Street[e]	**> 80**	**F**	**> 80**	**F**	40.7	D	44.5	D
17	Illinois Street	Mariposa Street[c,f]	17.0	B	17.1	B	44.6	D	**56.2**	**E**
18	Third Street	Mariposa Street[f]	42.0	D	42.0	D	21.1	C	21.7	C
19	Fourth Street	Mariposa Street[f]	14.3	B	14.4	B	<10	A	<10	A
20	Mariposa Street	I-280 NB off-ramp[f]	25.8	C	25.8	C	24.8	C	39.5	D
21	Mariposa Street	I-280 SB on-ramp[d]	12.8	B	12.9	B	<10	A	< 10	A
22	Third Street	Cesar Chavez St	47.6	D	47.6	D	18.2	B	18.3	B

NOTES:
a Delay presented in seconds per vehicle. For unsignalized intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
b Intersections operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.
c All-way stop-controlled intersection. The intersections of Terry A. Francois/South and Illinois/Mariposa would be signalized as part of the proposed project.
d The traffic signal at the intersection of Mariposa/I-280 southbound on-ramp is part of the roadway improvements on Mariposa Street between the I-280 northbound off-ramp and I-280 southbound on-ramp and the extension of Owens Street between 16th and Mariposa Streets, and is currently planned to be operational by fall 2015.
e Includes implementation of the 22 Fillmore Transit Priority Project, which includes converting one mixed-flow lane in each direction to a side-running transit-only lane.
f Under the Basketball Game scenario, a PCO would be stationed at this study intersection during the Saturday pre-event period, and, as necessary, would manually direct vehicles, pedestrians, transit, and bicyclists through the intersection. LOS reflects conditions without PCO intervention.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

TABLE 5.2-54
INTERSECTION LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITHOUT A SF GIANTS GAME – WITHOUT IMPLEMENTATION OF THE MUNI SPECIAL EVENT TRANSIT SERVICE PLAN – WEEKDAY EVENING AND LATE EVENING PEAK HOURS

			Basketball Game Scenario Evening				Basketball Game Scenario Late Evening			
			With Muni Special Event Transit Service Plan		*Without* Muni Special Event Transit Service Plan		With Muni Special Event Transit Service Plan		*Without* Muni Special Event Transit Service Plan	
#	Intersection Location		Delay[a]	LOS[b]	Delay	LOS	Delay	LOS	Delay	LOS
1	King St	Third Street	**64.6**	**E**	**68.4**	**E**	23.6	C	25.7	C
2	King St	Fourth Street	**61.4**	**E**	**70.7**	**E**	22.5	C	22.3	C
3	King St/Fifth St	I-280 ramps	**56.9**	**E**	**57.1**	**E**	10.8	B	10.7	B
4	Fifth St/Harrison	I-80 WB off-ramp	**>80**	**F**	**>80**	**F**	22.3	C	22.7	C
5	Fifth St/Bryant St	I-80 EB on-ramp	**>80**	**F**	**>80**	**F**	**>80**	**F**	**>80**	**F**
6	Third Street	Channel Street[f]	**>80**	**F**	**>80**	**F**	37.5	D	**>80**	**F**
7	Fourth Street	Channel Street[f]	**72.5**	**E**	**>80**	**F**	**>80**	**F**	**>80**	**F**
8	Seventh Street	Mission Bay Dr	**>80**	**F**	**>80**	**F**	38.8	D	**>80**	**F**
9	TA Francois Blvd	South Street[c,f]	< 10	A	< 10	A	13.4	B	22.4	D
10	Third Street	South Street[f]	45.1	D	47.4	D	<10	A	<10	A
11	TA Francois Blvd	16th Street[c,f]	17.7	B	17.8	B	16.9	B	17.7	B
12	Illinois Street	16th Street[c,f]	15.7(nb)	C	19.3(nb)	C	< 10 (sb)	A	< 10 (sb)	A
13	Third Street	16th Street[e,f]	34.2	C	40.3	D	15.7	B	22.1	C
14	Fourth Street	16th Street[e]	37.0	D	44.1	D	18.0	B	22.8	C
15	Owens Street	16th Street[e]	39.0	D	49.3	D	31.2	C	**62.0**	**E**
16	7th/Mississippi	16th Street[e]	**>80**	**F**	**> 80**	**F**	24.1	C	31.5	C
17	Illinois Street	Mariposa Street[c,f]	45.8	D	**71.5**	**E**	22.6	C	37.7	D
18	Third Street	Mariposa Street[f]	37.1	D	41.9	D	23.6	C	24.2	C
19	Fourth Street	Mariposa Street[f]	13.0	B	13.6	B	<10	A	<10	A
20	Mariposa Street	I-280 NB off-ramp[f]	32.5	C	53.7	D	24.7	C	26.1	C
21	Mariposa Street	I-280 SB on-ramp[d]	<10	A	<10	A	14.3	B	13.4	B
22	Third Street	Cesar Chavez St	33.9	C	34.1	C	21.9	C	22.0	C

NOTES:
[a] Delay presented in seconds per vehicle. For unsignalized intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
[b] Intersections operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.
[c] All-way stop-controlled intersection. The intersections of Terry A. Francois/South and Illinois/Mariposa would be signalized as part of the proposed project.
[d] The traffic signal at the intersection of Mariposa/I-280 southbound on-ramp is part of the roadway improvements on Mariposa Street between the I-280 northbound off-ramp and I-280 southbound on-ramp and the extension of Owens Street between 16th and Mariposa Streets, and is currently planned to be operational by fall 2015.
[e] Includes implementation of the 22 Fillmore Transit Priority Project, which includes converting one mixed-flow lane in each direction to a side-running transit-only lane.
[f] Under the Basketball Game scenario, a PCO would be stationed at this study intersection during pre-event and/or post-event periods, and, as necessary, would manually direct vehicles, pedestrians, transit, and bicyclists through the intersection. LOS reflects conditions without PCO intervention.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

The proposed project without implementation of the Muni Special Event Transit Service Plan would result in *significant* traffic impacts at the following additional study intersections, or analysis periods:

- Third/Channel (weekday late evening)
- Fourth/Channel (Saturday evening)
- Seventh/Mission Bay Drive (weekday late evening)
- Illinois/Mariposa (weekday evening, Saturday evening)
- Owens/16th (weekday late evening)

Impacts at these five intersections would be in addition to the significant impacts identified for the proposed project with implementation of the Muni Special Event Transit Service Plan in Impact TR-2 for conditions without an overlapping SF Giants evening game, and in Impact TR-11 for conditions with an overlapping SF Giants evening game. **Mitigation Measure M-TR-2a: Additional PCOs during Events**, and **Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts** may reduce the severity of traffic impacts.

As discussed in Section 5.2.5.2, the City fully anticipates implementation of the Muni Special Event Transit Service Plan and has identified sufficient funding to deliver the additional transit service. As described above, in order to provide a conservative CEQA analysis as well as information to the public and decision makers, the discussion above discloses the impacts of the proposed project if for some unknown reasons in the future, the City is unable to implement the Muni Special Event Transit Service Plan. The analysis shows that without the additional transit service, the proposed project would result in additional significant traffic impacts. In order to reduce the severity of these impacts, the project sponsor shall implement **Mitigation Measure M-TR-18: Auto Mode Share Performance Standard and Monitoring**, which would ensure that the severity of Impact TR-18 through Impact TR-24 would be the same as the corresponding Impact TR-2 through Impact TR-17 irrespective of whether the Muni Special Event Transit Service Plan was implemented, and would not result in secondary transportation impacts. With implementation of this mitigation measure, the proposed project's traffic impacts would remain ***significant and unavoidable with mitigation***.

Mitigation Measure M-TR-2a: Additional PCOs during Events (see Impact TR-2, above)

Mitigation Measure M-TR-2b: Additional Measures to Reduce Transportation Impacts (see Impact TR-2, above)

Mitigation Measure M-TR-18: Auto Mode Share Performance Standard and Monitoring

Performance Standards and Strategies for Achieving Them

The project sponsor shall be responsible for implementing TDM measures intended to reach an auto mode share performance standard for different types of events. Specifically, the project sponsor shall work to achieve the following performance standards:

1. For weekday events that have 12,500 or more attendees, the project shall not exceed an arrival auto mode share of 53 percent.

2. For weekend events that have 12,500 or more attendees, the project shall not exceed an arrival auto mode share of 59 percent.

The performance standards shall be achieved by the middle of the Golden State Warriors' third season at the event center, and for every Golden State Warriors season thereafter.

The project sponsor may implement any combination of TDM strategies, including those identified in the proposed project's TMP, to achieve the above performance standards. Potential strategies include, but are not limited to:

- Providing shuttle bus service between major transportation hubs such as Transbay Transit Terminal, BART stations, Caltrain stations and the event center.
- Providing bus shuttles between park & ride lots, remote parking facilities, or other facilities or locations within San Francisco, and the event center.
- Facilitating charter bus packages through the event sales department to encourage large groups to travel to and from the event center on charter buses.
- Reducing the project parking demand through a variety of mechanisms, including pricing.
- Offering high occupancy vehicle parking at more convenient locations than parking for the general public and/or at reduced rates.
- Undertaking media campaigns, including in social media, that promote walking and/or bicycling to the event center.
- Conducting cross-marketing strategies with event center businesses (e.g., 10 percent off merchandise/food if patrons arrive by transit and/or bike or on foot).
- Carrying out public education campaigns.
- Offering special event ferry service to the closest ferry station to the project site (similar to the existing service provided between AT&T Park and Alameda and Marin Counties by Golden Gate Transit, Alameda/Oakland and Vallejo ferry service).
- Providing incentive for arrivals by bike.
- Providing transit fare incentives to event ticket holders.

Monitoring and Reporting

The project sponsor shall retain a qualified transportation professional[50] to conduct travel surveys, as outlined below, and to document the results in a *Transportation Demand Management Report*. Prior to beginning the travel survey, the transportation professional shall develop the data collection methodology in consultation with and approved by OCII (or its designated representative such as the Environmental Review Officer (ERO)) and in consultation with SFMTA. It is anticipated that data collection would occur at least during

[50] The Transportation Demand Management Report shall be performed by a qualified transportation professional from the Planning Department's *Transportation Consultant Pool.*

four days for two different types of events, for a total of eight days. Specifically, data collection shall be conducted during at least two weekday and two weekend NBA basketball games with 12,500 or more attendees, and two weekday and two weekend non-basketball events with attendance of 12,500 or more attendees.

The schedule of the travel surveys shall be as follows:

- Comprehensive travel surveys of basketball game attendees shall be conducted between December and April of every season.
- Comprehensive travel surveys of non-basketball event attendees (conventions events, concerts, family shows, etc.) could be collected any time during the year.

The following data of event attendees shall be collected as part of the travel surveys:

- Origin/destination of the trip (city, zip code, home/work/other)
- Mode of travel to/from event center
  - If by transit, list mode and name of transit operator (AC Transit, BART, Caltrain, Muni, etc.)
  - If by rail, name of station trip started and ended
  - If by auto, number of people in the vehicle
  - If by auto, parking location and approximate walking time to event center
  - If by auto, ask if following trips would continue as auto, or if anticipate a mode shift.
  - If by bicycle or walking, name the origin of the trip. If a transfer from regional transit, name the origin and operator.
  - If by bike share, name the origin (i.e., the pick up location) of the trip. Note if trip is a "last mile" connection from regional transit, and include the origin and operator.
- Arrival and departure times at the event center

The travel survey shall employ whatever methodology necessary, as approved by the OCII (or the ERO) in consultation with SFMTA, to collect the above described data including but not limited to: manual or automatic (e.g., video or tubes) traffic volume counts, intercept surveys, smart phone application-based surveys, and on-line surveys.

The *Transportation Demand Management Report(s)* shall be submitted to OCII, or its designee, for review within 30 days of completion of the data collection. If the City finds that the project exceeds the stated mode share performance standard, the project sponsor shall revise the proposed project's Transportation Management Plan (TMP) to incorporate a set of measures that would lower the auto mode share. For basketball events, the TMP shall be revised by no later than August 15th of the calendar year to ensure adequate lead time to implement TDM measures prior to the start of the following basketball season. For non-basketball events, the proposed project's TMP shall be revised within 90 days of submittal of the *Transportation Demand Management Report* to incorporate a set of measure that would lower the auto mode share.

If the project does not meet the stated performance standard, the project sponsor shall implement TDM measures and collect data on a semi-annual basis (i.e., twice during a calendar year) to assess their effectiveness for basketball games and other events. The implementation of TDM measures shall be intensified until the auto mode split performance standard is achieved. Upon achievement of the performance standard, the project sponsor may resume travel survey data collection for basketball and non-basketball events on an annual basis. If the sponsor demonstrates three consecutive years of meeting the auto mode share performance standard, the comprehensive data collection effort may occur every two years.

The data collection plan described above may be modified by OCII (or the ERO) in coordination with SFMTA if field observations and/or other circumstances require data collection at different times and/or for different events than specified above. The modification of the data collection plan, however, shall not change the performance standards set forth in this mitigation measure.

Impact TR-19: Without implementation of the Muni Special Event Transit Service Plan, the proposed project would result in additional significant traffic impacts at freeway ramps that would operate at LOS E or LOS F under Existing plus Project conditions. (Significant and Unavoidable with Mitigation)

As described in Impact TR-18, without implementation of the Muni Special Event Transit Service Plan for large events, the number of event-related vehicle trips would increase over conditions with implementation of the Muni Special Event Transit Service Plan. For the Basketball Game scenario, the increase in the number of vehicles would be 54 vehicle trips during the weekday p.m. peak hour, 697 vehicles during the weekday evening and Saturday evening peak hours, and 742 during the weekday late evening peak hour. A portion of these vehicles would travel on I-80 and I-280, and may increase traffic volumes on the study ramp locations. Thus, without implementation of the Muni Special Event Transit Service Plan, the additional vehicle trips may increase or exacerbate the density at the ramp merge and diverge locations, such that the ramp LOS becomes unacceptable (i.e., LOS E or LOS F), or could substantially worsen existing LOS E or LOS F conditions.

Table 5.2-55 and **Table 5.2-56** present a comparison of the ramp LOS conditions for the Basketball Game scenario with and without the Muni Special Event Transit Service Plan for the weekday p.m. and Saturday evening peak hours (Table 5.2-53) and for the weekday evening and weekday late evening (Table 5.2-54) peak hours, respectively.

TABLE 5.2-55
FREEWAY RAMP LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITHOUT A SF GIANTS GAME - WITHOUT IMPLEMENTATION OF THE MUNI SPECIAL EVENT TRANSIT SERVICE PLAN – WEEKDAY PM AND SATURDAY EVENING PEAK HOURS

		BASKETBALL GAME SCENARIO WEEKDAY PM				BASKETBALL GAME SCENARIO SATURDAY EVENING			
		With Muni Special Event Transit Service Plan		*Without* Muni Special Event Transit Service Plan		With Muni Special Event Transit Service Plan		*Without* Muni Special Event Transit Service Plan	
#	Ramp Location	Density[a]	LOS	Density	LOS	Density	LOS	Density	LOS
1	I-80 EB on-ramp at Sterling	**36**	**E**	**36**	**E**	22	C	22	C
2	I-80 EB on-ramp at Fifth/Bryant	**--**	**F**	**--**	**F**	36	**E**	**36**	**E**
3	I-80 WB off-ramp at Fifth/Harrison	31	D	31	D	34	D	**36**	**E**
4	I-280 SB on-ramp at Pennsylvania	**35**	**E**	**35**	**E**	13	B	13	B
5	I-280 NB off-ramp at Mariposa	28	C	28	C	25	C	27	C
6	I-280 SB on-ramp at Mariposa	32	D	32	D	12	B	13	B

NOTES:
[a] Density of vehicles in merge and diverge influence area for on-ramp and off-ramp analysis, respectively. Measured in passenger cars per mile per lane. Density value is not presented for ramp analyses where the demand volume exceeds the capacity.
[b] Ramps operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

TABLE 5.2-56
FREEWAY RAMP LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITHOUT A SF GIANTS GAME - WITHOUT IMPLEMENTATION OF THE MUNI SPECIAL EVENT TRANSIT SERVICE PLAN – WEEKDAY EVENING AND LATE EVENING PEAK HOURS

		BASKETBALL GAME SCENARIO EVENING				BASKETBALL GAME SCENARIO LATE EVENING			
		With Muni Special Event Transit Service Plan		*Without* Muni Special Event Transit Service Plan		With Muni Special Event Transit Service Plan		*Without* Muni Special Event Transit Service Plan	
#	Ramp Location	Density[a]	LOS	Density	LOS	Density	LOS	Density	LOS
1	I-80 EB on-ramp at Sterling	28	C	28	**C**	23	C	24	C
2	I-80 EB on-ramp at Fifth/Bryant	**--**	**F**	**--**	**F**	34	D	**36**	**E**
3	I-80 WB off-ramp at Fifth/Harrison	**36**	**E**	**38**	**E**	27	C	27	C
4	I-280 SB on-ramp at Pennsylvania	28	C	28	C	21	C	22	C
5	I-280 NB off-ramp at Mariposa	34	D	**35**	**E**	13	B	13	B
6	I-280 SB on-ramp at Mariposa	25	C	26	C	20	B	21	C

NOTES:
[a] Density of vehicles in merge and diverge influence area for on-ramp and off-ramp analysis, respectively. Measured in passenger cars per mile per lane. Density value is not presented for ramp analyses where the demand volume exceeds the capacity.
[b] Ramps operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

The proposed project without implementation of the Muni Special Event Transit Service Plan would result in *significant* traffic impacts at the following three additional freeway ramp locations:

- I-80 eastbound on-ramp at Fifth/Bryant (weekday late evening)
- I-80 westbound off-ramp at Fifth/Harrison (Saturday evening)
- I-280 northbound off-ramp at Mariposa Street (weekday evening)

Impacts at these three freeway ramps would be in addition to the significant impacts identified for the proposed project with implementation of the Muni Special Event Transit Service Plan in Impact TR-3 for conditions without an overlapping SF Giants evening game, and in Impact TR-12 for conditions with an overlapping SF Giants evening game.

Mitigation Measure M-TR-2b: Auto Mode Share Performance Standard and Monitoring and **Mitigation Measure M-TR-18: Auto Mode Share Performance Standard and Monitoring,** described above, would also be applicable to address the freeway ramp impacts. Implementation of these measure would ensure that the severity of **Impact TR-18** would be the same as the corresponding Impact TR-3, irrespective of whether the Muni Special Event Transit Service Plan was implemented or not. With implementation of this mitigation measure, the proposed project's impacts related to freeway ramp operations would remain *significant and unavoidable with mitigation.*

Mitigation Measure M-TR-2b: Additional Measures to Reduce Transportation Impacts (see Impact TR-2, above)

Mitigation Measure M-TR-18: Auto Mode Share Performance Standard and Monitoring (see Impact TR-18, above)

Impact TR-20: Without implementation of the Muni Special Event Transit Service Plan, the proposed project would result in a substantial increase in transit demand that could not be accommodated by adjacent Muni transit capacity such that significant adverse impacts to Muni transit service would occur under Existing plus Project conditions. (Significant and Unavoidable with Mitigation)

Without implementation of the Muni Special Event Transit Service Plan, the transit capacity for the Basketball game scenario would decrease from those presented in **Table 5.2-41** (weekday evening and late evening) and **Table 5.2-42** (Saturday evening) in **Impact TR-4**. Without the additional T Third light rail service and the Muni Special Event Shuttles, the hourly capacity for the Muni service to the project site would decrease from about 6,700 passengers per hour to 2,900 passengers per hour during the weekday evening peak hour (i.e., inbound to the site), from 6,300 to 2,000 passengers per hour during the late evening peak hour (i.e., outbound from the project site, and from 6,100 to 2,100 passengers per hour during the Saturday evening peak hour (i.e., inbound to the site).

Table 5.2-57 presents the capacity utilization analysis for weekday p.m. and Saturday evening peak hours for the Basketball Game scenario without implementation of the Muni Special Event Transit Service Plan, while **Table 5.2-58** presents this information for the weekday evening and weekday late evening peak hours. Without implementation of the Muni Special Event Transit Service Plan for large events at the project site, the number of attendees arriving by transit is expected to decrease. Overall, without implementation of the Muni Special Event Transit Service Plan for a basketball game, during the weekday and Saturday evening peak hours (i.e., the peak hour of arrivals to the event center), the number of transit trips would decrease by 1,762 trips. During the weekday late evening peak hour the number of transit trips would decrease by 1,878 trips.

TABLE 5.2-57
TRANSIT ANALYSIS - EXISTING PLUS PROJECT CONDITIONS – WITHOUT A SF GIANTS GAME WITHOUT IMPLEMENTATION OF THE MUNI SPECIAL EVENT TRANSIT SERVICE PLAN – WEEKDAY PM AND SATURDAY EVENING PEAK HOURS

	Basketball Game Scenario Weekday PM Outbound			Basketball Game Scenario Saturday Evening Inbound		
Route/Service Provider	**Ridership**	**Capacity**	**Capacity Utilization**	**Ridership**	**Capacity**	**Capacity Utilization**
San Francisco						
T Third	2,441	3,808	64.1%	**2,278**	**1,714**	**132.9%**
22 Fillmore	545	942	73.9%	**495**	**378**	**131.0%**
Muni Special Event Shuttles	0	0	0%	0	0	0%
Total	2,490	4,750	66.0%	2,773	2,092	132.8%
East Bay						
BART	19,972	21,220	95.0%	3,323	8,740	38.0%
AC Transit	2,275	3,926	58.5%	73	200	36.4%
Ferries	805	1,615	50.3%	0	0	0%
Total	23,062	27,761	86.9%	3,396	8,940	38.0%
North Bay						
Buses	1,389	2,817	49.6%	99	137	72.3%
Ferries	968	1,959	49.8%	1,026	1,594	64.4%
Total	2,357	4,776	49.7%	1,125	1,731	65.5%
South Bay						
BART	8,698	16,963	51.4%	2,244	10,925	20.5%
Caltrain	2,405	3,100	**79.7%**	1,021	1,300	78.6%
SamTrans	145	320	45.9%	25	80	31.6%
Total	11,249	20,383	55.6%	3,280	12,305	26.7%

NOTES:

[a] For pre-event and post-event conditions, capacity utilization exceeding 100 percent highlighted in **bold.** Significant project impacts shaded.

[b] Ridership and capacity for the T Third and 22 Fillmore reflect implementation of the Central Subway and 22 Fillmore Transit Priority Project.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

TABLE 5.2-58
TRANSIT ANALYSIS - EXISTING PLUS PROJECT CONDITIONS – WITHOUT A SF GIANTS GAME WITHOUT IMPLEMENTATION OF THE MUNI SPECIAL EVENT TRANSIT SERVICE PLAN – WEEKDAY EVENING AND LATE EVENING PEAK HOURS

	Basketball Game Scenario Weekday Evening Inbound			Basketball Game Scenario Weekday Late Evening Outbound		
Route/Service Provider	**Ridership**	**Capacity**	**Capacity Utilization**	**Ridership**	**Capacity**	**Capacity Utilization**
San Francisco						
T Third	3,795	2,285	166.1%	**2,682**	**1,714**	**156.5%**
22 Fillmore	544	628	86.8%	**515**	**252**	**204.4%**
Muni Special Event Shuttles	0	0	0%	0	0	0%
Total	4,339	2,913	185.6%	3,197	1,966	162.7%
East Bay						
BART	5,019	15,870	31.6%	5,184	6,095	85.1%
AC Transit	245	520	47.1%	144	200	72.2%
Ferries	79	576	13.7%	0	0	0%
Total	5,343	16,966	31.5%	5,329	6,295	84.6%
North Bay						
Buses	106	120	88.0%	41	80	51.3%
Ferries	347	1,357	25.6%	**732**	**637**	**114.9%**
Total	453	1,477	30.6%	**773**	**717**	**107.8%**
South Bay						
BART	3,887	18,400	21.1%	2,086	5,290	39.4%
Caltrain	2,364	2,600	90.9%	589	650	90.5%
SamTrans	40	160	24.9%	27	40	68.2%
Total	6,291	21,160	29.7%	2,702	5,980	45.2%

NOTES:

[a] For pre-event and post-event conditions, capacity utilization exceeding 100 percent highlighted in **bold.** Significant project impacts shaded.

[b] Ridership and capacity for the T Third and 22 Fillmore reflect implementation of the Central Subway and 22 Fillmore Transit Priority Project.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

Without the three additional Muni Special Event Shuttles, the number of attendees accessing the project site via the T Third would increase, and, because the additional capacity would also not be provided on the T Third, the capacity utilization on the T Third would increase during the weekday evening and weekday late evening peak hours, and would exceed the 100 percent capacity utilization standard for special events. In addition, more attendees would use the 22 Fillmore (e.g. to access the 16th Street BART station), and the capacity utilization of the 22 Fillmore during the weekday late evening would increase from less than 85 percent to more than 100 percent capacity utilization. Thus, during the weekday late evening peak hour, conditions without the Muni Special Event Transit Service Plan would result in additional significant impacts on the T Third and 22 Fillmore during the weekday late evening peak hour.

During the Saturday evening peak hour, without the additional Muni light rail and special event shuttle capacity, the capacity utilization on the T Third and 22 Fillmore would increase to more than the 100 capacity utilization standard. Thus, during the Saturday evening peak hour, conditions without the Muni Special Event Transit Service Plan would result in an additional significant impact on the T Third and 22 Fillmore during the Saturday evening peak hour.

Overall, under existing plus project conditions without the Muni Special Event Transit Service Plan, the proposed project would result in *significant* project-specific transit impacts, as follows:

- T Third during the weekday evening, weekday late evening, and Saturday evening peak hours.
- 22 Fillmore during the weekday late evening, and Saturday evening peak hours.

Mitigation Measure M-TR-18: Auto Mode Share Performance Standard and Monitoring would also be applicable to address the impact on Muni service. Implementation of this measure would ensure that the severity of Impact TR-20 would be the same as the corresponding Impact TR-13, irrespective of whether the Muni Special Event Transit Service Plan was implemented or not. With implementation of this mitigation measure, the proposed project's impacts related to transit operations would remain *significant and unavoidable with mitigation.*

> **Mitigation Measure M-TR-18: Auto Mode Share Performance Standard and Monitoring** (see Impact TR-18, above)

Impact TR-21: Without implementation of the Muni Special Event Transit Service Plan, the proposed project would result in a substantial increase in transit demand that could not be accommodated by regional transit capacity such that significant adverse impacts to regional transit service would occur under Existing plus Project conditions. (Significant and Unavoidable with Mitigation)

As described in **Impact TR-20,** without implementation of the Muni Special Event Transit Service Plan for large events at the project site, the number of attendees arriving by transit, including those from the East Bay, North Bay, and South Bay, is projected to decrease, as more attendees would chose to drive to the event center because Muni service between the regional transit stops and the event center would be limited and operating at overcapacity conditions. Overall, without implementation of the Muni Special Event Transit Service Plan for a basketball game, during the weekday and Saturday evening peak hours (i.e., the peak hour of arrivals to the event center), the number of transit trips traveling to and from outside of San Francisco would decrease by 1,121 trips during the weekday evening peak hour, by 1,329 trips during the weekday late evening peak hour, and by 1,221 trips during the Saturday evening peak hour.

As presented in **Table 5.2-57** weekday p.m. and Saturday evening peak hours and **Table 5.2-58** for the weekday evening and weekday late evening peak hours, without implementation of the Muni Special Event Transit Service Plan for the Basketball Game scenario, the number of attendees arriving via Caltrain would decrease, which would result in a reduction in the capacity utilization on Caltrain such that the proposed project would not result in the significant impacts on Caltrain during the weekday evening, weekday late evening, and Saturday evening peak hours, as reported in **Impact TR-5** and **Impact TR-14**.

The reduction in project transit demand on regional transit operators would also reduce the capacity utilization for service to the North Bay buses and ferries. However, capacity utilization would still exceed 100 percent during the weekday late evening, and therefore, without implementation of the Muni Special Event Transit Service Plan, impacts to WETA and Golden Gate Transit capacity would remain significant and unavoidable.

Overall, under existing plus project conditions without a SF Giants game at AT&T Park and without the Muni Special Event Transit Service Plan, the proposed project would result in *significant* project-specific transit impacts on WETA and Golden Gate Transit service during the weekday late evening peak hours.

Implementation of **Mitigation Measure M-TR-5a: Additional Caltrain Service** and **Mitigation Measure M-TR-5b: Additional North Bay Ferry and Bus Service** would reduce or minimize the severity of the capacity utilization exceedances for the regional transit service providers. However, as noted in Impact TR-5, since the provision of additional Caltrain and North Bay service is uncertain and full funding for the service has not yet been identified, implementation of this mitigation measures is uncertain. Accordingly, the proposed project's significant impacts to Caltrain, Golden Gate Transit, and WETA transit capacity would remain *significant and unavoidable with mitigation.*

Mitigation Measure M-TR-5a: Additional Caltrain Service (see Impact TR-5, above)

Mitigation Measure M-TR-5b: Additional North Bay Ferry and Bus Service (see Impact TR-5, above)

Impact TR-22: Without implementation of the Muni Special Event Transit Service Plan, the proposed project could result in a substantial overcrowding on public sidewalks, nor create potentially hazardous conditions for pedestrians, or otherwise interfere with pedestrian accessibility on the site and adjoining areas under Existing plus Project conditions. (Less than Significant with Mitigation)

Without implementation of the Muni Special Event Transit Service Plan for large events at the project site, the number of attendees arriving by transit is expected to decrease, while the number of attendees arriving by auto mode would increase. Overall, without implementation of the Muni Special Event Transit Service Plan for a basketball game, during the weekday p.m. peak hour the number of vehicle trips would increase by 54, while the number of transit trips would decrease by 136 trips. During the weekday and Saturday evening peak hours (i.e., the peak hour of arrivals to the event center), the number of vehicle trips would increase by 697 vehicles, while the number of transit trips would decrease by 1,762 trips. During the weekday late evening peak hour (i.e., departures from the event center), the number of vehicle trips would increase by 742 vehicles, while the number of transit trips would decrease by 1,878 trips. In general, the number of pedestrian trips traveling to and from the event center would not change, however, the direction of travel to and from the project site may change depending on where the increased parking demand is accommodated. As a result, the number of pedestrians at the intersection of Third/South may decrease somewhat, and increase at the intersection of Third/16th as event attendees seek and find parking farther east and south of the project site.

During all events, the proposed project's TMP assumes that PCOs would be stationed at intersections adjacent to the proposed site (and elsewhere) to manage pedestrian flows and minimize conflicts, and that a similar level of management would be needed via police officers or PCOs regardless of whether the Muni Special Event Transit Service Plan is implemented. The increase in auto mode and project vehicle trips without implementation of the Muni Special Event Transit Service Plan and associated PCOs at the intersection of Third/South could result in overcrowding on the sidewalks and light rail platforms, and may result in potentially hazardous conditions for pedestrians, which would be considered a significant pedestrian impact.

Mitigation Measure M-TR-22: Provide Safe Pedestrian Access to Adjacent Transit and Parking Facilities and Monitoring

During events with 3,000 or more attendees, the project sponsor shall be responsible for providing trained personnel (e.g., off-duty SFPD staff) to control pedestrian, bicycle and vehicular flows to and from the event center at the intersections immediately adjacent to the project site and to ensure that Muni platforms serving the site are not over capacity. The trained personnel shall be provided during pre- and post-event periods. The project sponsor shall ensure that conflicts between various modes are reduced to the maximum extent possible through adequate staffing of trained personnel as well as other measures, as appropriate.

Other pedestrian management measures that could be implemented include but are not limited to: installation of barricades, proper signage and announcements to disperse patrons to other streets around the project site, such as to Terry A. Francois Boulevard, and cross-marketing incentives such as 20 percent discount at the restaurant and retail establishments to extend the peak departure period. Through the implementation of various strategies, the project sponsor shall ensure that pedestrian conflicts with other modes are minimized by separating vehicles, bicycles, transit and pedestrian flows to the greatest extent possible, including ensuring that various modes are adequately instructed about when it is their turn to proceed. The project sponsor shall also ensure that Muni platforms are not overcrowded by staging event attendees on the adjacent sidewalks until there is sufficient space on the Muni platforms, which are proposed to be expanded as part of the project.

At the intersection of Third/South, the trained personnel shall implement strategies to allow pedestrians to cross the street safely. The strategies could include manually overriding the traffic signal and directing pedestrians to cross, erecting temporary pedestrian crossing barriers, allowing use of the closed Third Street as a pedestrian access route, providing a defined passenger waiting area within the closed Third Street, and shielding passengers waiting to board light rail from adjacent pedestrian traffic.

Monitoring and Reporting

The project sponsor shall retain a qualified transportation professional[51] to conduct field observations of pedestrian hazards and safety conditions along Third Street adjacent to the project site, as outlined below, and to document the results in a *Pedestrian Access Report*. City staff shall verify the field data collection results. Prior to beginning field observations, the transportation professional shall develop the data collection methodology in consultation with and approved by OCII (or its designated representative such as the ERO) in coordination with SFMTA. The data collection methodology shall be reviewed and revised annually, if appropriate. Field observations shall be conducted during the following event types and attendance levels:

- at least two weekday NBA basketball games with 12,500 or more attendees;
- at least two weekend NBA basketball games with 12,500 or more attendees;
- at least two weekday non-basketball game events with 12,500 or more attendees;
- at least two weekend non-basketball game events with 12,500 or more attendees;
- at least two weekday non-basketball game events with 3,000 to 9,000 attendees; and,
- at least two weekend non-basketball game events with 3,000 to 9,000 attendees; and
- at least two weekday convention events of 9,000 or more attendees.

The pedestrian hazard and safety conditions field observations shall occur on an annual basis. The *Pedestrian Access Report* shall be submitted to SFMTA, OCII and Planning Department for review within 30 days of completion of the data collection. If the City finds that the project does not meet the performance standard outlined below, the Transportation Management Plan (TMP) shall be revised to incorporate techniques to minimize conflicts between pedestrians and other modes. The TMP shall be revised within 90 days of submittal of the *Pedestrian Access Report*. When the project is not meeting the stated performance standard, the project sponsor shall collect data on a semi-annual basis (i.e., twice during a calendar year) to assess the effectiveness of various measures incorporated into the revised TMP. The implementation of various measures shall be intensified until pedestrian access to and from the site occurs in a safe manner, as determined by OCII (or the ERO).

The performance standard for safe pedestrian operations consists of the following: substantial numbers of pedestrians are not spilling onto the Muni right-of-way area, are not illegally crossing Third Street midblock, are not overcrowding the Muni platforms, and are not crossing intersections against the signal. Upon achievement of the performance standard, the project sponsor may resume field observations for basketball, non-basketball and convention events on an annual basis. If the sponsor demonstrates three consecutive years of meeting the performance standard, the comprehensive data collection effort may occur every two years.

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[51] The Transportation Demand Management Report shall be performed by a qualified transportation professional from the San Francisco Planning Department's *Transportation Consultant Pool.* Available online at *http://www.sf-planning.org/index.aspx?page=1886.* Accessed May 28, 2015.

Further, in reviewing the *Pedestrian Access Report,* OCII (or the ERO) may adjust the size of the events for which this measure is applicable. For example, if small scale events (e.g., those with 5,000 attendees) do not result in crosswalk and/or Muni platform overcrowding or other similar pedestrian safety conditions, OCII (or the ERO) may revise this mitigation measure to apply to events of 5,001 or more attendees.

Mitigation Measure M-TR-22: Provide Safe Pedestrian Access to Adjacent Transit and Parking Facilities and Monitoring would ensure that the pedestrian impacts would remain the same as those identified in **Impact TR-6** for pedestrian conditions without an overlapping SF Giants evening game and **Impact TR-15** for pedestrian conditions with an overlapping SF Giants evening game irrespective of whether SFMTA PCOs were available during various events, and would not result in secondary transportation impacts. With implementation of **Mitigation Measure M-TR-22: Provide Safe Pedestrian Access to Adjacent Transit and Parking Facilities,** project-generated pedestrian demand during large events would not substantially affect pedestrian flows, create potentially hazardous conditions for pedestrians or otherwise interfere with pedestrian accessibility to the site and adjoining areas. Therefore, without implementation of the Muni Special Event Transit Service Plan, the proposed project's impact on pedestrians would be *less than significant with mitigation.*

Impact TR-23: Without implementation of the Muni Special Event Transit Service Plan, the proposed project would not result in potentially hazardous conditions for bicyclists, or otherwise substantially interfere with bicycle accessibility to the site and adjoining areas under Existing plus Project conditions. (Less than Significant)

Without implementation of the Muni Special Event Transit Service Plan for large events at the project site, the number of attendees arriving by bicycle is expected to increase by about 25 percent compared to conditions with the Muni Special Event Transit Service Plan. About 60 additional bicycle trips could be expected during the peak hour arriving or departing a large event. With the additional bicycle trips, bicycle conditions in the vicinity of the project site without the Muni Special Event Transit Service Plan would be similar to those presented above in Impact TR-7. However, because more event center attendees would be arriving by auto, traffic volumes on streets leading to and from the off-site parking facilities would be greater, which could result in increased potential for bicycle-vehicle conflicts. Project TMP measures, such as PCOs and post-event temporary lane closures, would serve to minimize congestion and conflicts between modes.

Overall, without implementation of the Muni Special Event Transit Service Plan, the number of attendees arriving by vehicle would increase prior to and following a large event, which may increase vehicle-bicycle conflicts, however, the proposed project TMP measures would minimize the potential for conflicts. Therefore, without implementation of the Muni Special Event Transit Service Plan, the proposed project's impact on bicyclists would be *less than significant.*

Mitigation: Not required

Impact TR-24: Without implementation of the Muni Special Event Transit Service Plan, the proposed project would not result in significant impacts on loading under Existing plus Project conditions. (Less than Significant)

Impacts related to passenger loading/unloading activities without implementation of the Muni Special Event Transit Service Plan would be similar to those identified above for Impact TR-8. Without implementation of the Muni Special Event Transit Service Plan, the number of event attendees arriving by transit would decrease, which would in turn reduce the passenger loading/unloading demand associated with passengers alighting and boarding the proposed Muni Special Event Shuttles on South, 16th, Illinois, and Third Streets. However, with fewer light rail vehicles serving the event center transit demand at the UCSF Mission Bay station, it would take longer for all attendees taking transit to board and depart the area. Therefore conditions on the sidewalks on Third and South Streets would become more congested. During all events, the proposed project's TMP assumes that PCOs would be stationed at intersections adjacent to the proposed site (and elsewhere) to manage pedestrian flows and minimize conflicts, and that a similar level of management would be provided via police officers or PCOs regardless of whether the Muni Special Event Transit Service Plan is implemented. The increase in auto mode and project vehicle trips without implementation of the Muni Special Event Transit Service Plan could lead to additional traffic circling in the area seeking parking, which could result in increased pedestrian-vehicle conflicts associated with passenger loading/unloading activity on Terry A. Francois Boulevard and South Street. Project TMP information on parking facilities and real-time information on availability would serve to minimize the impact of additional vehicles on passenger loading/unloading activities. Thus, similar to pedestrian conditions described above in Impact TR-8 for conditions that assume implementation of the Muni Special Event Transit Service Plan, proposed passenger loading/unloading facilities would be adequate to meet the demand associated with the project uses even without the Muni Special Event Transit Service Plan.

Impacts related to truck and service vehicle loading/unloading activities, which would not occur immediately before or after events at the project site, would be the same as those described above for Impact TR-8. Freight deliveries would occur prior to events, and would be accommodated on-site with the loading area, and at the curb adjacent to the project site on South Street and Terry A. Francois Boulevard. **Improvement Measure I-TR-8: Truck and Service Vehicle Loading Operations Plan** would reduce the potential for conflicts between proposed project-generated loading/unloading activities and pedestrians, transit, bicyclists, and autos.

For the reasons noted above, the truck/service vehicle and passenger loading/unloading activities adjacent to the project site would not be substantially affected, and therefore, without implementation of the Muni Special Event Transit Service Plan, impacts related to loading would be *less than significant.*

Mitigation: Not required

Improvement Measure I-TR-8: Truck and Service Vehicle Loading Operations Plan (see Impact TR-8, above)

Impact TR-25: Without implementation of the Muni Special Event Transit Service Plan, the proposed project would not result in significant impacts on emergency vehicle access under Existing plus Project conditions. (Less than Significant)

Impacts related to emergency vehicle access without implementation of the Muni Special Event Transit Service Plan would be similar to those identified in **Impact TR-10**. The additional vehicle trips resulting from the projected shift from transit to auto mode would be dispersed over a broader area, as more drivers would have to park at off-street facilities located further away from the project site (most likely north of the Mission Creek Channel), reducing the effect of the increased vehicle traffic on the roadway network. Some increase in vehicles on Terry A. Francois Boulevard would be anticipated at the proposed passenger loading/unloading zones, as it is anticipated that without implementation of the Muni Special Event Transit Service Plan more attendees would be dropped off and picked up at the passenger loading/unloading zone. However, this increase in vehicles adjacent to the project site would be accommodated without a substantial increase in vehicle conflicts as adequate project frontage would be available to accommodate the increase passenger loading/unloading demand. The proposed roadway improvements that are planned to be built as part of the Mission Bay South Infrastructure Plan in the vicinity of the project site (i.e., extension and widening of 16th Street between Illinois and Terry A. Francois Boulevard, realignment of Terry A. Francois Boulevard, widening of Mariposa Street, implementation of the transit-only lane on 16th Street) would facilitate emergency access to the site such that before and after events, emergency vehicle access to the project site and nearby hospital uses would be maintained. As discussed in Impact TR-10, implementation of **Improvement Measure I-TR-10a: UCSF Emergency Vehicle Access and Garage Signage Plan** and **Improvement Measure I-TR-10b: Mariposa Street Restriping** would enhance emergency vehicle access to UCSF emergency facilities. For the reasons noted above, the emergency vehicle access to the site or to the surrounding area would not be substantially affected, and therefore, without implementation of the Muni Special Event Transit Service Plan, impacts related to emergency vehicle access would be *less than significant.*

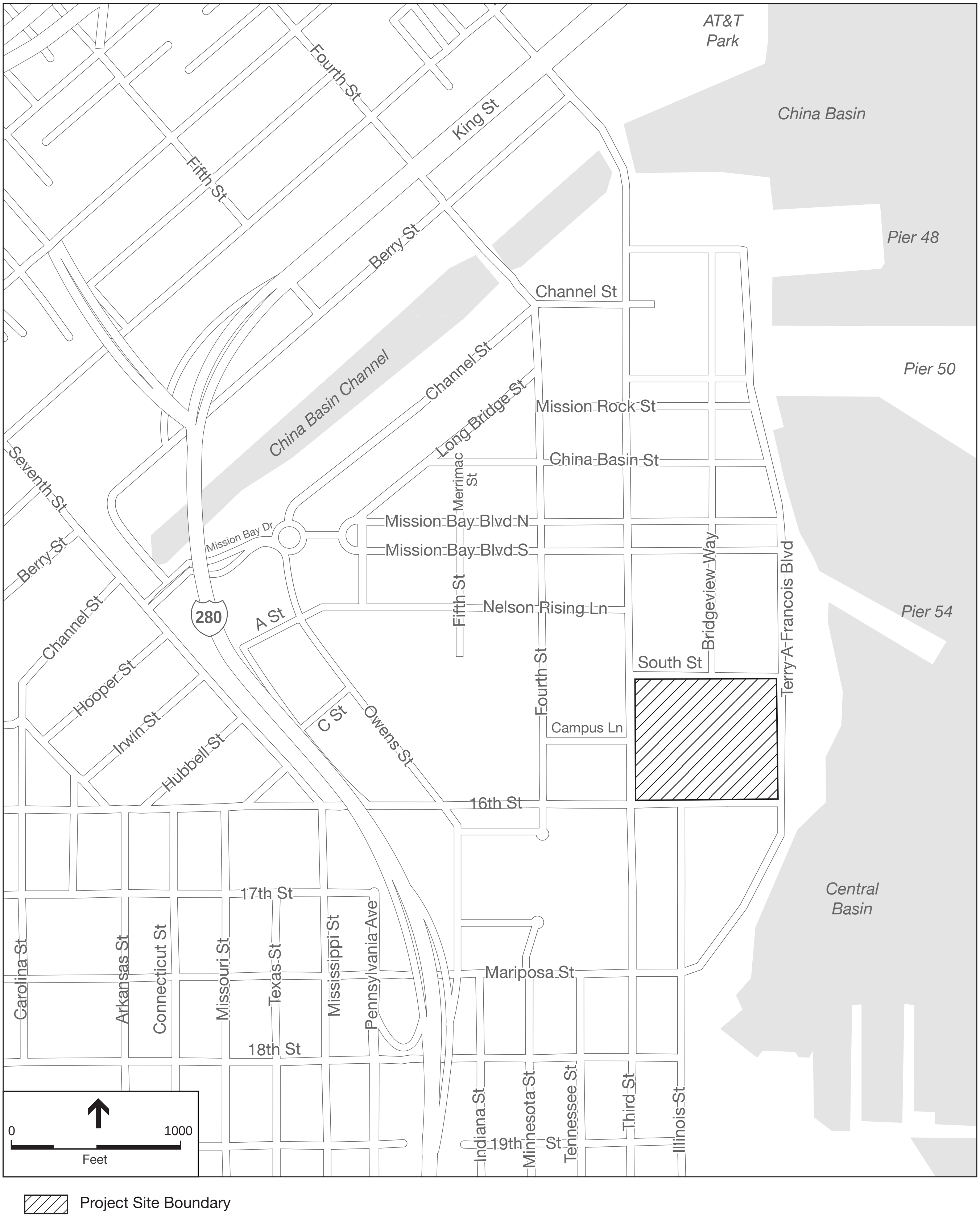
Mitigation: Not required

Improvement Measure I-TR-10a: UCSF Emergency Vehicle Access and Garage Signage Plan (see Impact TR-10, above)

Improvement Measure I-TR-10b: Mariposa Street Restriping (see Impact TR-10, above)

5.2.5.5 Cumulative Impacts

This section discusses the cumulative impacts to transportation that could result from the project, in conjunction with past, present, and reasonably foreseeable future projects. The geographic context for the analysis of cumulative transportation impacts includes the sidewalks and roadways adjacent to the project site, and the local roadway and transit network in the vicinity of the project. The cumulative analysis reflects the completion of the roadway network within Mission Bay, as presented in **Figure 5.2-21**. The discussion of cumulative transportation impacts



SOURCE: OCII, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-21
2040 Cumulative Roadway Network in Mission Bay

assesses the degree to which the project would affect the transportation network in conjunction with other reasonably foreseeable projects. Detailed calculations are included in **Appendix TR**.

As described in Section 5.2.5.3 above, future 2040 cumulative traffic, transit and pedestrian forecasts were estimated based on cumulative development and growth identified by the SFCTA SF-CHAMP travel demand model.

Cumulative Construction Impacts

Impact C-TR-1: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative construction-related ground transportation impacts. (Less than Significant)

The construction of the proposed project may overlap with the construction of other reasonably foreseeable projects listed in Section 5.1.3 above, including the UCSF LRDP Mission Bay campus projects, Seawall Lot 337 and Pier 48 Mixed-Use Project (Mission Rock Project), the Kaiser Medical Offices at 1600 Owens Street (currently under construction), Uber/ARE project on Mission Bay Blocks 26/27, The Exchange project on Mission Bay Block 40, the Family House project on Mission Bay Block 7 East, affordable housing projects on Mission Bay Blocks 3, 6, and 7, the Residential and Hotel project on Mission Bay Block 1, and 360 Berry Street project on Mission Bay Block N4/P3. In addition, project construction would overlap with construction activities associated with realignment of Terry A. Francois Boulevard to the east of the project site, and construction of the Bayfront Park, as well as other parks on Mission Bay Blocks P23 and P24.

The Uber/ARE project on Mission Bay Blocks 26/27, located directly north of the project site across South Street, consists of 423,000 gsf of office space. Construction on this project is estimated to start by the end of 2015 and continue for 18 to 24 months.

The buildout of Mission Bay has been ongoing since 1999, and as of 2014, roughly 64 percent of the housing units have been completed and close to 40 percent of the planned office and laboratory space is complete. In 2013 and 2014 when the transportation data was collected for this EIR for the existing setting conditions, about 1.13 million gsf of development were under construction at the Mission Bay Campus. The majority of the remaining construction is included as part of the UCSF LRDP and would be constructed over the next 20 years.[52] The timing of construction of other development projects noted above is not currently known. As discussed in Impact TR-1, it is anticipated that construction at the project site over the 26-month construction period would overlap with the construction activity of other projects in the area, notably the UCSF LRDP projects, planned for construction between 2015 and 2019. These include 523

52 When the LRDP in Mission Bay is completed, there will be approximately 3 million gsf of UCSF-occupied space, excluding structure parking and temporary childcare. The 2014 Plan-level analysis of the UCSF LRDP determined that although construction activities would be temporary, construction impacts would be considered potentially significant given the magnitude of the LRDP development over the course of many years (over 20 plus years), and need for ongoing coordination and monitoring. However, with implementation of mitigation measures, the UCSF LRDP construction-related transportation impacts would be reduced to less than significant levels. UCSF LRDP, pp. 3-39 and 7-89.

residential units, about 440,000 gsf of research, clinical and medical space, and a parking garage containing 500 vehicle parking spaces. In particular, the UCSF East Campus project on Blocks 33/34, located directly south of the project site across 16th Street, consists of 500,000 gsf of office space, but may include up to 250,000 gsf of clinical space with the remainder research/office space. The project will be built in two phases, with the first phase (about 250,000 gsf) starting construction in 2016 and continuing for about 18 to 24 months. Detailed construction schedules of other UCSF projects are not currently known, however, it is anticipated that a portion of the construction schedules would overlap with the 26-month project construction period. These UCSF projects are projected to generate about 40 daily truck trips on average, and these trucks would enter/exit the UCSF campus via Mission Bay Boulevard North, Nelson Rising Lane, Owens Street, 16th Street, and Fourth Street.

In addition, construction of the planned Bayfront Park east of a realigned Terry A. Francois Boulevard (on Mission Bay Block P22), a neighborhood park located along the west side of Terry A. Francois Boulevard south of 16th Street (on Mission Bay Block P23), as well as a neighborhood park on the north side of Mariposa Street east of Owens Street (on Mission Bay Block P24) would overlap with construction of the proposed project. Construction on the parks on Mission Bay Blocks P23 and P24 has been initiated, with construction completed by the end of 2016. Construction on the Bayfront Park (P22) directly to the east of the project site would begin following realignment of Terry A. Francois Boulevard, and would be completed by 2018.

The Exchange project on Mission Bay Block 40 is located about 1,200 southwest of the project site, while the Family House project on Mission Bay Block 7 East, affordable housing projects on Mission Bay Blocks 3, 6, and 7, the Residential and Hotel project on Mission Bay Block 1, and 360 Berry Street project on Mission Bay Block N4/P3 are located between 1,000 and 3,000 feet to the northwest of the project site, respectively. Construction truck traffic associated with these projects traveling between the sites and I-80 and I-280 may travel on the same roadways and at the same time as project-generated construction traffic further from the project site and on the regional facilities.

If Caltrain adopts the electrification project and funding remains available, construction of the Peninsula Corridor Electrification Project could start in 2016, and the first electrically-powered trains would be in service by 2020 or 2021.[53] Construction activities would occur primarily within the Caltrain right-of-way to the west of the project site.

Localized cumulative construction-related transportation impacts could occur as a result of reasonably foreseeable projects in the vicinity of the project site that would generate increased traffic at the same time and on the same roads as the proposed project. As part of the construction permitting process, each development project would be required to work with the various departments of the City to develop a detailed and coordinated plan that would address

[53] Peninsula Corridor Electrification Project FAQ Update December 2014. Available online at http://www.caltrain.com/projectsplans/CaltrainModernization/Modernization/PeninsulaCorridorElectrificationProject.html. Accessed May 28, 2015.

construction vehicle routing, traffic control, and pedestrian movement adjacent to the construction area. The cumulative construction-related transportation impacts of the multiple nearby construction projects would occur over an extended duration, and the project sponsor would coordinate with various City departments such as SFMTA and DPW through the SFMTA Transportation Advisory Committee (TASC), a multi-agency review body, to develop coordinated plans that would address construction-related vehicle routing and pedestrian movements adjacent to the construction area for the duration of construction overlap.

Overall, because proposed project's construction activities would be temporary and limited in duration, and are required to be conducted in accordance with City requirements, the proposed project would not contribute considerably to the cumulative construction-related transportation impacts. Furthermore, proposed project **Improvement Measure I-TR-1: Construction Management Plan and Public Updates** would further reduce the proposed project's less-than-significant impacts related to potential conflicts between construction activities and pedestrians, transit, and autos, and includes provisions for construction truck traffic management, construction worker parking plan, project construction updates for adjacent businesses and residents, and carpool and transit access for construction workers.

Therefore, for the above reasons, the proposed project, in combination with past, present and reasonably foreseeable development in San Francisco, would not contribute considerably to the significant cumulative construction-related transportation impacts, and the project's cumulative impact would be *less than significant*.

Mitigation: Not required

Comparison of Impact C-TR-1 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR did not identify any significant cumulative impacts related to construction-related transportation impacts. Consequently, no new or different mitigation measures or alternatives to reduce project impacts related to construction activities are identified or required with respect to the currently proposed project. On the basis of the above, the project would result in no new or substantially more severe significant effects than those identified in the Mission Bay FSEIR related to construction-related transportation impacts.

Cumulative Traffic Impacts

Impact C-TR-2: The project, in combination with other past, present, and reasonably foreseeable future projects, would result in significant cumulative traffic impacts at multiple intersections in the project vicinity under 2040 Cumulative conditions. (Significant and Unavoidable with Mitigation)

Under 2040 cumulative conditions, proposed project impacts were assessed by calculating the project-generated traffic conditions at intersections that are projected to operate at LOS E or LOS F under 2040 cumulative conditions for the No Event scenario for the weekday p.m. and

Saturday evening peak hours. Because the SF-CHAMP travel demand model does not include the travel demand associated with events, the proposed project cumulative impacts for events at the project site (i.e., the Convention Event and Basketball Game scenarios) for the weekday p.m. peak hour were assessed by adding the event-related traffic volumes to the No Event scenario.

At intersections that are projected to operate at LOS E or LOS F under 2040 cumulative conditions, the increase in proposed project vehicle trips was reviewed to determine whether the increase would contribute considerably to critical movements operating at LOS E or LOS F. In addition, the intersections where project-specific significant impacts were identified for existing plus project conditions, the proposed project would also be considered to result in a cumulative impact under 2040 cumulative conditions. Supporting documentation regarding the cumulative contributions is included in **Appendix TR**.

Table 5.2-59, **Figure 5.2-22**, and **Figure 5.2-23** present the intersection LOS analysis for 2040 cumulative conditions for the weekday p.m. peak hour, while **Table 5.2-60** and **Figure 5.2-24** present the intersection LOS analysis for the Saturday evening peak hour.

As shown in **Table 5.2-59**, for 2040 cumulative weekday p.m. peak hour conditions with the proposed project (i.e., for the No Event, Convention Event, and Basketball Game scenarios), 10 of the 22 study intersections would operate at LOS E or LOS F conditions during the weekday p.m. peak hour, including the intersections of King/Third, King/Fourth, Fifth/Harrison/I-80 westbound off-ramp, Fifth/Bryant/I-80 eastbound on-ramp, Third/Channel, Seventh/Mission Bay Drive, Third/16th, Owens/16th, Seventh/Mississippi/16th, and Third/Cesar Chavez. The proposed project would result in project-specific impacts (i.e., from LOS D or better to LOS E or LOS F, or from LOS E to LOS F under either existing plus project or 2040 cumulative conditions), or contribute considerably (i.e., more than 5 percent) to the poorly operating critical movements at intersections that are projected to operate at LOS E or LOS F conditions at 9 of the 10 intersections that would operate at LOS E or LOS F under 2040 cumulative conditions: King/Third, King/Fourth, Fifth/Harrison/I-80 westbound off-ramp, Third/Channel, Seventh/Mission Bay Drive, Third/16th, Owens/16th, Seventh/Mississippi/16th, and Third/Cesar Chavez.

In addition, as shown in **Table 5.2-60**, for 2040 cumulative Saturday evening peak hour conditions with the proposed project, the intersection of Fifth/Harrison/I-80 westbound off-ramp is projected to operate at LOS E under the No Event scenario. For the Basketball Game scenario, 8 of the 22 study intersections would operate at LOS E or LOS F conditions, including the intersections of King/Third, King/Fourth, Fifth/Harrison/I-80 westbound off-ramp, Fifth/Bryant/I-80 eastbound on-ramp, Third/Channel, Fourth/Channel, and Seventh/Mission Bay Drive, and Seventh/Mississippi/16th. The proposed project would result in project-specific impacts, or contribute considerably to the poorly operating critical movements at all eight intersections that are projected to operate at LOS E or LOS F conditions.

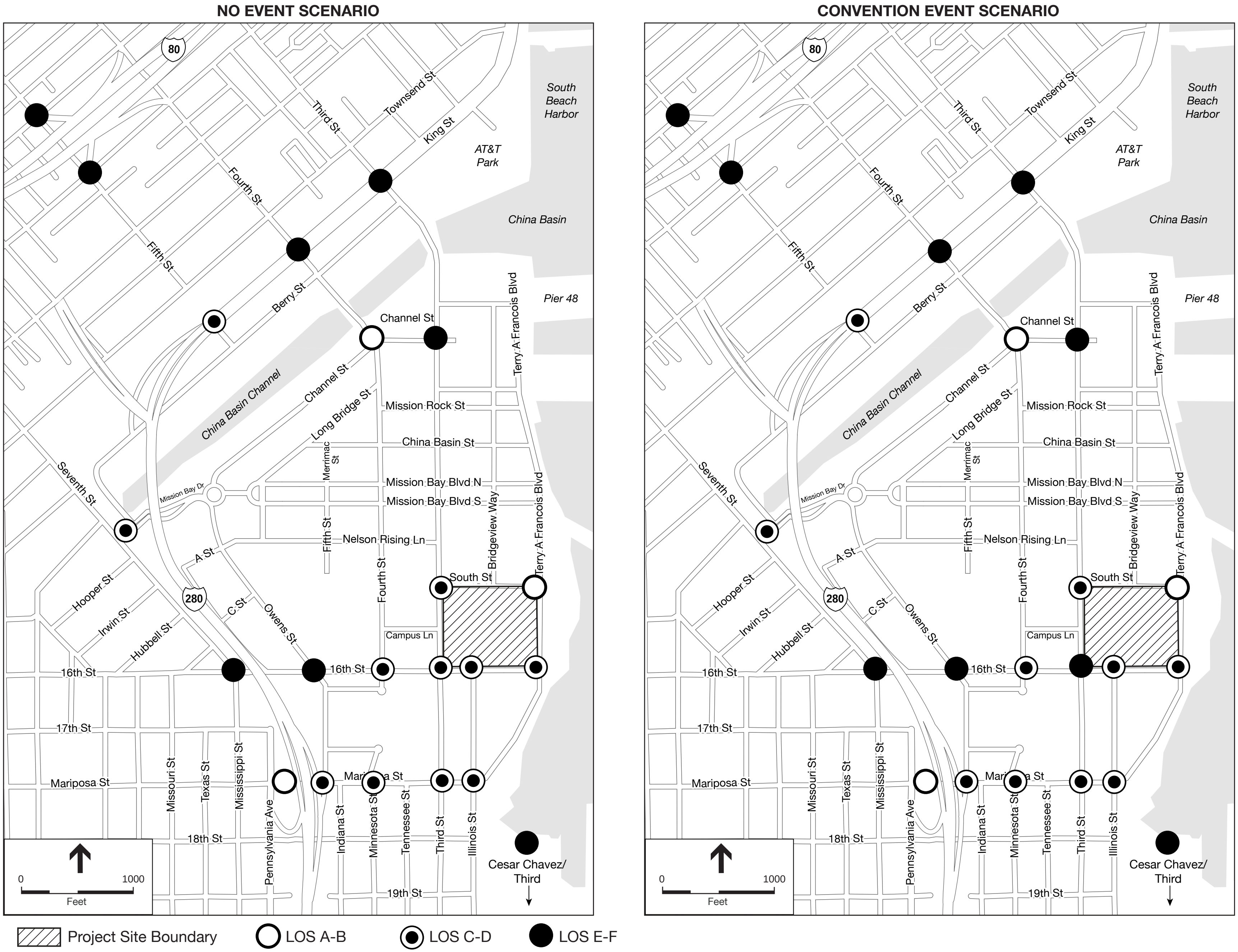
TABLE 5.2-59
INTERSECTION LEVEL OF SERVICE – 2040 CUMULATIVE CONDITIONS – WEEKDAY PM PEAK HOUR

#	Intersection Location		No Event		Convention Event		Basketball Game	
			Delay[a,b]	LOS	Delay	LOS	Delay	LOS
1	King St	Third Street	**>80**	**F**	**>80**	**F**	**>80**	**F**
2	King St	Fourth Street	**>80**	**F**	**>80**	**F**	**>80**	**F**
3	King St/Fifth St	I-280 ramps	24.5	C	23.8	C	23.8	C
4	Fifth St/Harrison	I-80 WB off-ramp	**>80**	**F**	**>80**	**F**	**>80**	**F**
5	Fifth St/Bryant St	I-80 EB on-ramp	**>80**	**F**	**>80**	**F**	**>80**	**F**
6	Third Street	Channel Street	**65.7**	**E**	**> 80**	F	**71.6**	**E**
7	Fourth Street	Channel Street	17.6	B	15.1	B	18.7	B
8	Seventh Street	Mission Bay Dr	47.7	D	52.9	D	**66.5**	**E**
9	TA Francois Blvd	South Street	< 10	A	< 10	A	< 10	A
10	Third Street	South Street	34.8	C	40.1	D	38.2	D
11	TA Francois Blvd	16th Street	20.4	C	20.4	C	20.5	C
12	Illinois Street	16th Street[c]	21.4 (nb)	C	22.6 (nb)	C	17.9 (nb)	C
13	Third Street	16th Street[e]	51.9	D	**69.4**	**E**	**70.9**	**E**
14	Fourth Street	16th Street[e]	27.0	C	25.1	C	24.6	C
15	Owens Street	16th Street[e]	**61.4**	**E**	**66.4**	**E**	**58.9**	**E**
16	7th/Mississippi	16th Street[e]	**77.9**	**E**	**>80**	**F**	**>80**	**F**
17	Illinois Street	Mariposa Street	20.4	C	21.2	C	21.2	C
18	Third Street	Mariposa Street	48.7	D	51.3	D	48.2	D
19	Fourth Street	Mariposa Street	21.9	C	21.0	C	19.5	B
20	Mariposa Street	I-280 NB off-ramp	38.9	D	40.2	D	37.4	D
21	Mariposa Street	I-280 SB on-ramp[d]	13.1	B	14.3	B	13.1	B
22	Third Street	Cesar Chavez St	**63.6**	**E**	**>80**	**F**	**>80**	**F**

NOTES:

[a] Delay presented in seconds per vehicle. For unsignalized intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
[b] Intersections operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.
[c] All-way stop-controlled intersection.
[d] The traffic signal at the intersection of Mariposa/I-280 southbound on-ramp is part of the roadway improvements on Mariposa Street between the I-280 northbound off-ramp and I-280 southbound on-ramp and the extension of Owens Street between 16th and Mariposa Streets, and is currently planned to be operational by fall 2015.
[e] Includes implementation of the 22 Fillmore Transit Priority Project, which includes converting one mixed-flow lane in each direction to a side-running transit-only lane.
[f] Under the Basketball Game scenario, a PCO would be stationed at this study intersection during the Saturday pre-event period, and, as necessary, would manually direct vehicles, pedestrians, transit, and bicyclists through the intersection. LOS reflects conditions without PCO intervention.

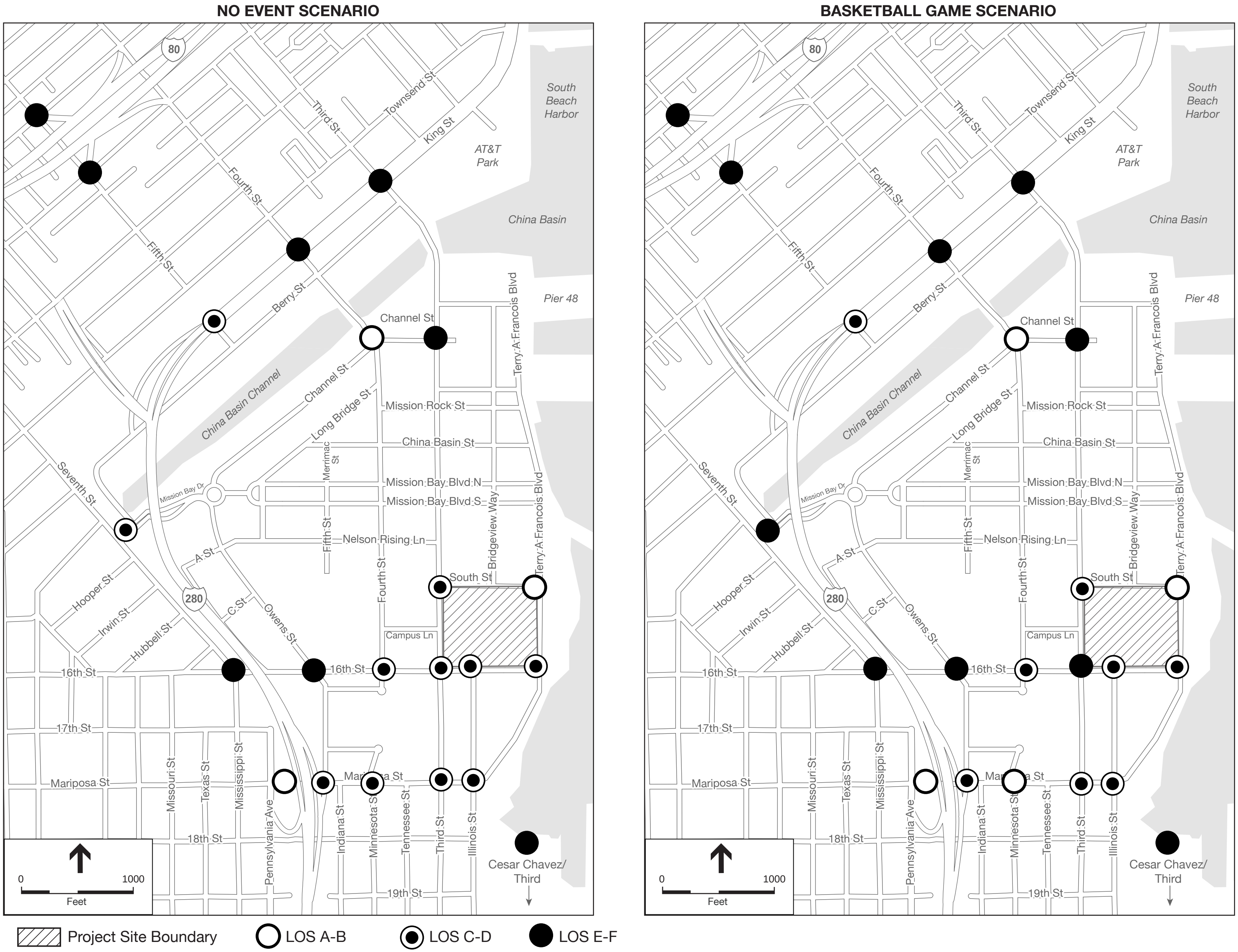
SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015



SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E: Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-22
2040 Cumulative Intersection LOS-Weekday PM Peak Hour - No Event and Convention Event Scenarios



SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-23

2040 Cumulative Intersection LOS-Weekday PM Peak Hour - No Event and Basketball Game Scenarios

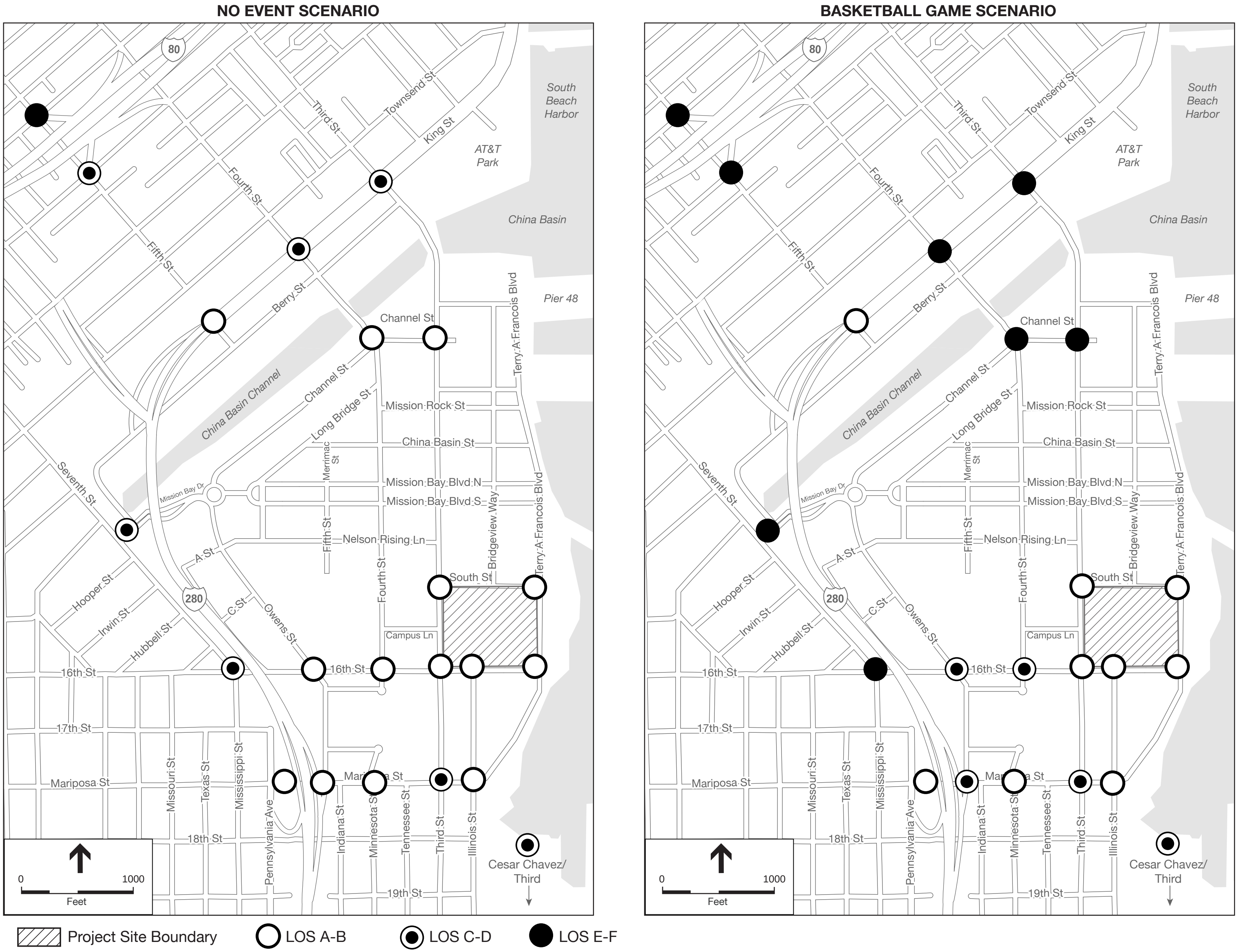
TABLE 5.2-60
INTERSECTION LEVEL OF SERVICE – 2040 CUMULATIVE CONDITIONS – SATURDAY EVENING PEAK HOUR

#	Intersection Location		No Event		Basketball Game	
			Delay[a]	LOS[b]	Delay	LOS
1	King St	Third Street	44.3	D	**56.8**	**E**
2	King St	Fourth Street	36.7	D	**70.8**	**E**
3	King St/Fifth St	I-280 ramps	15.7	B	< 10	A
4	Fifth St/Harrison	I-80 WB off-ramp	**74.9**	**E**	**>80**	**F**
5	Fifth St/Bryant St	I-80 EB on-ramp	43.9	D	**71.4**	**E**
6	Third Street	Channel Street[f]	12.4	B	**>80**	**F**
7	Fourth Street	Channel Street[f]	< 10	A	**67.5**	**E**
8	Seventh Street	Mission Bay Dr	26.6	C	**>80**	**F**
9	TA Francois Blvd	South Street[f]	< 10	A	<10	A
10	Third Street	South Street[f]	< 10	A	15.0	B
11	TA Francois Blvd	16th Street[f]	19.5	B	19.0	B
12	Illinois Street	16th Street[c,f]	12.2 (eb)	B	13.3 (nb)	B
13	Third Street	16th Street[e,f]	17.4	B	18.0	B
14	Fourth Street	16th Street[e]	17.8	B	20.3	C
15	Owens Street	16th Street[e]	13.9	B	24.8	C
16	7th/Mississippi	16th Street[e]	42.6	D	**61.2**	**E**
17	Illinois Street	Mariposa Street[f]	15.5	B	16.9	B
18	Third Street	Mariposa Street[f]	22.9	C	24.2	C
19	Fourth Street	Mariposa Street[f]	< 10	A	<10	A
20	Mariposa Street	I-280 NB off-ramp[f]	18.2	B	35.3	D
21	Mariposa Street	I-280 SB on-ramp[d]	10.2	B	<10	A
22	Third Street	Cesar Chavez St	23.7	C	22.8	C

NOTES:

[a] Delay presented in seconds per vehicle. For unsignalized intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
[b] Intersections operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.
[c] All-way stop-controlled intersection.
[d] The traffic signal at the intersection of Mariposa/I-280 southbound on-ramp is part of the roadway improvements on Mariposa Street between the I-280 northbound off-ramp and I-280 southbound on-ramp and the extension of Owens Street between 16th and Mariposa Streets, and is currently planned to be operational by fall 2015.
[e] Includes implementation of the 22 Fillmore Transit Priority Project, which includes converting one mixed-flow lane in each direction to a side-running transit-only lane.
[f] Under the Basketball Game scenario, a PCO would be stationed at this study intersection during the Saturday pre-event period, and, as necessary, would manually direct vehicles, pedestrians, transit, and bicyclists through the intersection. LOS reflects conditions without PCO intervention.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015



SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
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Figure 5.2-24
2040 Cumulative Intersection LOS-Saturday Evening Peak Hour -
No Event and Basketball Game Scenarios

In addition, as discussed in under existing plus project conditions in **Impact TR-11**, the proposed project would result in significant traffic impacts at five additional study intersections during the weekday p.m. and weekday evening peak hours for conditions with an overlapping evening event at AT&T Park, including: King/Fifth/I-280 ramps (weekday evening), Third/South (weekday evening), Fourth/16th (weekday p.m.), Illinois/Mariposa (weekday evening), and Mariposa/I-280 northbound off-ramp (weekday evening), and project-specific traffic impacts at these intersection would be also considered significant cumulative impacts of the project.

Generally, to mitigate poor operating conditions of study intersections, additional travel lane capacity would be needed on one or more approaches to the intersection, particularly at intersections with the I-80 ramps. The provision of additional travel lane capacity by narrowing sidewalks, removal of on-street parking, and/or removal of bicycle lanes would generally be infeasible and inconsistent with the transit, bicycle, and pedestrian environment encouraged by the City's *Transit First* Policy by removing space dedicated to pedestrians, and/or bicycles and increasing the distances required for pedestrians to cross streets. Implementation of **Mitigation Measure M-TR-2a: Additional PCOs during Events, Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts, Mitigation Measure M-TR-11a: Additional PCOs During Overlapping Events, Mitigation Measure M-TR-11b: Participation in Ballpark/Mission Bay Transportation Coordinating Committee,** and **Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events** would reduce the proposed project's contribution to cumulative impacts related to event-related traffic conditions but would not reduce the contribution to less-than-significant levels.

Overall, combined for all analysis peak hours, the proposed project would result in cumulative impacts, or contribute to 2040 cumulative impacts at the following 16 study intersections: King/Third, King/Fourth, King/Fifth/I-280 ramps, Fifth/Harrison/I-80 westbound off-ramp, Fifth/Bryant/I-80 eastbound on-ramp, Third/Channel, Fourth/Channel, Seventh/Mission Bay Drive, Third/South, Third/16th, Fourth/16th, Owens/16th, Seventh/Mississippi/16th, Illinois/Mariposa, Mariposa/I-280 northbound off-ramp, and Third/Cesar Chavez. As noted above, the proposed project would result in project-specific impacts or contribute considerably to cumulative impacts at nine intersections during the weekday p.m. peak hour, and at the eight intersections during the Saturday evening peak hour, and these impacts would be *significant and unavoidable with mitigation.*

Mitigation Measure M-TR-2a: Additional PCOs during Events (see Impact TR-2, above)

Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts (see Impact TR-2, above)

Mitigation Measure M-TR-11a: Additional PCOs During Overlapping Events (see Impact TR-11, above)

Mitigation Measure M-TR-11b: Participation in Ballpark/Mission Bay Transportation Coordinating Committee (see Impact TR-11, above)

Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events (see Impact TR-11, above)

Comparison of Impact C-TR-2 to Mission Bay FSEIR Impact Analysis

Cumulative traffic impacts were identified as significant and unavoidable in the Mission Bay FSEIR, which was based on Plan-level contributions to significant cumulative impacts at seven intersections at or near freeway ramps (Brannan/Sixth/I-280 ramps, Bryant/Second, Bryant/Fifth/I-80 eastbound on-ramp, Harrison/First, Harrison/Second, Harrison/Fremont/I-80 westbound off-ramp, and Harrison/Essex), and on the Bay Bridge and its approaches during the weekday p.m. peak hour. The significant and unavoidable cumulative impacts at 15 of the 16 study intersections identified above would be a new significant effect not identified in the Mission Bay FSEIR (i.e., the intersection of Bryant/Fifth/I-80 eastbound on-ramp was identified as a significant and unavoidable impact in the Mission Bay FSEIR). Therefore, the proposed project would result in *new significant* cumulative traffic impacts not previously identified in the Mission Bay FSEIR.

Impact C-TR-3: The project, in combination with other past, present, and reasonably foreseeable future projects, would result in significant cumulative traffic impacts at multiple freeway ramps in the project vicinity under 2040 Cumulative conditions. (Significant and Unavoidable with Mitigation)

Similar to the analysis for 2040 cumulative intersection operations, proposed project impacts at the freeway ramps were assessed by calculating the project-generated traffic conditions at ramp locations that are projected to operate at LOS E or LOS F under 2040 cumulative conditions for the No Event scenario for the weekday p.m. and Saturday evening peak hours. Because the SF-CHAMP travel demand model does not include the travel demand associated with events, the proposed project cumulative impacts for events at the project site for the weekday p.m. peak hour were assessed by adding the event-related traffic volumes (i.e., the Convention Event and Basketball Game scenarios) to the No Event scenario. At freeway ramps that are projected to operate at LOS E or LOS F under 2040 cumulative conditions, the increase in proposed project vehicle trips was reviewed to determine whether the increase would contribute considerably to the ramp volumes. In addition, the freeway ramps where project-specific significant impacts were identified for existing plus project conditions, the proposed project would also be considered to result in a cumulative impact under 2040 cumulative conditions. Supporting documentation regarding the cumulative contributions is included in **Appendix TR**.

Table 5.2-61 presents the 2040 cumulative analysis for freeway ramp operations for the weekday p.m. peak hour, while **Table 5.2-62** presents this information for the Saturday evening peak hour. Under 2040 cumulative No Event conditions, ramp operations would worsen from existing conditions, and five of the six freeway ramps would operate at LOS E or LOS F. Because the proposed project would result in significant impacts at three ramp locations under existing plus project conditions (i.e., I-80 eastbound on-ramp at Fifth/Bryant, I-80 westbound off-ramp at Fifth/Harrison, and I-280 northbound off-ramp at Mariposa Street), these impacts under 2040 cumulative conditions would be considered significant cumulative impacts. The proposed project would contribute considerably to the LOS F conditions at the I-280 southbound on-ramp at

TABLE 5.2-61
FREEWAY RAMP LEVEL OF SERVICE – 2040 CUMULATIVE CONDITIONS – WEEKDAY PM PEAK HOUR

#	Ramp Location	No Event		Convention Event		Basketball Game	
		Density[a]	LOS[b]	Density	LOS	Density	LOS
1	I-80 EB on-ramp at Sterling	**--**	**F**	**--**	**F**	**--**	**F**
2	I-80 EB on-ramp at Fifth/Bryant	**--**	**F**	**--**	**F**	**--**	**F**
3	I-80 WB off-ramp at Fifth/Harrison	**40**	**E**	**40**	**E**	**--**	**F**
4	I-280 SB on-ramp at Pennsylvania	**--**	**F**	**--**	**F**	**--**	**F**
5	I-280 NB off-ramp at Mariposa	34	D	34	D	35	D
6	I-280 SB on-ramp at Mariposa	**--**	**F**	**--**	**F**	**--**	**F**

NOTES:
[a] Density of vehicles in merge and diverge influence area for on-ramp and off-ramp analysis, respectively. Measured in passenger cars per mile per lane. Density value is not presented for ramp analyses where the demand volume exceeds the capacity.
[b] Ramps operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

TABLE 5.2-62
FREEWAY RAMP LEVEL OF SERVICE – 2040 CUMULATIVE CONDITIONS – SATURDAY EVENING PEAK HOUR

#	Ramp Location	No Event		Basketball Game	
		Density[a]	LOS[b]	Density	LOS
1	I-80 EB on-ramp at Sterling	24	C	24	C
2	I-80 EB on-ramp at Fifth/Bryant	**37**	**E**	**36**	**E**
3	I-80 WB off-ramp at Fifth/Harrison	33	D	**41**	**E**
4	I-280 SB on-ramp at Pennsylvania	16	B	16	B
5	I-280 NB off-ramp at Mariposa	19	B	27	C
6	I-280 SB on-ramp at Mariposa	15	B	15	B

NOTES:
[a] Density of vehicles in merge and diverge influence area for on-ramp and off-ramp analysis, respectively. Measured in passenger cars per mile per lane. Density value is not presented for ramp analyses where the demand volume exceeds the capacity.
[b] Ramps operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

Mariposa Street during the weekday p.m. peak hour, and this would be considered a significant impact. The proposed project would have a cumulatively considerable contribution to the cumulative impacts at the two other freeway ramps that would operate at LOS E or LOS F under 2040 cumulative conditions (i.e., I-80 eastbound on-ramp at Sterling Street, and I-280 southbound on-ramp at Pennsylvania Street).

As described for existing plus project conditions, no feasible mitigations are available for the freeway ramp impacts because there is insufficient physical space for additional capacity without redesign of the I-80 and I-280 ramp and mainline structures, and which may require acquisition of additional right-of-way. Implementation of **Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts** and **Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events** would reduce the proposed project's contribution to cumulative impacts related to event-related traffic conditions but would not mitigate the contribution to less-than-significant levels. Therefore, for the above reasons, the proposed project, in combination with past, present and reasonably foreseeable development in San Francisco, would contribute considerably to cumulative traffic impacts at three freeway ramps (i.e., I-80 eastbound on-ramp at Fifth/Bryant, I-80 westbound off-ramp at Fifth/Harrison, and I-280 southbound on-ramp at Mariposa Street), and impacts would be ***significant and unavoidable with mitigation***.

> **Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts** (see Impact TR-2, above)

> **Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events** (see Impact TR-11, above)

Comparison of Impact C-TR-3 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR did not address cumulative traffic impacts on freeway ramp facilities as a distinct transportation topic. The significant and unavoidable cumulative impacts at the I-80 westbound Harrison/Fremont off-ramp and Fifth Street on-ramp, the I-80 eastbound Seventh Street off-ramp, and the I-280 southbound Sixth Street on-ramp would be a *new significant* cumulative impact not identified in the Mission Bay FSEIR.

Cumulative Transit Impacts

Impact C-TR-4: The project, in combination with other past, present, and reasonably foreseeable future projects, could have significant transit impacts on Muni service under 2040 Cumulative conditions, and could contribute to significant cumulative transit impacts at Muni screenlines. (Less than Significant with Mitigation)

Proposed project transit impacts for 2040 cumulative conditions were assessed by calculating the project contribution to the Muni downtown screenlines operating at more than Muni's established 85 percent capacity utilization standard during the weekday p.m. peak hour. The ridership and capacity utilization for the T Third line and 22 Fillmore bus route was also assessed for 2040 cumulative conditions. In addition, where project-specific significant impacts were identified for the existing plus project transit analysis, the proposed project would also be considered to result in a cumulative impact under 2040 cumulative conditions.

Table 5.2-63A presents the ridership and capacity utilization for the T Third and 22 Fillmore for the weekday p.m. peak hour for 2040 cumulative conditions for the No Event and Convention Event scenarios. Under 2040 cumulative conditions, capacity on the T Third would increase over existing conditions, and capacity utilization would remain similar to existing plus project conditions. For weekday p.m. peak hour conditions, for both scenarios, the capacity utilization would be less than the 85 percent capacity utilization standard.

TABLE 5.2-63A
MUNI TRANSIT ANALYSIS – WEEKDAY PM PEAK HOUR – 2040 CUMULATIVE CONDITIONS

	No Event Scenario Outbound from the Project Site			Convention Event Scenario Outbound from Project Site	
Route[b]	Ridership	Capacity	Capacity Utilization[a]	Ridership	Capacity Utilization
T Third	3,018	5,712	52.8%	3,588	62.8%
22 Fillmore	714	942	75.8%	719	76.3%
Total	3,732	6,654	56.1%	4,306	64.7%

NOTES:

a For weekday p.m. peak hour, a capacity utilization standard of 85 percent used to determine significant impacts.
b 2040 cumulative ridership and capacity for the T Third and 22 Fillmore include implementation of the Central Subway and 22 Fillmore Transit Priority Project.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

Table 5.2-63B presents the ridership and capacity utilization for the T Third and 22 Fillmore for the weekday evening and weekday late evening peak hours for 2040 cumulative conditions for the Basketball Game scenario. Under 2040 cumulative conditions, for both weekday pre-event and post-event conditions, the capacity utilization would be less than the 100 percent capacity utilization standard for events.

TABLE 5.2-63B
MUNI TRANSIT ANALYSIS – WEEKDAY EVENING AND LATE EVENING PEAK HOURS – BASKETBALL GAME SCENARIO - 2040 CUMULATIVE CONDITIONS

	Basketball Game Scenario Weekday Evening Inbound to the Project Site			Basketball Game Scenario Weekday Late Evening Outbound from Project Site		
Route[b]	Ridership	Capacity	Capacity Utilization[a]	Ridership	Capacity	Capacity Utilization
T Third	5,434	6,028	90.1%	3,880	5,046	76.9%
22 Fillmore	304	628	48.5%	212	252	84.1%
Muni Special Event Shuttles	1,139	1,218	93.5%	942	978	96.3%
Total	6,877	7,874	87.3%	5,034	6,276	80.2%

NOTES:

a For event conditions, a capacity utilization of 100 percent was used to determine significant impacts.
b 2040 cumulative ridership and capacity for the T Third and 22 Fillmore include implementation of the Central Subway and 22 Fillmore Transit Priority Project.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

Table 5.2-64 presents the results of the Muni and regional screenline analysis for existing and 2040 cumulative conditions for the weekday p.m. peak hour. The 2040 cumulative transit screenline analysis accounts for ridership and/or capacity changes associated with the TEP, the Central Subway, the new Transbay Transit Center, the electrification of Caltrain, and expanded WETA service. During the weekday p.m. peak hour, the capacity utilization of some screenlines and corridors within the Muni downtown screenlines would exceed Muni's 85 percent capacity utilization standard. These exceedances of the capacity utilization standard would be considered a significant cumulative impact. Overall, the addition of the project-generated riders to the Muni downtown screenlines and corridors that exceed the 85 percent capacity utilization standard would be less than 5 percent, and therefore the proposed project would not contribute considerably to the cumulative impact.

By 2040, additional Muni transit service capacity is planned to become available on the T Third and 22 Fillmore routes to accommodate transit demand generated by the proposed project as well as nearby development. Therefore, with the increases in Muni capacity, as well as expansion of the Mission Bay TMA shuttle routes, capacity utilization for the analysis scenarios would not exceed the capacity utilization standard (i.e., 85 percent during non-event conditions and during the weekday p.m. peak hour, and 100 percent during events) during the weekday p.m., weekday late evening, and Saturday evening peak hours. The exception would be on the T Third on days with overlapping evening events at AT&T Park and at the event center where capacity utilization during the weekday evening, weekday late evening, and Saturday evening peak hours would exceed 100 percent, and this would be considered a significant cumulative impact of the project. However, Mitigation Measure M-TR-13: Additional Muni Transit Service During Overlapping Events would reduce the transit impacts on the T Third to a less-than-significant level, and therefore the proposed project's transit cumulative impacts would be *less than significant with mitigation.*

> **Mitigation Measure M-TR-13: Additional Muni Transit Service During Overlapping Events** (see Impact TR-13, above)

Comparison of Impact C-TR-4 to Mission Bay FSEIR Impact Analysis

Cumulative transit impacts on the T Third were identified as less than significant with mitigation in the Mission Bay FSEIR, which was based on Plan-level contributions to T Third ridership in 2015 cumulative conditions. Mission Bay FSEIR Mitigation Measure E.45 to provide additional T Third light rail to the Mariposa Street stop was found to reduce Plan-level cumulative transit impacts to less-than-significant levels. Consequently, no new or different mitigation measures or alternatives to reduce project impacts related to transit are identified or required with respect to the currently proposed project. On the basis of the above, the project would result in no new or substantially more severe significant effects than those identified in the Mission Bay FSEIR related to transit impacts.

TABLE 5.2-64
MUNI DOWNTOWN AND REGIONAL SCREENLINES –
WEEKDAY PM PEAK HOUR – 2040 CUMULATIVE CONDITIONS

Screenline/Transit Provider[a]	Existing Conditions			2040 Cumulative Conditions		
	Ridership	Capacity	Capacity Utilization	Ridership	Capacity	Capacity Utilization
Muni Downtown Screenlines						
Northeast						
Kearny/Stockton	2,172	3,291	66.0%	6,295	8,329	75.6%
Other lines	570	1,078	52.9%	1,229	2,065	59.5%
Screenline Total	*2,742*	*4,369*	*62.8%*	*7,524*	*10,394*	*72.4%*
Northwest						
Geary	1,821	2,528	72.0%	2,996	3,621	82.7%
California	1,371	1,686	81.3%	**1,765**	**2,021**	**87.3%**
Sutter/Clement	472	630	74.9%	**749**	**756**	**99.1%**
Fulton/Hayes	969	1,176	82.4%	**1,762**	**1,877**	**93.9%**
Balboa	640	929	68.8%	775	974	79.6%
Screenline Total	*5,273*	*6,949*	*75.9%*	***8,048***	***9,248***	***87.0%***
Southeast						
Third Street	553	714	77.5%	2,300	5,712	40.3%
Mission	1,539	2,789	55.2%	**2,673**	**3,008**	**88.9%**
San Bruno/Bayshore	1,328	2,134	62.2%	**1,817**	**2,134**	**85.2%**
Other lines	1,040	1,712	60.8%	1,583	1,927	82.1%
Screenline Total	*4,461*	*7,349*	*60.7%*	*8,373*	*12,781*	*65.5%*
Southwest						
Subway lines	4,766	6,294	75.7%	5,691	6,804	83.6%
Haight/Noriega	1,109	1,651	67.2%	1,265	1,596	79.3%
Other lines	277	700	39.6%	380	840	45.2%
Screenline Total	*6,152*	*8,645*	*71.2%*	*7,337*	*9,240*	*79.4%*
Muni Screenlines Total	*18,628*	*27,312*	*68.2%*	*27,096*	*35,952*	*75.4%*
Regional Screenlines						
East Bay						
BART	19,940	21,220	94.0%	30,383	33,170	91.6%
AC Transit	2,275	3,926	57.9%	7,000	12,000	58.3%
Ferry	806	1,615	49.9%	5,319	5,940	89.5%
Screenline Total	23,021	*26,761*	86.0%	42,702	*51,110*	83.5%
North Bay						
GGT Buses	1,400	2,817	49.7%	2,070	2,817	73.5%
Ferry	971	1,959	49.6%	1,619	1,959	82.6%
Screenline Total	2,371	*4,776*	*49.6%*	3,689	*4,776*	*77.2%*
South Bay						
BART	8,686	16,963	51.2%	13,971	24,182	57.8%
Caltrain	2,405	3,100	77.6%	2,529	3,600	70.3%
SamTrans	146	320	45.6%	150	320	46.9%
Ferries	0	0	0.0%	59	200	29.5%
Screenline Total	11,2373	*20,383*	*55.1%*	16,709	*28,302*	*59.0%*
Regional Screenlines Total	36,629	*51,920*	*70.5%*	63,101	*84,188*	*75.0%*

NOTES:

[a] Muni Downtown and Regional screenlines reflect outbound trips from downtown San Francisco.
[b] Muni Downtown screenlines or corridors operating at more than Muni's 85 percent capacity utilization standard are highlighted in **bold**.

SOURCE: SF Planning Department Memorandum, *Transit Data for Transportation Impact Studies*, June 2013 and Regional and Local 2040 Cumulative Transit Screenlines for Transportation Impact Studies, March 2014. Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

Impact C-TR-5: The project, in combination with other past, present, and reasonably foreseeable future projects, would have significant transit impacts on regional transit under 2040 Cumulative conditions. (Significant and Unavoidable with Mitigation)

Proposed project transit impacts for 2040 cumulative conditions were assessed by calculating the project contribution to the weekday p.m. peak hour regional screenlines operating at more than the 100 percent capacity utilization standard. In addition, where project-specific significant impacts were identified for the existing plus project transit analysis, the proposed project would also be considered to result in a cumulative impact under 2040 cumulative conditions.

Table 5.2-64 presents the regional screenlines for the weekday p.m. peak hour. Under 2040 cumulative conditions, all regional transit service providers are projected to operate under the capacity utilization standard of 100 percent, and therefore, the proposed project would have less-than-significant transit impacts on regional transit service during the weekday p.m. peak hour.

However, as discussed in Impact TR-5, for the Basketball Game scenario without a SF Giants game at AT&T Park, the proposed project would result in *significant* project-specific transit impacts to Caltrain capacity during the weekday evening, weekday late evening, and Saturday evening peak hours, and to WETA and Golden Gate Transit ferry and bus capacity during weekday late evening peak hour. In addition, as discussed in Impact TR-14, for the Basketball Game scenario with an overlapping evening game at AT&T Park, the proposed project would result in an additional significant project-specific transit impact to BART capacity to the East Bay during the weekday late evening peak hour.

Overall, under 2040 cumulative conditions, the proposed project would result in *significant* cumulative transit impacts on BART, Caltrain, Golden Gate Transit, and WETA. Implementation of **Mitigation Measure M-TR-5a: Additional Caltrain Service, Mitigation Measure M-TR-5b: Additional North Bay Ferry and Bus Service, and Mitigation Measure M-TR-14: Additional BART Service to the East Bay during Overlapping Events** would reduce or minimize the severity of the capacity utilization exceedances for the regional transit service providers. However, since the provision of additional East Bay, South Bay, and North Bay service is uncertain, and full funding for the service has not yet been identified, implementation of these mitigation measures is uncertain. Accordingly, the proposed project's significant cumulative impacts to BART, Caltrain, Golden Gate Transit and WETA transit capacity would remain *significant and unavoidable with mitigation*.

Mitigation Measure M-TR-5a: Additional Caltrain Service (see Impact TR-5, above)

Mitigation Measure M-TR-5b: Additional North Bay Ferry and Bus Service (see Impact TR-5, above)

Mitigation Measure M-TR-14: Additional BART Service to the East Bay During Overlapping Events (see Impact TR-14, above)

Comparison of Impact C-TR-5 to Mission Bay FSEIR Impact Analysis

Cumulative transit impacts on AC transit was identified as less than significant with mitigation in the Mission Bay FSEIR, which was based on Plan-level contributions to the regional screenlines during the weekday p.m. peak hour for 2015 cumulative conditions. Mission Bay FSEIR Mitigation Measure E.44 to encourage AC Transit to expand service and Mission Bay FSEIR Mitigation Measure E.45 to provide additional T Third light rail to the Mariposa Street stop were found to reduce Plan-level cumulative transit impacts to less than significant levels.

Under the proposed project, no cumulative impacts on AC Transit are projected for 2040 cumulative conditions for the weekday p.m. peak hour. However, the proposed project's significant and unavoidable with mitigation cumulative impacts to BART, Caltrain, Golden Gate Transit and WETA would be a significant effect not identified in the Mission Bay FSEIR. Therefore, the proposed project would result in new *significant* cumulative transit impacts not previously identified in the Mission Bay FSEIR.

Cumulative Pedestrian Impacts

Impact C-TR-6: The project, in combination with other past, present, and reasonably foreseeable future projects, could result in significant adverse cumulative pedestrian impacts. (Less than Significant with Mitigation)

The pedestrian volumes in the project vicinity would increase between implementation of the proposed project and 2040 cumulative conditions due to buildout of planned Mission Bay developments in the project vicinity (e.g., UCSF Mission Bay Campus) and construction of the Bayfront Park east of the project site. As described in Impact TR-6, the proposed project includes numerous sidewalks network and traffic control improvements that would improve and define the pedestrian network adjacent to the project site. Some improvements, such as new sidewalks along 16th Street between Illinois Street and Terry A. Francois Boulevard and signalization of the intersections of Terry A. Francois Boulevard/South and Terry A. Francois Boulevard/16th would enhance pedestrian circulation and access to the planned Bayfront Park and Bay Trail. **Table 5.2-65** presents the 2040 cumulative pedestrian LOS conditions at the study locations for the weekday p.m. peak hour for the No Event, Convention Event, and Basketball Game scenarios, while **Table 5.2-66** presents the pedestrian LOS for the Saturday evening peak hour for the No Event and Convention Event scenarios. Under 2040 cumulative conditions, pedestrian LOS for the weekday p.m. peak hour would be LOS D or better for the three scenarios. The 2040 cumulative pedestrian LOS for the Saturday evening peak hour would be LOS B or better for the No Event scenario, but LOS D or better for the Basketball Game scenario. The exceptions are the south and east crosswalks at the intersection of Third/South, which would operate at LOS E or LOS F for the Basketball Game scenario. As for existing plus project conditions, the LOS E and LOS F conditions would be considered a significant pedestrian impact, and as under existing plus project conditions, with implementation of **Mitigation Measure M-TR-6: Active Management of Pedestrian Flows at the intersection of Third/South** would reduce the pedestrian impacts to less-than-significant levels.

TABLE 5.2-65
PEDESTRIAN LEVEL OF SERVICE – 2040 CUMULATIVE CONDITIONS – WEEKDAY PM PEAK HOUR

Analysis Location	No Event		Convention Event		Basketball Game	
	MOE[a]	LOS	MOE	LOS	MOE	LOS
Crosswalks						
Third St/South St						
North	138	A	65	A	136	A
South	38	A	22	D	15	D
East	86	A	26	C	49	B
Third St/16th St						
North	94	A	42	B	64	B
South	142	A	94	A	54	B
East	203	A	68	A	113	A
West	155	A	112	A	69	A
Terry A. Francois Blvd/South St						
North	336	A	91	A	110	A
South	391	A	107	A	67	A
West	463	A	59	B	89	A
Sidewalks						
Third St between South & 16th Streets						
East	0.8	B	1.8	B	0.9	B
West	0.4	A	0.6	A	0.5	A
South Street – South Side	0.7	B	1.9	B	0.8	B
16th Street – North Side	0.6	B	1.8	B	0.9	B

NOTE:
[a] MOE – Measure of Effectiveness. Circulation area measured in average square feet per pedestrian for crosswalk analysis, and pedestrian unit flow measured in average pedestrians per minute per foot for sidewalk analysis.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

In addition, there would be a projected increase in background vehicle and bicycle traffic between existing plus project and 2040 cumulative conditions that could result in increased potential for pedestrian-vehicle and pedestrian-bicycle conflicts. However, the project's numerous pedestrian network improvements would define the pedestrian network adjacent to the project site and would offset the risks associated with increases in vehicle and bicycle volumes. For the above reasons, the proposed project's contribution to potential cumulative impacts on pedestrians would be *less than significant with mitigation.*

Mitigation Measure M-TR-6: Active Management of Pedestrian Flows at the Intersection of Third/South (see Impact TR-6, above)

TABLE 5.2-66
PEDESTRIAN LEVEL OF SERVICE – 2040 CUMULATIVE CONDITIONS – SATURDAY EVENING PEAK HOUR

Analysis Location	No Event		Basketball Game	
	MOE[a]	LOS[b]	MOE	LOS
Crosswalks				
Third St/South St[c]				
North	199	A	**11**	**E**
South	61	A	**3**	**F**
East	30	A	21	D
Third St/16th St[c]				
North	109	A	39	C
South	157	A	33	C
East	120	A	20	D
West	194	A	39	C
Terry A. Francois Blvd/South St[c]				
North	374	A	33	C
South	240	A	16	D
West	388	A	21	D
Sidewalks				
Third St between South & 16th Streets				
East	0.6	B	1.0	B
West	0.2	A	0.4	A
South Street – South Side	0.7	B	1.2	B
16th Street – North Side	0.8	B	1.5	B

NOTES:
[a] MOE – Measure of Effectiveness. Circulation area measured in average square feet per pedestrian for crosswalk analysis, and pedestrian unit flow measured in average pedestrians per minute per foot for sidewalk analysis.
[b] Crosswalks operating at LOS E or LOS F highlighted in **bold**. Significant project impacts shaded.
[c] Under the Basketball Game scenario, a PCO would be stationed at this study intersection during the Saturday pre-event period, and, as necessary, would manually direct vehicles, pedestrians, transit, and bicyclists through the intersection. LOS reflects conditions without PCO intervention.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015

Comparison of Impact C-TR-6 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR did not identify any significant cumulative impacts related to pedestrians. Although the proposed project could result in significant pedestrian impacts at the crosswalks at the intersection of Third/South, this impact would be reduced to less than significant with identified mitigation measures. Therefore, the project would not result in new significant impacts from what was previously identified in the Mission Bay FSEIR.

Cumulative Bicycle Impacts

Impact C-TR-7: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative bicycle impacts. (Less than Significant)

The proposed project would not considerably contribute to cumulative bicycle circulation or conditions. The proposed project would include on-site elements to accommodate bicyclists traveling to and from the project site. In addition, Class II bicycle lanes on 16th Street would be extended in both directions east of Third Street to Terry A. Francois Boulevard, which would facilitate access to the planned cycle track and the Bay Trail that runs along the shoreline parallel to Terry A. Francois Boulevard. The intersection of Terry A. Francois Boulevard/16th Street would be signalized, and a bicycle signal and two-stage turn queue boxes would be installed to facilitate turns between the bicycle lanes on 16th Street and the two-way cycle track on the east side of Terry A. Francois Boulevard. The proposed project improvements on 16th Street and at the intersection of Terry A. Francois Boulevard/16th Street would be in addition to the planned cycle track on Terry A. Francois Boulevard that would be made as part of the Mission Bay Plan. These bicycle improvements would enhance cycling conditions in the study area. As bicycling continues to increase throughout San Francisco, the number of bicyclists on the area bicycle facilities is also anticipated to increase. While there would be a general increase in vehicle traffic that is expected through the future 2040 cumulative conditions, the proposed project would not create potentially hazardous conditions for bicycles, or otherwise interfere with bicycle accessibility to the site and adjoining areas, or substantially affect the existing, planned, and proposed bicycle facilities in the project vicinity. Therefore, for the above reasons, the proposed project, in combination with past, present and reasonably foreseeable development in San Francisco, would result in *less-than-significant cumulative impacts on bicyclists.*

Mitigation: Not required

Comparison of Impact C-TR-7 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR did not identify any significant cumulative impacts related to bicycles. Consequently, no new or different mitigation measures or alternatives to reduce project impacts related to bicycles are identified or required with respect to the currently proposed project. On the basis of the above, the project would result in no new or substantially more severe significant effects than those identified in the Mission Bay FSEIR related to bicycle impacts.

Cumulative Loading Impacts

Impact C-TR-8: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative loading impacts. (Less than Significant)

Loading impacts, like pedestrian impacts, are by their nature localized and site-specific, and would not contribute to impacts from other reasonably foreseeable projects in the vicinity of the project site. Moreover, the proposed project would not result in loading impacts related to freight/service vehicles and passenger loading/unloading activities, as the estimated loading demand would be met on-site at the proposed service area/truck loading area, and on South Street and Terry A. Francois Boulevard. **Improvement Measure I-TR-8: Truck and Service Vehicle Operations Plan** would reduce the potential for conflicts between proposed project freight and service vehicle activities and pedestrians, transit, bicyclists, and autos on the adjacent streets. Therefore, the proposed project, in combination with past, present and reasonably foreseeable future development in the project vicinity, would result in *less-than-significant cumulative loading impacts.*

Mitigation: Not required

Improvement Measure I-TR-8: Truck and Service Vehicle Operations Plan (see Impact TR-8, above)

Comparison of Impact C-TR-8 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR did not identify any significant cumulative impacts related to loading. Consequently, no new or different mitigation measures or alternatives to reduce project impacts related to loading/unloading activities are identified or required with respect to the currently proposed project. On the basis of the above, the project would result in no new or substantially more severe significant effects than those identified in the Mission Bay FSEIR related to loading impacts.

Cumulative Impacts on UCSF Helipad Operations

Impact C-TR-9: The project, in combination with other past, present, and reasonably foreseeable future projects, could result in significant adverse cumulative impacts to the UCSF helipad. (Less than Significant with Mitigation)

See Section 5.2.6, Project Impacts on UCSF Helipad Operations regarding cumulative impacts related to the UCSF helipad operations.

Cumulative Emergency Vehicle Access Impacts

Impact C-TR-10: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative emergency vehicle access impacts. (Less than Significant)

The proposed project would not contribute considerably to cumulative emergency vehicle access impacts in the area. With implementation of the proposed project, emergency vehicle access to the project site would remain similar to existing conditions, however, as discussed in **Impact TR-10**, with implementation of the proposed project, 16th Street would be built out between Illinois Street and Terry A. Francois Boulevard. By 2040, the planned roadway network in Mission Bay would be completely built out, and would provide emergency vehicle access to planned development. With implementation of the planned 22 Fillmore Transit Priority Project, transit-only lanes will be implemented on 16th Street, and emergency vehicles will be permitted use of the transit-only lanes. The transit-only lanes on 16th Street would have fewer vehicles in them than the adjacent mixed-flow lanes, and would not be subject to any turn restrictions. Emergency vehicles may adjust travel routes to respond to incidents; however, emergency vehicle access in the area would not be substantially affected. As discussed in **Impact TR-10** and **Impact TR-17**, emergency vehicle access would be maintained during events at the event center, without and with overlapping events at AT&T Park. Persons accessing the UCSF Medical Center emergency room and urgent care center in their personal vehicles during an emergency would, if necessary, also be able to utilize the transit-only lanes to bypass congested segments on 16th Street. On Mariposa Street, emergency vehicles and other persons accessing the emergency room and urgent care center in their personal vehicles during an emergency would be able to travel within the center left-turn lane to access the intersection of Fourth/Mariposa.

During large events at the event center, including during overlapping events, PCOs would be stationed at the intersections of Fourth/Mariposa, Owens/Mariposa/I-280 northbound off-ramp, and Owens/16th, and would prevent queues from blocking access to the UCSF Medical Center. For smaller events, PCOs would be stationed at key intersections and would be monitoring conditions, and could be reassigned to respond to conflicts between event center traffic and UCSF hospital access. In addition, when PCOs are deployed for an event, they would have the capability to radio ahead to other PCOs down the street regarding the approaching vehicle requiring emergency access. **Improvement Measure I-TR-10a: UCSF Emergency Vehicle Access and Garage Signage Plan** and **Improvement Measure I-TR-10b: Mariposa Street Restriping** would enhance emergency vehicle access to UCSF emergency facilities. Therefore, for the above reasons, the proposed project, in combination with past, present and reasonably foreseeable development in San Francisco, would result in *less than significant* emergency vehicle access impacts.

Mitigation: Not required

Improvement Measure I-TR-10a: UCSF Emergency Vehicle Access and Garage Signage Plan (see Impact TR-10, above)

Improvement Measure I-TR-10b: Mariposa Street Restriping (see Impact TR-10, above)

Comparison of Impact C-TR-10 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR did not address cumulative emergency vehicle access impacts as a distinct transportation topic. Given that the project would have less than significant impacts on emergency vehicle access, the project would result in no new or substantially more severe significant effects than those identified in the Mission Bay FSEIR.

5.2.5.6 Parking Conditions

As discussed in Chapter 2, Introduction, SB 743 amended CEQA by adding Public Resources Code Section 21099 regarding the analysis of parking impacts for certain urban infill projects in transit priority areas. Public Resources Code Section 21099(d), effective January 1, 2014, provides that "parking impacts of a residential, mixed-use residential, or employment center project on an infill site located within a transit priority area shall not be considered significant impacts on the environment." The proposed project meets each of the above three criteria: it is in a transit priority area because of its location within ½ mile of a major transit stop; it is an infill site because it is located on a previously developed site in an urban area; and it is an employment center because it would be an expansion of existing commercial support uses, located in a transit priority area on a site already developed and zoned for commercial uses. Thus, this SEIR does not consider adequacy of parking in determining the significance of project impacts under CEQA. However, OCII acknowledges that parking conditions may be of interest to the public and the decision makers. Therefore, a parking demand analysis is presented for informational purposes and considers secondary physical impacts associated with constrained supply (e.g., queuing by drivers waiting for scarce onsite parking spaces that affects the public right-of-way).

The Mission Bay FSEIR did not identify any significant impacts related to the identified parking shortfall, and did not require any mitigation measures. The project would not have any new or substantially more severe significant effects than those identified in the Mission Bay FSEIR related to parking, although, as noted above, the discussion of parking conditions is presented for informational purposes only.

Proposed Project Parking Supply

The project site currently contains two surface metered parking facilities containing about 605 parking spaces. With implementation of the proposed project, the existing surface parking lots would be eliminated. The proposed project would provide a total of 950 on-site vehicle parking spaces, including 22 ADA accessible spaces within an on-site parking garage containing 899 spaces and 51 parking spaces within the separate loading center. With the exception of about six spaces, which would be tandem spaces, all vehicle parking spaces would be independently-accessible.[54] Vehicular access to the garage would be from both South Street and 16th Street, and 51 of the vehicle spaces would be located within the separate below-grade loading area within the parking garage. The 51 vehicle parking spaces within the loading area would be reserved for use by the Golden State Warriors. As part of the project, the sponsor has also acquired the right to park at 132 existing off-street parking spaces in the 450 South Street parking garage, accessed from South Street and Bridgeview Way directly north of the project site. Combined, the proposed project would have 1,082 vehicle parking spaces serving the project uses.

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54 Independently-accessible parking spaces allow a vehicle to be accessed without having to move another vehicle.

During non-event periods, ticket-issuing machines paired with a pay-on-foot ticket kiosks[55] would be set up to manage project visitor parking, while an Automatic Vehicle Identification System (AVI)[56] would be implemented to control on-site employee parking. During Golden State Warriors basketball games, a prepaid parking system is proposed for patrons to access the parking garage, where the parking attendant would scan a prepaid barcode hang tag on vehicles (prepaid credentials would be sold through the Golden State Warriors season ticket process). An AVI system may also be used for members of the Golden State Warriors to access the garage.

With implementation of the proposed project, on-street parking adjacent to the project site would be provided on South Street, Terry A. Francois Boulevard, and 16th Street, as follows:

- On the south side of South Street, a Mission Bay TMA shuttle stop approximately 60 feet in length would be provided immediately east of Third Street, and a taxi zone approximately 100 feet in length would be provided east of Bridgeview Way, where the project garage entrance/exit is located. Seven metered commercial loading spaces would be provided directly west of Terry A. Francois Boulevard, and one metered commercial loading space would be located between the TMA shuttle stop and the project garage driveway. The remaining curb length would be dedicated to 14 metered parking spaces. Nineteen metered parking spaces would be located on the north side of South Street, between Terry A. Francois Boulevard and Third Street.

- On the west side of Terry A. Francois Boulevard, approximately eight metered commercial loading spaces would be provided immediately south of South Street and a 75-foot wide paratransit stop would be provided midblock. The remaining curb length would be dedicated to 14 metered parking spaces. Twenty-nine metered parking spaces would be located on the east side of Terry A. Francois Boulevard between 16th and South Streets.

- On the north side of 16th Street one metered commercial loading space and 30 metered parking spaces would be provided. On the segment of 16th Street between Illinois Street and Terry A. Francois Boulevard, 24 metered parking spaces would be located to the south of the curbside bicycle lane. The parking lane would be separated from the bicycle lane by a 4-foot wide buffer. On the segment between Third and Illinois Streets, seven metered parking spaces (including one commercial loading space) would be located adjacent to the curb, and the proposed bicycle lane would be adjacent to the curb parking lane. Thirty metered parking spaces would be located on the south side of 16th Street, between Terry A. Francois Boulevard and Third Street.

- On Third Street, no stopping or parking is allowed at any time on either side of the street, and the prohibition would be maintained as part of the proposed project. Additional signage would be placed as part of the proposed project on the east sidewalk to emphasize the existing stopping and parking prohibitions, including the prohibition of passenger loading/unloading at any time.

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55 A machine that accepts payment and validates pay-parking access tickets without cashier assistance. These machines are also known as automatic pay stations.

56 An Automatic Vehicle Identification (AVI) system involves using radio frequency identification (RFID) system to automatically identify a vehicle when it enters a garage, so that it can be authorized and permitted to enter and exit. The system is able to identify a vehicle as it approaches the gate, allowing the parking system to authorize entry and open the gate, without the driver having to stop or open the window.

As discussed below, during post-event conditions, temporary parking restrictions would reduce vehicular travel on the affected streets, and would displace the existing parking demand to other streets or to off-street facilities in the nearby vicinity.

Project Parking Supply and Demand

Table 5.2-67 summarizes the proposed project parking demand and supply for the project scenarios for midday (between 11:30 a.m. and 1:30 p.m.) and evening (7:00 and 8:30 p.m.) conditions on weekdays and Saturdays. The proposed project parking supply of 1,082 parking spaces includes 950 parking spaces within the on-site parking garage, as well as 132 parking spaces off-site within the 450 South Street Parking Garage for which the project sponsor has acquired parking rights to serve the project.

TABLE 5.2-67
PROJECT PARKING SUPPLY AND DEMAND BY SCENARIO

	Weekday		Saturday	
Supply and Demand	**Midday**	**Evening**	**Midday**	**Evening**
Project Supply	1,082	1,082	1,082	1,082
Project Demand[a]				
No Event	1,049	489	589	462
Convention Event	**1,906**	669	--	--
Basketball Game	1,072	**4,270**	589	**4,573**

NOTE:
[a] Instances where the project demand exceeds the proposed supply are in **bold** and shaded.

SOURCE: Adavant Consulting/LCW Consulting, 2015

The project parking demand would change depending on the event condition, and would be greatest during the weekday midday on days with a convention event (1,906 spaces), on weekday evenings with a basketball game (4,270 spaces), and on Saturday evenings with a basketball game (4,573 spaces).

As highlighted in **Table 5.2-67**, for the No Event scenario, the project-generated parking demand would be accommodated within the proposed supply. For the Convention Event scenario[57], the parking demand would exceed the project supply during the weekday midday period, while for the Basketball Game scenario, the parking demand would exceed the project supply during both weekday and Saturday evenings. This unmet parking demand would need to be accommodated in other off-street parking facilities in the study area or by means of on-street parking.

As indicated in **Section 5.2.3.7** above, on-street parking within Mission Bay is well utilized during the daytime hours, with midday occupancies about 90 percent. Given this high level of

[57] Daytime convention event with about 9,000 attendees.

parking occupancy and the fact that all on-street spaces will be metered in the future as part of the SFMTA/Port parking management plan, no credit for on-street parking availability has been assumed for the analysis of midday parking conditions under any scenario.

Typical parking utilization in the area during the evening and overnight hours is about 25 percent due to the current limited evening uses in the area, increasing to 60 percent during on SF Giants evening game days. On days with evening events at the project site, some visitors may seek on-street parking, and parking occupancy would increase in the project vicinity during events at the project site. However, the SFMTA and Port of San Francisco are implementing special event rates in the general vicinity of AT&T Park during SF Giants games, which would also be applicable during events at the project site. Metered rates would be comparable to those charged at off-street parking facilities during events.

Thus, given that the availability of on-street parking in the evening would be relatively small (150 to 250 spaces overall) and that all on-street spaces would be metered and charge special event rates, no credit for on-street parking availability has been assumed for the analysis of evening parking conditions with a basketball game.

For these reasons, the analysis of parking supply and demand conditions focused on all the off-street facilities within the transportation study area (i.e., those facilities listed in **Table 5.2-8**) and presented in **Figure 5.2-8**). The following section presents the off-street parking supply for the project analysis scenarios for conditions without and with a SF Giants evening game at AT&T Park grouped by facility owner/operator.

Existing plus Project Study Area Off-street Parking Supply

Table 5.2-68 presents the midday and evening parking supply within the transportation study area for weekday and Saturdays for conditions without a SF Giants game at AT&T Park and for conditions with a SF Giants evening game at AT&T Park. Additional detail by parking facility is included in **Appendix TR**. A number of parking facilities currently open, or remain open, during games at AT&T Park to accommodate attendees driving to a baseball game. Specifically, parking facilities at 185 Berry Street, Pier 48 Sheds A and B, and Lot C with about 1,100 parking spaces overall are closed on no game days but become available for public parking during a SF Giants game on weekdays, while Pier 48 Sheds A and B and Lot C become available for public parking on Saturdays.[58] As a result of this variation in the operation of existing parking facilities during SF Giants games at AT&T Park, the parking supply would also vary for existing plus project conditions without and with an event at the project site, and without and with an overlapping SF Giants evening game at AT&T Park.

The transportation analysis assumes that current operating characteristics of the public parking facilities supporting the SF Giants evening game at AT&T Park do not change, and that the existing facilities currently open to the general public on weekdays and weekends would remain

[58] Lot A is only available to SF Giants parking permit holders on home game days.

TABLE 5.2-68
EXISTING PLUS PROJECT STUDY AREA PARKING SUPPLY BY SCENARIO

Parking Facility Grouping	No Event and Convention Event				Basketball Game[e]			
	Weekday		Saturday		Weekday		Saturday	
	Midday	Evening	Midday	Evening	Midday	Evening	Midday	Evening
Conditions without a SF Giants Game at AT&T Park								
1 Project Site	950	950	950	950	950	950	950	950
2 SF Giants Facilities[a]	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530
3 UCSF Facilities[b]	2,590	2,590	2,590	2,590	2,590	2,590	2,590	2,590
4 Alexandria Facilities[c]	2,180	--	--	--	2,180	1,400	--	1,400
5 Other Facilities[d]	435	135	135	135	435	135	135	135
Total	8,685	6,205	6,205	6,205	8,685	7,605	6,205	7,605
Conditions with a SF Giants Evening Game at AT&T Park								
1 Project Site	950	950	950	950	950	950	950	950
2 SF Giants Facilities	2,530	3,350	2,530	3,350	2,530	3,530	2,530	3,350
3 UCSF Facilities	2,590	2,590	2,590	2,590	2,590	2,590	2,590	2,590
4 Alexandria Facilities	2,180	--	--	--	2,180	2,180	--	2,180
5 Other Facilities	435	405	135	135	435	405	135	435
Total	8,685	7,295	6,205	7,025	8,685	9,475	6,205	9,505

NOTES:
a SF Giants facilities include Pier 48 Sheds A and B and Lot C (Blocks 3E and 4E)
b UCSF facilities include 1650 Third Street, Block 23, 1625 Owens Street (Rutter Community Center), and Medical Center Phase 1 Garage and Lot
c Alexandria facilities include 450 South Street and 1670 Owens Street
d Other facilities include 601 Terry A. Francois Boulevard (Pier 52 boat launch) and a temporary Port lot on the east side of Terry A. Francois Boulevard.
e Basketball Game scenario assumes that about 1,200 parking spaces within 450 South Street would be available for event parking on weekday and weekend evening for conditions without a SF Giants game, and that 450 South Street, 1670 Owens Street and 185 Berry Street facilities would be available on Saturdays for conditions with a SF Giants evening game.

SOURCE: Adavant Consulting/LCW Consulting, 2015

available to the public (e.g., most UCSF parking facilities currently operate 24 hours a day every day), including employees and visitors to the proposed project site.

Thus, for existing plus project conditions for the No Event and Convention Event scenarios, the weekday parking supply would be about 8,700 spaces during the midday and 6,200 during the evening periods, and on Saturdays the parking supply would be about 6,200 spaces during the midday and evening periods (i.e., parking facilities at 185 Berry Street, 450 South Street, and 1670 Owens Street would remain closed on Saturdays, as under Existing conditions).

Study Area Parking Supply for Conditions without a SF Giants Game at AT&T Park

For purposes of the transportation analysis, it was assumed that in addition to the facilities currently available for parking by the general public, the 450 South Street garage containing approximately 1,400 spaces, which is currently closed to the general public after 7:00 p.m., would also be available to accommodate event-related parking during weekday and weekend evening events. This would be similar to what currently occurs at the 185 Berry Street garage on weekdays during a SF Giants evening game. Thus, as noted in **Table 5.2-68**, during the Saturday analysis period, the parking supply in the study area would increase from the current 6,200 parking spaces to 7,600 spaces.

It should be noted that the Mission Rock Project would eliminate the existing surface parking lot (i.e., Lot A), and replace it with a combination of residential, office, and commercial uses. The Mission Rock Project would provide approximately 3,100 parking spaces on-site, including construction of a structured parking garage that would also serve patrons of AT&T Park on a parcel at the south end of Seawall Lot 337 (i.e., Parcel D), with a capacity of about 2,300 vehicle spaces (the approximate capacity of Lot A). The preliminary construction-phasing plan calls for this parking garage to be built in the first phase as to maintain the maximum number of parking spaces for SF Giants games.[59] When the Mission Rock Project parking garage is under construction, about 1,600 vehicles (estimated at about two-thirds of the existing Lot A capacity based on the size of Parcel D as compared to the overall size of Lot A) would be accommodated in the remainder of Lot A. Under the Basketball Game scenario, between 1,500 and 2,000 attendees are estimated to park at Lot A, and, therefore, when the Mission Rock Project parking garage is under construction, approximately 400 project-generated vehicles would seek and find parking elsewhere (such as at the 450 Fourth Street Garage and UCSF's Third Street Parking Garage).

Study Area Parking Supply for Conditions with a SF Giants Evening Game at AT&T Park

The existing plus project parking supply for No Event and Convention Event scenarios during a baseball game at AT&T Park was assumed to be the same as for existing conditions (i.e., on weekdays about 8,700 spaces during the midday and 7,300 spaces during the evening periods, and on Saturdays about 6,200 spaces during the midday and 7,000 spaces during the evening periods).

For the Basketball Game scenario with a SF Giants evening game at AT&T Park, the transportation analysis assumes that additional facilities that currently remain closed during baseball games at AT&T Park would open during the evenings to accommodate the additional project event-related parking. Specifically, the supply assumes that both Alexandria facilities (i.e., 450 South Street and 1670 Owens Street) would open on weekday evening, and that on Saturday evenings, both Alexandria facilities, as well as the 185 Berry Street garage, would be also available.

Existing plus Project Conditions without a SF Giants game at AT&T Park

Table 5.2-69 presents the existing plus project parking demand and supply for the analysis scenarios for conditions without a SF Giants game at AT&T Park. The parking assessment assumes that the existing parking demand associated with the surface parking facilities on the project site without at SF Giants game at AT&T Park would be accommodated at other nearby facilities, and is, therefore, included in the existing areawide parking demand within the study

[59] Seawall Lot 337 and Pier 48 Mixed-Use Project, Notice of Preparation of an EIR, December 11, 2013. Case No. 2013.0208E. Available online at http://sfmea.sfplanning.org/2013.0208E_NOA.pdf. Accessed May 28, 2015.

TABLE 5.2-69
EXISTING PLUS PROJECT STUDY AREA PARKING DEMAND AND SUPPLY WITHOUT A SF GIANTS GAME AT AT&T PARK

Parking Facility Grouping	No Event		Convention Event		Basketball Game	
	Midday	Evening	Midday	Evening	Midday	Evening
Weekday Conditions						
Existing Demand	5,409	2,111	5,409	2,111	5,409	2,111
Project Demand	1,049	489	1,906	669	1,072	4,270
Total Demand	6,458	2,600	7,315	2,780	6,481	6,381
Total Supply	8,685	6,205	8,685	6,205	8,685	7,605
Total Parking Occupancy	74%	42%	84%	45%	75%	84%
Surplus/(Shortfall)[a]	2,227	3,605	1,370	3,425	2,204	1,224
Shortfall if Additional Facilities Not Open after 7:00 p.m.	No shortfall (facilities are open at midday)	No shortfall	No shortfall (facilities are open at midday)	No shortfall	No shortfall (facilities are open at midday)	**(176)**
Shortfall if UCSF Facilities Not Available for Event Parking	No shortfall	No shortfall	No shortfall	No shortfall	No shortfall	No shortfall
Saturday Conditions						
Existing Demand	1,159	919	—	—	1,159	919
Project Demand	589	462	—	—	589	4,573
Total Demand	1,748	1,381	—	—	1,757	5,492
Total Supply	6,205	6,205	—	—	6,205	7,605
Total Parking Occupancy	28%	22%	—	—	28%	72%
Surplus/(Shortfall)	4,457	4,824	—	—	4,448	2,113
Shortfall if Additional Facilities Not Open on Saturdays	No shortfall	No shortfall	—	—	No shortfall	No shortfall
Shortfall if UCSF Facilities Not Available for Event Parking	No shortfall	No shortfall	—	—	No shortfall	No shortfall

NOTE:
[a] Parking supply shortfall highlighted in **bold** and shaded.

SOURCE: Adavant Consulting/LCW Consulting, 2015

area. The existing parking supply of 610 spaces within the two surface parking lots on the project site was remove from the areawide parking supply.

No Event Scenario

As noted above, under the No Event scenario (i.e., assuming the parking demand generated by the office, retail and restaurant uses) for both weekday and Saturday conditions, parking would be accommodated within the proposed project parking supply, and therefore would not affect other off-street parking facilities in the study area. Total areawide parking occupancy would be about 74 percent during the weekday midday and 42 percent during the weekday evening, and substantially lower (about 22 to 28 percent) on a Saturday. It should be noted that the weekday midday occupancy is greater at some nearby facilities, such as the UCSF garages which currently operate at 90 to 95 percent during the midday period; as such, it is possible that some of those vehicles parking at those facilities could migrate to the project garage, evening out the distribution of overall utilization.

Convention Event Scenario

Under the Convention Event scenario, the parking demand would exceed the total project parking supply, and a portion of the demand would need to be accommodated in other nearby off-street parking facilities, such as Lot A which contains approximately 2,400 spaces and is currently 30 to 40 percent occupied during the weekday midday period. Overall, weekday midday parking utilization within the study area would increase from 74 percent under the No Event scenario to 84 percent under the Convention Event scenario. Weekday evening occupancy within the study area under the Convention Event scenario would be similar to the No Event, below 50 percent occupied, as the daytime convention event would be practically over at that time.

Basketball Game Scenario

On weekdays under the Basketball Game scenario, the midday parking demand would be similar to the No Event scenario (i.e., primarily the parking demand associated with the office, retail, and restaurant uses), and would be accommodated on-site. During the weekday evening, however, the basketball game-generated parking demand would exceed the project supply, and would need to be accommodated at other nearby off-street parking facilities. It is anticipated that a substantial portion of the project-generated parking demand under the Basketball Game scenario would be accommodated in Lot A (about 1,500 vehicles), as well as in the 450 South Street Parking Garage (about 1,200 vehicles, and which the analysis assumes would be open). In addition, it is anticipated that about 600 vehicles would be accommodated within various UCSF parking facilities, including the 1650 Third Street, 1625 Owens Street, and Medical Center Phase 1 garages. On Saturday evenings, more vehicles would be parked at Lot A (about 2,100 vehicles, reflecting the lower current parking occupancy at Lot A), and slightly fewer at the UCSF facilities (about 500 vehicles). As indicated in **Table 5.2-69**, the overall weekday evening parking occupancy in the study area would increase from 42 percent under the No Event scenario to 64 percent under the Basketball Game scenario. On Saturdays, the overall parking occupancy would increase from 22 percent under the No Event scenario to 72 percent under the Basketball Game scenario.

In the event that the 450 South Street Parking Garage would not be made available for event parking during weekday and weekend evenings (i.e., only those parking facilities that are currently open in the evenings would be able to accommodate the proposed project parking demand), occupancy of other facilities (such as the nearby UCSF garages and lots) would increase to their capacity, and overall occupancy would increase from 84 percent to more than 100 percent on weekday evenings, and from 69 percent to 89 percent on Saturday evenings. As a result of the approximately 200-space parking shortfall on weekdays (about 3 percent of the project demand), individuals who would have preferred to drive may instead use transit to arrive at the site because the perceived convenience of driving is lessened by a shortage of parking. By promoting carpooling, providing parking attendant services, providing clear direction to alternative parking locations in advance of events, and adjusting event parking rates, the parking supply would likely be more efficiently utilized during the event days and the potential parking deficit would be eliminated.

In the event that the 450 South Street parking garage would not be made available for event parking during weekday evenings, and the proposed parking supply in the study area would not meet demand, and it is possible that some drivers may seek available parking in adjacent residential areas to the south. South of the project site within the study area, the streets between Mariposa and 18th Streets, between Indiana and Third Streets are subject to the RPP "X' regulation which restricts on-street parking Monday through Friday, to a two or four-hour period between the hours of 8:00 a.m. and 4:00 p.m. unless an RPP "X" permit is displayed, in which case there is no time limit enforced. On these streets, the RPP regulation is not in effect during the weekday evenings, thus residents arriving to these areas could have difficulty parking on-street. If residents in adjacent residential areas to the south perceive an increased challenge in finding on-street parking in their neighborhoods, residents can request to establish a new or expand existing RPP Area "X" through the SFMTA. They may also explore other possible parking management strategies to address spillover parking in residential areas. The extent of spillover into the nearby residential neighborhoods to the south could be minimized by extending the RPP regulations to a larger area, reducing all non-residential on-street parking to two hours, adding parking meters at key locations, and increasing weekday midday enforcement.

Table 5.2-69 also shows that in the event that the UCSF parking facilities would not be made available for event parking during weekday and weekend evenings, the expected project parking demand could still be accommodated among the remaining facilities (assuming that the 450 South Street parking garage is available), with the overall occupancy increasing from 84 percent to 91 percent on weekday evenings, and from 69 percent to 77 percent on Saturday evenings.

As part of post-event transportation management, temporary parking restrictions on South Street (34 spaces between Third Street and Terry A. Francois Boulevard), Terry A. Francois Boulevard (15 spaces between South and 16th Streets), 16th Street (61 spaces between Third Street and Terry A. Francois Boulevard), and Illinois Street (40 spaces between 16th and 18th Streets) would reduce vehicular travel on the affected streets, and would displace the existing parking demand to other streets or to off-street facilities in the nearby vicinity. As noted above, lack of available on-street parking may result in drivers looking for a parking space on other streets, primarily to the west and south of the project site. During the weekday and weekend evening periods, on-street parking occupancy is low, and the overall number of parking spaces that would be affected would be relatively low (less than 150 spaces), and would not be expected to substantially affect overall on-street parking conditions.

Overall, under existing plus project conditions without a SF Giants evening game at AT&T Park, the project-generated parking demand would be accommodated with the existing off-street and on-street supply during weekday and Saturday conditions, as long as the 450 South Street parking garage becomes available for event parking on weekday evenings.

Existing plus Project Conditions with a SF Giants Evening Game at AT&T Park

Table 5.2-70 presents the existing plus project parking demand and supply for the analysis scenarios for conditions with a SF Giants evening game at AT&T Park. The parking assessment assumes that the existing parking demand associated with the surface parking facilities on the project site with a SF Giants evening game at AT&T Park would be accommodated at other nearby facilities, and is, therefore, included in the areawide parking demand within the study area. The existing parking supply of 610 spaces within the two surface parking lots on the project site was removed from the areawide parking supply.

TABLE 5.2-70
EXISTING PLUS PROJECT STUDY AREA PARKING DEMAND AND SUPPLY WITH A SF GIANTS EVENING GAME AT AT&T PARK

Parking Facility Grouping	No Event		Convention Event		Basketball Game	
	Midday	Evening	Midday	Evening	Midday	Evening
Weekday Conditions						
Existing Demand	4,865	5,344	4,865	5,344	4,865	5,344
Project Demand	1,049	489	1,906	669	1,072	4,270
Total Demand	5,914	5,833	6,771	6,013	5,937	9,614
Total Supply	8,685	7,295	8,685	7,295	8,685	9,475
Total Parking Occupancy	68%	80%	78%	82%	68%	101%
Surplus/(Shortfall)[a]	2,771	1,462	1,914	1,282	2,748	**(139)**
Shortfall if Additional Facilities Not Open after 7:00 p.m.	No shortfall (facilities are open at midday)	No shortfall	No shortfall (facilities are open at midday)	No shortfall	No shortfall (facilities are open at midday)	**(2,319)**
Shortfall if UCSF Facilities Not Available for Event Parking	No shortfall	No shortfall	No shortfall	No shortfall	No shortfall	**(1,065)**
Saturday Conditions						
Existing Demand	1.319	5,003	–	–	1,319	5,003
Project Demand	589	462	–	–	598	4,573
Total Demand	1,908	5,465	–	–	1,917	9,576
Total Supply	6,205	7,025	–	–	6,205	9,505
Total Parking Occupancy	31%	78%	–	–	31%	101%
Surplus/(Shortfall)	4,297	1,560	–	–	4,288	**(71)**
Shortfall if Additional Facilities Not Open after 7:00 p.m.	No shortfall	No shortfall	–	–	No shortfall	**(2,521)**
Shortfall if UCSF Facilities Not Available for Event Parking	No shortfall	No shortfall	–	–	No shortfall	**(969)**

NOTE:
[a] Parking supply shortfall highlighted in **bold** and shaded.

SOURCE: Adavant Consulting/LCW Consulting, 2015

No Event Scenario

As shown in **Table 5.2-70**, under the No Event scenario for both weekday and Saturday conditions, parking would be accommodated within the proposed project parking supply, and therefore would not affect other off-street parking facilities in the study area. Thus, the No Event scenario with a SF Giants evening game at AT&T Park would be similar to existing conditions. Total areawide parking occupancy would be about 68 percent during the weekday midday and 80 percent during the weekday evening, while on a Saturday the total areawide parking occupancy would be about 31 percent during the midday and 78 percent during the evening. This occupancy reflects the parking demand associated with the SF Giants game attendees parking within the study area, as well as the additional parking supply typically provided by the SF Giants and others on baseball game days. For SF Giants evening game, 185 Berry Street, Piers 48, and Lot C are open to accommodate SF Giants parking demand on weekday evenings, and Piers 48 and Lot C are open to accommodate SF Giants parking demand on weekends. Lot A is only available to SF Giants permit parking holders on game days.

Convention Event Scenario

Under the Convention Event scenario with a SF Giants evening game at AT&T Park, parking occupancy during the weekday midday and evening would be similar to conditions without a SF Giants game. On days with a SF Giants evening game at AT&T Park, overall midday occupancy is currently somewhat lower than on days without a SF Giants game, and the demand associated with the convention event would be accommodated without substantially affecting overall parking conditions. During the weekday evening period, parking demand associated with the convention event would be low, and would also not substantially affect the overall parking conditions.

However, on weekdays when SF Giants games start at 12:05 p.m., 12:45 p.m., 1:15 p.m., or 1:35 p.m., the midday parking demand would be greater than that presented in **Table 5.2-70** for evening games, and therefore, there would be a parking shortfall in the area on those days. The number of SF Giants day games is limited, with about 11 of the 54 weekday games scheduled for the 2015 regular season (about two games per month between April and October). In those instances, the approximately 900 project vehicles that would otherwise park at Lot A would not be able to do so, as Lot A would only be available to SF Giants parking permit holders. It could be expected that convention event planners would provide additional shuttle bus service to the project site on those days, to minimize parking demand. In addition, promoting public transit and encouraging carpooling would further reduce parking demand, while providing parking attendant services could increase the parking supply.

Basketball Game Scenario

On weekdays with an evening basketball game, the midday parking demand would be similar to the No Event scenario (i.e., primarily the parking demand associated with the office, retail, and restaurant uses), and parking would be accommodated on-site. During the weekday evening, however, the project-generated parking demand, combined with the SF Giants parking demand, would exceed the project supply, and would need to be accommodated in other nearby facilities.

On weekday evenings, overall parking demand would increase from 84 percent on days without SF Giants games to a theoretical 101 percent (about 140-space parking deficit) on days with a SF Giants evening game. As a result of the approximately 140-space parking shortfall on weekdays (less than 3.5 percent of the project demand), individuals who would have preferred to drive may instead use transit to arrive at the site because the perceived convenience of driving is lessened by a shortage of parking. By promoting carpooling, providing parking attendant services, and adjusting event parking rates, the parking supply would likely be more efficiently utilized during the event days and the potential parking shortfall could be eliminated. If the additional spaces provided at 450 South Street and 1670 Owens Street facilities were not available as assumed to accommodate public parking on days with a SF Giants evening game, the unmet project parking demand would increase from about 140 spaces to about 2,300 spaces. Similarly, if UCSF parking facilities would not be made available for event parking during weekday evenings the unmet project parking demand would increase from about 140 spaces to about 1,070 spaces.

On Saturdays, the overall parking occupancy during the evening period would increase from 78 percent to a theoretical 101 percent (about 70-space parking deficit, which would be less than 1.6 percent of the project parking demand and well within the daily variation of traffic). If the additional parking spaces at 450 South Street, 1670 Owens Street, and 185 Berry Street garages were not available as assumed to accommodate public parking on days with a SF Giants evening game, the expected 70-space parking deficit would increase to about 2,520 spaces. Similarly, if UCSF parking facilities would not be made available for event parking during Saturday evenings the unmet project parking demand would increase from about 70 spaces to about 970 spaces.

Overall, under existing plus project conditions with a SF Giants evening game at AT&T Park, the project-generated parking demand would be accommodated with the existing off-street and on-street supply during weekday and Saturday conditions, as long as the 450 South Street and 1670 Owens Street and UCSF-owned parking garages become available for event parking on weekday and weekend evenings, and the 185 Berry Street garage becomes available for event parking on weekend evenings.

Existing plus Project Conditions without the Muni Special Event Transit Service Plan

As described in Section 5.2.5.3, this SEIR assessed conditions if the Muni Special Event Transit Service Plan for large events at the event center were not to be implemented as part of the project. **Table 5.2-29** through **Table 5.2-32** present the resulting change in travel modes of event attendees for a basketball game from transit to auto modes. Because more attendees would be driving, the event-related parking demand would also increase over conditions with implementation of the Muni Special Event Transit Service Plan, particularly during the late evening period when parking demand associated with events would be greatest. During the late evening the parking demand for the Basketball Game scenario would increase by 606 spaces on weekdays and 669 spaces on a Saturday.

On weekday and Saturday evening basketball games without an overlapping SF Giants evening game at AT&T Park, the additional parking demand would be accommodated within the study area parking supply, although parking occupancies would increase to close to capacity. On weekday and Saturday evening basketball games with an overlapping SF Giants evening game, the identified weekday and Saturday parking shortfalls in the study area would increase from approximately 140 spaces to 745 spaces, and from approximately 70 spaces to 740 spaces, respectively. It is likely that if the Muni Special Event Transit Service Plan is not implemented, additional parking facilities outside of the study area would be identified to accommodate the increased demand (e.g., potential parking lot(s) in the vicinity of Pier 70), and existing facilities would be more efficiently utilized during event days through the use of attendant parking. Parking utilization of existing parking facilities for the SF Giants to the north of the study area (e.g., the Pier 30 lot and the Bayside lot at Seawall Lot 330 containing a total of about 1,300 spaces, and are about 35 percent occupied on weekday evenings and 50 percent on weekend evenings during SF Giants evening games) would increase from existing conditions. In addition, because the proposed parking supply in the study area would not meet demand, it is possible that some drivers may seek available parking in adjacent residential areas to the south.

2040 Cumulative Parking Conditions

Considering cumulative parking conditions, over time, due to build-out of Mission Bay and particularly UCSF in the project vicinity, parking demand and competition for on-street and off-street parking would increase. **Table 5.2-71** provides a summary of the estimated planned cumulative increases in non-residential development and corresponding parking supply and demand changes in the Mission Bay South area. The 2040 cumulative non-residential parking supply and demand was based on data obtained from previous and ongoing studies being conducted in the Mission Bay area, including the UCSF 2014 LRDP EIR and the Seawall Lot 337 and Pier 48 Mixed-Use Project; more detailed information is provided in **Appendix TR**. As shown in the table, the proposed overall supply would accommodate about 40 percent of the estimated overall non-residential parking demand (weekday midday), and 70 percent of the weekday evening parking demand. **Figure 5.2-25** presents the location of the proposed off-street parking facilities associated with proposed and planned future development.

The estimates of future parking demand for planned Mission Bay projects was based on standard *SF Guidelines* methodologies that do not consider the likely long-term shift from auto to non-auto modes of travel that is likely to occur over the next 25 years as a result of the Mission Bay Plan providing parking at approximately half the rate of the estimated demand as well as improved transit service to Mission Bay in the future. A similar effect is likely to occur to the proposed project, as transit service to Mission Bay is improved, as the available parking supply on undeveloped parcels is eliminated, and as parking becomes more expensive, particularly during overlapping events. As such, the parking shortfalls presented in **Table 5.2-72**, which are based on existing travel patterns, can be considered conservative, that is, higher than could be expected for the above reasons.

TABLE 5.2-71
ADDITIONAL CUMULATIVE NON-RESIDENTIAL DEVELOPMENT PLANNED IN THE MISSION BAY SOUTH AREA - FROM EXISTING CONDITIONS TO YEAR 2040

Proposed Development	Net Change in Non-Residential Parking Supply[d]	Increase in Non-Residential Parking Demand			
		Weekday		Saturday	
		Midday	Evening	Midday	Evening
Mission Rock Project[a]	-350[e]	2,600	2,350	1,560	1,500
Remainder of the Mission Bay Plan[b]	875	1,810	475	490	290
Remainder of UCSF LRDP to 2040[c]	2,750	3,410	1,800	860	680
Total	3,275	7,820	4,625	2,910	2,470

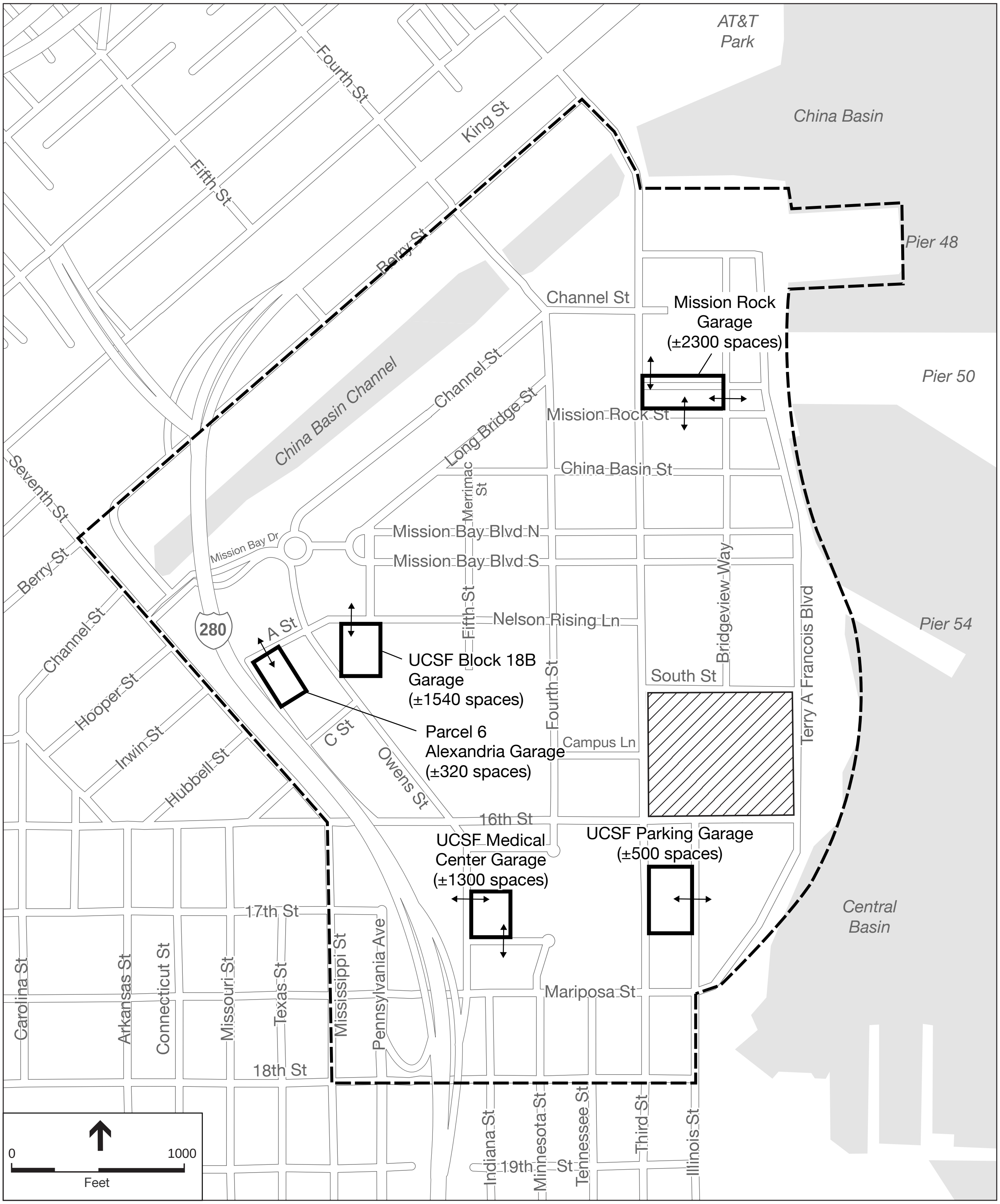
NOTES:
a Mixed-use development project with 1.25 million to 1.6 million gsf of commercial/office/research and development (R&D) uses and 150,000 to 250,000 gsf of retail/entertainment/ancillary uses.
b Includes hotel/commercial development in Block 1 (250 rooms and 25,000 gsf retail), Kaiser Permanente at 1600 Owens St (220,000 gsf MOB), Parcel 1 at Block 26 (200,000 gsf office/research), Parcel 1 at Block 27 (300,000 gsf office/research), Block 40 (660,000 gsf office/research), and Parcel 7 at Blocks 41-43 (60,000 gsf office/research).
c Blocks 15, 16, 18A, 23A and 25B at the North Campus, Phase 2 of the Medical Center at the South campus, and Blocks 33-34 (500,00 gsf office/research, but may include up to 250,000 gsf clinical space with the remainder dedicated to research/office uses) at the East Campus.
d Includes removal of existing temporary parking spaces at currently undeveloped parcels, such as those used for SF Giants game parking (Lot A, Lot C, Pier 48, etc.).
e A net addition of 600 spaces on days when SF Giants do not play at AT&T Park.

SOURCE: Adavant Consulting/LCW Consulting, 2015

2040 Cumulative with Project Conditions without a SF Giants game at AT&T Park

Table 5.2-72 presents the 2040 cumulative with project parking demand and supply for the analysis scenarios for conditions without a SF Giants game at AT&T Park. A comparison between existing plus project (**Table 5.2-69**) and 2040 cumulative with project (**Table 5.2-72**) parking conditions shows that, under 2040 cumulative conditions, parking demand would exceed parking supply during the weekday midday period for all project scenarios (No Event, Convention Event, and Basketball Game), as opposed to existing plus project conditions where no shortfall was identified. The weekday midday parking shortfall, estimated to be between 1,370 and 2,225 spaces, would be a result of cumulative development and growth in Mission Bay. These planned developments would provide parking spaces at approximately 50 percent of the estimated peak parking demand.

As a result of the 2040 cumulative parking shortfall during the weekday midday period, individuals who would have preferred to drive may instead use non-auto modes of travel to arrive at Mission Bay. By promoting carpooling, providing parking attendant services, adjusting work schedules, and increasing parking rates, the cumulative parking supply would likely be more efficiently utilized during peak demand times (weekday midday), although the overall 2040 cumulative parking shortfall would likely not be eliminated.



Project Site Boundary
Parking Study Area

SOURCE: OCII/UCSF, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-25
New Parking Facilities by 2040

TABLE 5.2-72
2040 CUMULATIVE WITH PROJECT STUDY AREA PARKING DEMAND AND SUPPLY WITHOUT A SF GIANTS GAME AT AT&T PARK

Parking Facility Grouping	No Event		Convention Event		Basketball Game	
	Midday	Evening	Midday	Evening	Midday	Evening
Weekday Conditions						
Existing Supply + Project	8,685	6,205	8,685	6,205	8,685	7,605
Additional existing facilities that remain open after hours	0	0	0	0	0	780
Cumulative Changes	4,225	2,837	4,225	2,837	4,225	3,065
Total Cumulative Supply	12,910	9,042	12,910	9,042	12,910	11,450
Existing Demand + Project	6,458	2,600	7,315	2,780	6,481	6,381
Cumulative Changes	7,820	4,625	7,820	4,625	7,820	4,625
Total Cumulative Demand	14,278	7,225	15,135	7,405	14,301	11,006
Surplus/(Shortfall)[a]	**(1,368)**	1,817	**(2,225)**	1,637	**(1,391)**	444
Total Parking Occupancy	**111%**	80%	**117%**	82%	**111%**	96%
Saturday Conditions						
Existing Supply + Project	6,205	6,205	–	–	6,205	7,605
Additional existing facilities open on Saturday	0	0	–	–	0	0
Cumulative Changes	2,837	2,837	–	–	2,837	2,837
Total Cumulative Supply	9,042	9,042	–	–	9,042	10,442
Existing Demand + Project	1,748	1,381	–	–	1,757	5,492
Cumulative Changes	3,420	2,850	–	–	3,420	2,850
Total Cumulative Demand	5,168	4,231	–	–	5,177	8,342
Surplus/(Shortfall)	3,874	4,811	–	–	3,865	2,100
Total Parking Occupancy	57%	47%	–	–	57%	80%

NOTE:
[a] Parking supply shortfall highlighted in **bold** and shaded.

SOURCE: Adavant Consulting/LCW Consulting, 2015

Because the proposed cumulative parking supply in Mission Bay would not meet cumulative demand on weekdays at midday, it is possible that some drivers may seek available parking in adjacent residential areas to the south, some of which are subject to the RPP "X' regulation (currently limits parking to two or four hours, depending on the block, between the hours of 8:00 a.m. and 4:00 p.m. unless an RPP "X" permit is displayed). Because some visitors might park for less than four hours, residents of these areas could find it more challenging to find parking on the street. Expansion of an existing RPP area, or altering the existing time limits and/or time-of-day of enforcement for an RPP zone, is typically a resident-driven process. As noted above, if residents in adjacent residential areas to the south perceive an increased challenge in finding on-street parking in their neighborhoods, residents can request to establish a new or expand existing RPP Area "X" through the SFMTA. They may also explore other possible parking management strategies to address spillover parking in residential areas. The extent of spillover into the nearby residential neighborhoods to the south could be minimized by extending the RPP regulations to a larger area, reducing all non-residential on-street parking to two hours, adding parking meters at key locations, and increasing weekday midday enforcement.

2040 Cumulative with Project with a SF Giants evening game at AT&T Park

Table 5.2-73 presents the 2040 cumulative with project parking demand and supply for the analysis scenarios for conditions with an overlapping SF Giants evening game at AT&T Park. A comparison between existing plus project (**Table 5.2-70**) and 2040 cumulative with project (**Table 5.2-73**) parking conditions with an overlapping SF Giants evening game shows that, under 2040 cumulative conditions, parking demand would exceed parking supply during the weekday midday period for all project scenarios (No Event, Convention Event, and Basketball Game), as opposed to existing plus project conditions where no shortfall has been identified. The weekday midday parking shortfall, estimated to be between 800 and 1,700 spaces, would be a result of cumulative development and growth in Mission Bay, which, as noted above, would provide parking spaces at approximately 50 percent of the estimated peak parking demand based on current travel characteristics.

The 2040 cumulative weekday midday parking shortfall with an overlapping SF Giants evening game at AT&T Park would be 60 to 75 percent of the shortfall that would be experienced without an overlapping SF Giants evening game at AT&T Park. This is because the daytime parking demand in Mission Bay on days when the SF Giants play in the afternoon is typically lower than on no-game days, as a result of the higher daily parking rates ($50 and higher) charged on game days at parking facilities managed by the SF Giants. As a result of the cumulative parking shortfall during the weekday midday period, individuals who would have preferred to drive may instead use non-auto modes of travel to arrive at Mission Bay, and as noted above, the cumulative parking supply would likely be more efficiently utilized during peak demand times, but the overall cumulative parking shortfall would likely not be eliminated.

Because the projected 2040 cumulative parking supply in Mission Bay would not meet 2040 cumulative demand during the weekday midday, it is possible that some drivers may seek available parking in adjacent residential areas to the south. Because some cumulative visitors might park for less than four hours, residents of these areas could find it difficult to park on the street. The extent of spillover into the nearby residential neighborhoods to the south could be minimized by extending the RPP regulations to a larger area, reducing all non-residential on-street parking to two hours, and increasing weekday midday enforcement.

A 2,000-space larger parking shortfall would also be experienced on weekday evenings with overlapping evening games at the event center and at AT&T Park (about 150 spaces under existing plus project conditions compared to 2,150 spaces under 2040 cumulative conditions). Similarly, a 230-space larger parking shortfall would also be experienced on Saturday evenings with an overlapping event at the event center and at AT&T Park (about 70 spaces under existing

TABLE 5.2-73
2040 CUMULATIVE WITH PROJECT STUDY AREA PARKING DEMAND AND SUPPLY WITH A SF GIANTS EVENING GAME AT AT&T PARK

Parking Facility Grouping	No Event		Convention Event		Basketball Game	
	Midday	Evening	Midday	Evening	Midday	Evening
Weekday Conditions						
Existing Supply + Project	8,685	7,295	8,685	7,295	8,685	9,475
Additional existing facilities that remain open after hours	0	1,390	0	1,390	0	0
Cumulative Changes	4,225	1,887	4,225	2,115	4,225	2,615
Total Cumulative Supply	12,910	10,572	12,910	10,800	12,910	12,090
Existing Demand + Project	5,914	5,833	6,771	6,013	5,937	9,614
Cumulative Changes	7,820	4,625	7,820	4,625	7,820	4,625
Total Cumulative Demand	13,734	10,458	14,591	10,638	13,757	14,239
Surplus/(Shortfall)[a]	**(824)**	114	**(1,681)**	162	**(847)**	**(2,149)**
Total Parking Occupancy	**106%**	99%	**113%**	99%	**107%**	**118%**
Saturday Conditions						
Existing Supply + Project	6,205	7,025	–	–	6,205	9,505
Additional existing facilities that open on Saturday	0	0	–	–	0	0
Cumulative Changes	2,837	1,887	–	–	2,837	2,615
Total Cumulative Supply	9,042	8,912	–	–	9,042	12,120
Existing Demand + Project	1,908	5,465	–	–	1,917	9,576
Cumulative Changes	3,420	2,850	–	–	3,420	2,850
Total Cumulative Demand	5,328	8,315	–	–	5,337	12,426
Surplus/(Shortfall)	3,714	597	–	–	3,705	**(306)**
Total Parking Occupancy	59%	93%	–	–	59%	**103%**

NOTE:
[a] Parking supply shortfall highlighted in **bold** and shaded.

SOURCE: Adavant Consulting/LCW Consulting, 2015

plus project conditions compared to 310 spaces under 2040 cumulative conditions). The parking supply shortfall would be due to a combination of several factors: the unavailability of existing baseball-oriented parking during an SF Giants game, an increase of cumulative parking at a lower rate than the estimated cumulative demand for the Mission Bay area, and an increase in evening demand as a result of new retail and restaurant uses associated cumulative development.

The project sponsor of the Mission Rock development project is currently developing a Transportation Demand Management (TDM) Program as part of the Mission Rock project that would include a plan to coordinate and facilitate parking and traffic at and around the Mission

Rock site on SF Giant game days. One of the key elements of the TDM program would be to manage and optimize the shared parking opportunities between office, retail, commercial, and AT&T Park users on game days. Based on preliminary information on the TDM program, approximately 2,000 of the spaces located at the proposed 2,300-space parking structure stalls would be dedicated to the visitors AT&T Park. This would be accomplished through a combination of promotion of carpooling, increased provision of parking attendant services, adjustment of work schedules, and increased event day parking rates. It would be expected that as a result of the robust TDM program for the Mission Rock project, approximately 2,000 vehicles unrelated to the SF Giants game would not be parked within the study area on weekday evenings during a overlapping basketball game at the project site and SF Giants evening game at AT&T Park, thus increasing the parking supply available to event center attendees and reducing or potentially eliminating the future cumulative parking shortfall.

5.2.6 Project Impacts on the UCSF Helipad Operations

This section of the SEIR addresses potential impacts associated with the implementation of the proposed project in consideration of the helipad operations that occur at the nearby UCSF Benioff Children's Hospital. This section documents available information on the existing UCSF hospital helipad facilities and operations, describes applicable regulations governing helipad operations and development in the vicinity of helipads, and addresses potential safety issues associated with construction and operation of the proposed project in the vicinity of the helipad.

5.2.6.1 Summary of the Mission Bay FSEIR and Other Applicable Environmental Review Documents in Mission Bay Plan Area

While the Mission Bay FSEIR assumed the development of a range of UCSF land uses in the Mission Bay Plan area, no helipad was specifically proposed by UCSF in the Plan area at that time of preparation of the Mission Bay FSEIR, and consequently, the Mission Bay FSEIR did not address potential impacts associated with development or operation of a helipad in the Plan area.

On March 17, 2005, The Regents of the University of California ("The Regents") certified the *Long Range Development Plan Amendment No. 2 – Hospital Replacement Final Environmental Impact Report*[60] (UCSF LRDP Amendment No. 2 Final EIR), which preliminarily addressed potential public safety impacts associated with the development of a potential helipad for medical helicopter transports on one of two possible sites: Block 16 (North Site) and Block 36 (South site) in the Mission Bay South Plan area. The UCSF LRDP Amendment No. 2 Final EIR determined that although there were no existing surrounding structures in the Mission Bay South Plan area that constituted an obstruction based upon Federal Aviation Administration (FAA) or California Department of Transportation Division of Aeronautics (DOA) final approach and takeoff area (FATO) standards, the maximum building heights from future development within the Mission Bay South Plan are could have the potential to create a flight path obstruction for a future helipad. The UCSF LRDP Amendment No. 2

60 UCSF, *Long Range Development Plan (LRDP) Amendment No. 2 – Hospital Replacement Final Environmental Impact Report*, certified March 17, 2005, SCH No. 2004072067.

Final EIR Hazards and Hazardous Materials section noted; however, that approval of a helipad at that site would be subject to future project-specific environmental review, including safety conflicts for the helipad, and concluded that compliance with future CEQA requirements for individual UCSF projects in Mission Bay, together with FAA and DOA review and approval for any subsequent Mission Bay South Plan area projects that could create an obstruction, would reduce this potential impact to a less-than-significant level.

On September 30, 2005, the former San Francisco Redevelopment Agency approved an Addendum to the Mission Bay FSEIR (Addendum No. 5)[61] determining that the UCSF LRDP Amendment No. 2 did not entail any substantial changes that would require major revisions to the Mission Bay FSEIR, nor would new significant impacts or a substantial increase in the severity of previously-identified significant effects occur, and no new information had emerged that would materially change any of the analyses or conclusions in the Mission Bay FSEIR.

On September 17, 2008, The Regents certified the *UCSF Medical Center at Mission Bay Final Environmental Impact Report*[62] (UCSF Medical Center Final EIR), which also addressed potential environmental impacts associated with the development and operation of a helipad on the roof of the proposed medical center's outpatient building on Block 36 in the Mission Bay South Plan area. The UCSF Medical Center Final EIR analyzed 1.4 average daily helicopter transports and 3 daily helicopter transports on a busy day. The UCSF Medical Center Final EIR Aeromedical Helicopter Flight Operations and Public Safety section, relying in part on the results of a Risk Assessment for Helicopter Operations prepared in support of the EIR, determined that the helipad operations would result in a negligible risk to human safety in the vicinity of the helipad site. Furthermore, the UCSF Medical Center Final EIR determined that the operation of the proposed helipad in conjunction with another potential future helipad in the same general area (i.e., San Francisco General Hospital) would result in a less-than-significant cumulative public safety risk.

The former San Francisco Redevelopment Agency approved an Addendum to the Mission Bay FSEIR (Addendum No. 6)[63] on September 10, 2008 determining that UCSF Medical Center Draft EIR did not entail any substantial changes that would require major revisions to the Mission Bay FSEIR, nor would new significant impacts or a substantial increase in the severity of previously-identified significant effects occur, and no new information had emerged that would materially change any of the analyses or conclusions in the Mission Bay FSEIR.

The Regents approved construction of the helipad as part of its approval of Phase 1 of the Medical Center at Mission Bay on September 17, 2008. However, it deferred approval of operation of the helipad until the development of a residential sound reduction program (RSRP), which was identified as a mitigation measure in the 2008 Medical Center at Mission Bay Final EIR. In 2009, an

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61 San Francisco Redevelopment Agency, *Mission Bay Subsequent EIR Addendum, ER 919-97 Addendum No. 5,* approved September 20, 2005.

62 UCSF, *UCSF Medical Center at Mission Bay Final Environmental Impact Report*, certified September 17, 2008, SCH No. 2008012075.

63 San Francisco Redevelopment Agency, *Mission Bay Subsequent EIR Addendum, ER 919-97 Addendum No. 6,* approved September 10, 2008.

RSRP was developed with community involvement. The effectiveness of the RSRP in mitigating helicopter noise was analyzed in the Final Supplemental Environmental Impact Report for the UCSF Medical Center at Mission Bay – Residential Sound Reduction Program for Helicopter Operations, which was certified by the Regents on April 20, 2009, followed by UC approval of helipad operations.[64] On July 28, 2009, the San Francisco Board of Supervisors, as a responsible agency for the helipad project under CEQA, considered the UCSF Medical Center at Mission Bay Final EIR adequate as supplemented and amended, and approved the proposed UCSF helipad.[65]

On November 20, 2014, The Regents certified the *UCSF 2014 Long Range Development Plan Final EIR*[66] (UCSF 2014 LRDP Final EIR) which addressed additional planned development on the UCSF campus in Mission Bay South. The 2014 UCSF LRDP Final EIR Hazards and Hazardous Materials section addressed potential public safety impacts associated with additional land use development proposed under the 2014 LRDP in the helipad vicinity in the Mission Bay South Plan area, and determined that the implementation of the 2014 LRDP would have a less-than-significant impact for people residing or working near the helipad.

5.2.6.2 Setting

UCSF Benioff Children's Hospital Helipad

UCSF Helipad Overview

The UCSF Benioff Children's Hospital helipad began operating in February 2015, and is currently the only operating hospital helipad in San Francisco. Helicopter access to the hospital is limited to children and pregnant women with critical and life-threatening conditions.[67] All patients with less serious conditions are transported by ground ambulance. The helipad is not used for routine transport of stable patients, transport of patients to other UCSF facilities, or for any non-patient related travel. The hospital is not a trauma center; and consequently, is not used for trauma scene transport.[68]

UCSF Helipad Location and Design

Figure 5.2-26 presents the location of the UCSF Benioff Children's Hospital helipad with respect to the project site. The helipad is located atop the roof of the UCSF Ron Conway Gateway Medical Building at 1825 4th Street, on Block 36 in the Mission Bay South Plan area. The helipad is located approximately 500 horizontal feet west of the southwest corner of the project site. The

64 UCSF, *UCSF Medical Center at Mission Bay - Residential Sound Reduction Program for Helicopter Operations Final Supplemental EIR*, certified April 20, 2009, SCH No. 2008012075.

65 San Francisco Board of Supervisors, Resolution No. 310-09, *Resolution Approving the Proposed Helipad at the UCSF Medical Center at Mission Bay under California Public Utilities Code Section 21661.5 and Adopting Environmental Findings under the California Environmental Quality Act, including a Mitigation Monitoring and Reporting Program and a Statement of Overriding Considerations,* adopted July 28, 2009.

66 UCSF, *UCSF 2014 Long Range Development Plan Final EIR,* November 20, 2014, SCH No. 2103092047.

67 Examples of life-threatening conditions include a baby born with a life-threatening birth defect, a child with septic shock and organ failure that may die within hours, or a pregnant woman with a condition threatening her life and/or the life of her baby.

68 UCSF, *Facts About UCSF Medical Center at Mission Bay: UCSF Benioff Children's Hospital San Francisco Helipad*, August 8, 2014.

Mission Bay Redevelopment Plan Area Boundary

Project Site Boundary

SOURCE: UCSF, 2014; ESA, 2015; Google Maps, 2014

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E: Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-26
UCSF Benioff Children's Hospital Helipad and Designated Flight Paths

helipad deck is located at an elevation of approximately 140 feet above ground level (agl) [156 feet above mean sea level (msl)]. The helipad facility contains applicable design and safety features, including a raised landing area with required markings, perimeter lighting, safety netting, lighted windcone, and rooftop obstruction lighting.[69]

UCSF Helipad Existing Operations

As was assumed in the UCSF Medical Center at Mission Bay Final EIR, UCSF projects the hospital will experience approximately 500 annual medical transports per year to the helipad, amounting to about 42 monthly transports, or 1.4 average daily transports and 3 daily transports on a busy day. UCSF contracts with medical companies that base their medical transport teams and helicopters in Oakland. Helicopter daily average arrival times are 7:00 a.m. to 3:00 p.m. (42 percent), 3:00 p.m. to 11:00 p.m. (40 percent) and 11:00 p.m. to 7:00 a.m. (18 percent).[70]

Figure 5.2-26 presents the designated helicopter arrival and departure flight paths for the helipad. These flight paths were developed through extensive coordination with the City and local community considering a number of factors, including wind conditions and a goal of minimizing noise effects to residential uses in the area. As shown in Figure 5.2-26, the primary arrival/departure route is from/to the east along 16th Street and over the Bay. Alternate and secondary flight paths are only used if the primary flight path is not desirable due to wind conditions or safety considerations. One alternate arrival/departure route is from/to the west along 16th Street, along Interstate 280, Mission Bay Commons, and over the Bay; another alternate arrival/departure route is from/to the north for a short distance, hence east-west along South Street and over the Bay. The secondary departure route is along 16th Street to points west.

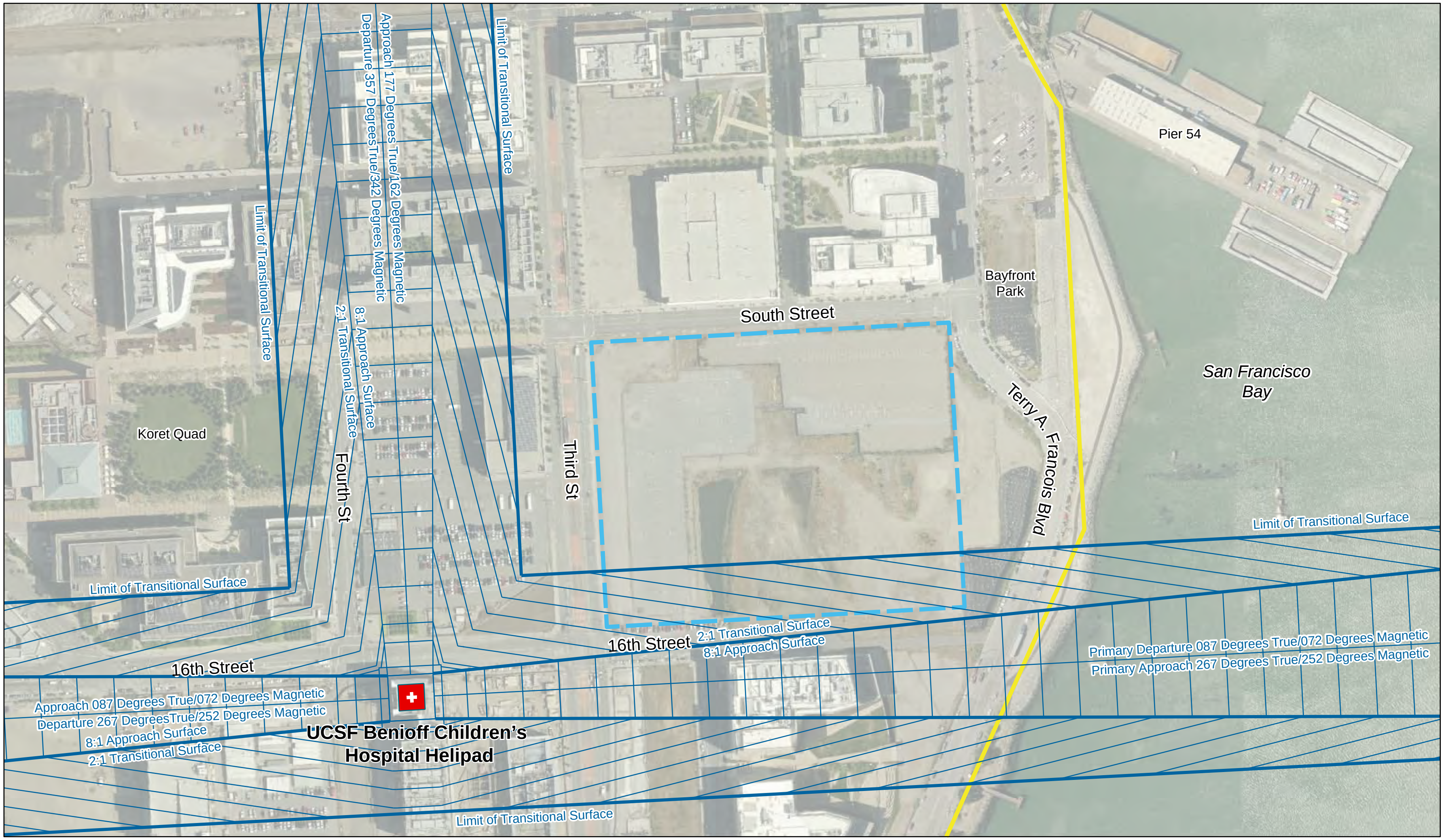
UCSF estimates the flight time for UCSF helicopters from the Bay shoreline to the helipad is approximately one to two minutes, and the estimated descent-to-landing and ascent-to-departure is approximately 30 seconds. Helicopter hovering is not a routine part of helicopter landing operations at the helipad.[71]

UCSF service contracts with air medical companies require that all pilots be routinely trained to ensure that optimum arrival and departure flight paths are followed for each helicopter type that serves UCSF.

UCSF Helipad Airspace and Obstruction Clearance Surfaces

The airspace surfaces for a heliport[72] are prescribed in Title 14 *Code of Federal Regulations* (CFR) Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace*. Section 77.23 defines imaginary airspace surfaces for civil (non-military) heliports. The applicable airspace surfaces for the UCSF helipad are described below and illustrated in **Figure 5.2-27**.

69 Heliplanners, Exhibit HP-1, UCSF Medical Center at Mission Bay Heliport Layout Plan, revised September 25, 2014
70 UCSF, *Facts About UCSF Medical Center at Mission Bay: UCSF Benioff Children's Hospital San Francisco Helipad*, August 8, 2014.
71 *Ibid.*
72 Please note the terms "helipad" and "heliport" are used interchangeably in this SEIR.



Mission Bay Redevelopment Plan Area Boundary

Project Site Boundary

0 200
Feet

SOURCE: Heliplanners, Inc., 2014 (UCSFMC Helipad Features and Airspace Contours); Golden State Warriors, 2015 (Proposed Site Plan); www.DataSF.org, 2012 (Aerial). Adapted by ESA, 2015.

NOTE: Airspace contours are expressed in mean feet above sea level (msl).

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-27
UCSF Benioff Children's Hospital Helipad Airspace Surfaces

Primary Surface – The Primary Surface is a horizontal plane at the elevation of the established heliport elevation (approximately 156 feet msl). The Primary Surface for the UCSF helipad is 98 feet by 98 feet square, which coincide with the location and dimensions of the facility's Final Approach and Takeoff Area (FATO).

Approach Surface – Each Approach Surface associated with a heliport begins at the edge of the heliport's Primary Surface and the inner width of the surface is the same width as the Primary Surface. The Approach Surface then extends outward and upward for a horizontal distance of 4,000 feet where its outer width is 500 feet. The slope of the Approach Surface for civil heliports is 8:1 (one foot upward for every eight feet outward).

Transitional Surfaces – The Transitional Surfaces extend outward and upward from the lateral boundaries of the Primary Surface and the Approach Surface(s) at a slope of 2:1. The Transitional Surfaces extend for a lateral distance of 250 feet measured horizontally from the centerline of the Primary Surface and Approach Surfaces.

FAA Order 8260.3B, United States Standard for Terminal Instrument Procedures (TERPS), contains the criteria used to formulate, review, approve, and publish procedures for instrument flight procedures to and from civil and military airports. The Order identifies Obstacle Clearance Surfaces required for different types of instrument approach procedures (i.e., night time straight-in instrument approach). The UCSF Medical Center helipad operates under Visual Flight Rules. There are no published instrument approach procedures for the UCSF Medical Center helipad. Therefore, TERPS Obstacle Clearance Surface criteria are not applicable to the hospital's helipad. However, UCSF indicates it is currently developing a GPS instrument approach procedure.

5.2.6.3 Regulatory Framework

Federal Regulations

Federal Aviation Administration

The Federal Aviation Administration (FAA) is the agency of the U.S. Department of Transportation that is charged with (1) regulating air commerce to promote its safety and development; (2) achieving the efficient use of navigable airspace of the United States; (3) promoting, encouraging, and developing civil aviation; (4) developing and operating a common system of air traffic control and air navigation for both civilian and military aircraft; and (5) promoting the development of a national system of airports.

Heliport Design Standards

FAA Advisory Circular (AC) 150/5390-2C, *Heliport Design*, provides standards, guidelines, and specifications for the siting, design, and construction of heliports.[73] Chapter 4 of AC 5390-2C provides information and guidance for the layout and design of hospital heliports. These standards are required for projects funded by the FAA, but are the FAA's recommendations for all heliports.

[73] It should be noted that at the time the UCSF helipad was designed, FAA AC 150/5390-2B (published September 30, 2004) was in effect. FAA AC 150/5390-2C (published April 24, 2012) cancels FAA AC 150/5390-2B.

Notice of Landing Area Proposal

14 CFR Part 157, *Notice of Construction, Alteration, Activation and Deactivation*, requires persons proposing to construct, activate, deactivate, or alter a heliport to give advance notice of their intent to the FAA. Pursuant to Federal Regulation 14 CFR Part 157, prior to construction of the UCSF helipad, the FAA conducted an aeronautical study that evaluated the effects the helipad would have on existing or future traffic patterns of neighboring airports; the effects on the existing airspace structure and projected programs of the FAA; the effects it would have on the safety of persons and property on the ground; and the effects that existing or proposed manmade objects (on file with the FAA) and natural objects within the affected area would have on the helipad. The FAA aeronautical study and determination do not consider environmental or land use compatibility impacts.

Following the study, the FAA issued an advisory airspace determination that the helipad would not adversely affect the safe and efficient use of the navigable airspace by aircraft, provided among other stipulations, that all operations are conducted in Visual Flight Rules (VFR) weather conditions, and routes of ingress and egress are established and maintained obstruction-free. UCSF obtained its airspace determination from the FAA on June 1, 2011. As discussed above, UCSF is currently developing a GPS instrument approach procedure; a followup FAA airspace study and airspace determination would be required to convert the facility from VFR only to both VFT and IFR.

Hazards to Air Navigation

14 CFR Part 77 establishes requirements for notification to the FAA of objects that may affect navigable airspace. It sets standards for determining obstructions to navigable airspace and provides for aeronautical studies of such obstructions to determine their effect on the safe and efficient use of airspace. Although the requirements of 14 CFR Part 77 only applies to public airports and heliports, it provides meaningful criteria for the protection of navigable airspace associated with private heliports.

Part 77 defines objects that are obstructions to imaginary airspace surfaces. The FAA presumes these obstructions to be a hazard to air navigation unless an FAA study determines otherwise. Objects presumed to affect navigable airspace may be mitigated by: 1) removing the object, 2) altering (i.e., lowering) the object, or 3) marking and/or lighting the object (providing it would not be a hazard if marked or lighted).

Outdoor Lighting / Nuisance Lighting

FAA Advisory Circular 70-1, *Outdoor Laser Operations*, provides information for outdoor laser operations that may affect aircraft operations. The Advisory Circular describes how to notify the FAA of planned laser operations and what action the FAA will take to respond to such notifications.[74]

[74] FAA also issued Advisory Circular 70/7460-1K which provides guidance on lighting and/or marking obstructions.

Airspace Management

FAA Order JO 7400.2K, *Procedures for Handling Airspace Matters*, prescribes policy, criteria, guidelines, and procedures applicable to the Air Traffic (ATO) division of the FAA in regard to airspace management. The Order also prescribes the methods for conducting aeronautical studies and making determinations as to whether or not an obstruction constitutes a hazard to air navigation.

Chapter 30 of Order 7400.2K prescribes policy and guidelines for determining the potential effect of "high intensity light operations"[75] on users of the national airspace system (NAS). The Order outlines the methods by which the FAA would conduct an aeronautical study and issue a determination on the effect of a proposal to use a HIL. FAA policy on this topic notes that consideration must be given to commercial and general aviation requirements as well as to the public right of "freedom of transit" through the airspace. The FAA policy states that "while a sincere effort must be made to negotiate equitable solutions to conflicts over the use of the NAS for non–aviation purposes, aviation must receive primary emphasis." Chapter 29 of the Order also addresses the process of conducting an aeronautical study for outdoor laser operations.

State Regulations

California Department of Transportation

Heliport Permit

State Heliport Permit requirements are promulgated in the California Public Utilities Code (PUC), Section 21001 et seq., otherwise known as the State Aeronautics Act, and the California Code of Regulations (CCR), Title 21, Sections 3525-3560, Airports and Heliports. The California Department of Transportation (Caltrans) Division of Aeronautics (DOA) issues permits for all helipads in the State of California. Helipads must meet the FAA's FATO standards in order to obtain a Caltrans operating permit.

Pursuant to Public Utilities Commission (PUC) Section 21666, among other requirements, before issuing a State Heliport Permit:

1. The site meets or exceeds the minimum heliport standards specified by Caltrans in its rules and regulations
2. Safe air traffic patterns have been established for the proposed heliport and all existing airports/heliports and approved airport/heliport sites in its vicinity.
3. Safe "zones of approach" for the heliport have been engineered in conformity with the provisions of PUC 21403 (i.e., compliance with FAR Part 77).

[75] A High Intensity Light (HIL) is defined in Order 7400.2K as a "lighting system other than laser designed to penetrate the navigable airspace. A sky searchlight is an example of an HIL.

On November 24, 2009, UCSF received a Heliport Site Approval Permit issued by the Caltrans DOA which effectively authorized helipad construction. On September 18, 2013, UCSF received a Heliport Permit for a special-use heliport issued by the Caltrans DOA, which authorized startup of flight operations.

Local Regulations

As discussed above, UCSF obtained approval from the San Francisco Board of Supervisors in July 2009 for the construction and operation of a helipad within City limits.

5.2.6.4 Impacts and Mitigation Measures

Significance Threshold

As discussed in the Initial Study, Hazards and Hazardous Materials section (see Appendix NOP-IS), the project site is not located within an airport land use plan, within two miles of a public airport or public use airport, or within the vicinity of private airstrip. Consequently, these criteria are not applicable to the proposed project. The project is, however, within the vicinity of a private helipad and its operational flight paths. Furthermore, the Initial Study, Transportation and Circulation section indicated that the project's effect on the helipad's air traffic patterns could be affected and merited analysis in the SEIR.

Consequently, for purposes of this SEIR, the construction and/or operation of the project would have a significant impact related to air safety and hazards if the project were to:

- Involve features that would result in substantial air safety risk and/or create a safety hazard for people residing or working in the project area.

Buildings or structures that penetrate Part 77 airspace surfaces associated with the UCSF Benioff Children's Hospital helipad would be considered "obstructions" to air navigation and assumed to be a potential hazard. Although a hazard determination is made by the FAA only for public airports and private facilities with published instrument approaches, penetrations to the airspace surfaces associated with the private UCSF helipad would be considered a significant impact to the safe operation and utility of the helipad.[76]

Substantial light emissions and/or glare from potential nuisance light sources could adversely affect the vision of pilots using the UCSF helipad and interfere with executing visual approaches to the helipad and landing and takeoff maneuvers. Although a specific threshold indicating a significant impact is not established, a potential to adversely affect the vision of pilots and interfere with the execution of a visual approach to the hospital helipad would indicate a significant impact.

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[76] It is anticipated that instrument approach procedures for the private UCSF helipad would not be published for public use. Further, it is unknown at this time whether or not the FAA would make a hazard determination for the UCSF helipad with a "private" instrument approach procedure. However, for the purpose of this study, a conservative approach was applied in which an apparent obstruction to the helipad's airspace was assumed to be a hazard.

Approach to Analysis

Methodology for Analysis of Direct Impacts

Airspace

The impact analysis in this SEIR determines whether or not the proposed project's temporary and permanent structures would penetrate the Part 77 Approach and Transitional airspace surfaces established for the UCSF Benioff Children's Hospital helipad. If potential obstructions are identified, the amount by which one or more airspace surfaces would be penetrated was evaluated to determine whether measures may be needed to eliminate or minimize the impact.

Information used to conduct the analysis included:

- aerial photography obtained from the City of San Francisco (DataSF.org)
- the UCSF Benioff Children's Hospital Helipad Layout Plan prepared by Heliplanners, Inc. for UCSF, which depicts the location of the hospital's helipad and its airspace surfaces and elevations
- site plans for the proposed project development, including building heights, provided by the project sponsor
- preliminary construction tower crane plan details, including type, size, and location of tower cranes, provided by the project sponsor
- ALTA/ACSM Land Title Survey for the project site, prepared by Martin M. Ron Associates, provided by the project sponsor

First, a base map was prepared depicting the helipad's existing airspace surfaces in the vicinity of the proposed project. The location and heights of the principal proposed permanent structures, including proposed office and retail building podium and towers, and the event center, were added to the base map to depict the location and approximate elevation of the structures in relation to the existing airspace surfaces. In addition, the location and heights of the temporary project construction cranes, as provided by the project sponsor, were separately added to the base map to illustrate the location and approximate elevations of the construction cranes in relation to the existing airspace surfaces.[77]

As a conservative approach in evaluating the proposed buildings, the average post-construction ground elevation at the project site was assumed to be equal to the highest existing curb elevation adjacent to the project site (southwest corner). The curb elevations on the land survey referenced in Mission Bay Datum values were adjusted in reference to North American Vertical Datum of 1988 (NAVD 88), which is commonly used for airport and heliport drawings and for conducting airspace evaluations. Consistent with the *Mission Bay South Design for Development* guidelines, the maximum heights of the proposed office and retail buildings included an additional 20 feet above

[77] It should be noted that both the sponsor's proposed site plans and preliminary construction tower crane plan details are not design level plans, and consequently, reported elevations and effects on airspace are considered approximate.

the building rooftops to account for assumed rooftop mechanical equipment and enclosures. The maximum building heights were then added to the post-construction ground elevation to obtain the maximum building elevations. The analysis then compared the elevation data to determine if the proposed buildings would penetrate the airspace surfaces. The analysis evaluated representative test points for the proposed buildings and estimated the approximate clearance or penetration for each test point.

As a conservative approach in evaluating the temporary project construction cranes, the crane maximum working elevation (ground elevation plus crane height) within each crane's working radius was assumed. This accounts for some mobility of the cranes during construction. The crane maximum working elevations were then assessed to determine if they had the potential to penetrate the airspace surfaces associated with the helipad.

Light Emissions

No proposed exterior lighting details are currently available for the proposed project. Due to the lack of specific information regarding specific proposed exterior lighting, including temporary construction lighting, and long-term operational lighting, this SEIR provides a qualitative evaluation of potential associated lighting impacts.

Methodology for Analysis of Cumulative Impacts

Foreseeable past, present, and probable future projects in the project area that could result in cumulative construction or operational impacts in combination with the proposed project are described in Section 5.1, Impact Overview. The analysis considers whether or not there would be a significant, adverse cumulative impact associated with the helipad operations in combination with past, present, and probable future projects in the immediate vicinity, and if so, whether or not the project's contribution to the cumulative impact would be significant (i.e., cumulatively considerable).

Impact Evaluation—Construction

Airspace

Impact TR-9a: Construction of the proposed project could temporarily obstruct helipad airspace surfaces. (Less than Significant with Mitigation)

As described in detail in Chapter 3, Project Description, construction of the proposed project is anticipated to begin in late 2015 and occur over an approximate 26-month period. Construction activities would include, among other activities, construction of all proposed development, including event center, podium structure, office towers, and plazas. Building erection would require the use of tower cranes, which may be used throughout the construction duration. Tower cranes are comprised of a fixed vertical mast (or tower), a long horizontal jib arm, a shorter horizontal machinery arm, operators cab, and slewing unit (engine).

The preliminary project construction plan as proposed by the sponsor anticipates the placement and use of multiple construction cranes on the project site during construction. Four cranes are anticipated to be required between months 3 through 5 of construction, and five cranes would be used starting in month 6 and used through to approximately to the end of construction period. The maximum crane heights would be either 200 or 240 feet agl, depending on crane and its location. **Figure 5.2-28** illustrates the proposed construction crane locations, crane maximum working elevations (msl) and crane working radii.[78] As shown in Figure 5.2-28, the estimated maximum working elevation of the cranes would be either 214 or 254 feet msl, with a working radii of between 201 and 267 horizontal feet, depending on the crane and its location.

Using the approach and methodology discussed under *Approach to Analysis* above, the project construction cranes were assessed to determine if they would have the potential to penetrate the Part 77 Approach and Transitional airspace surfaces established for the UCSF helipad. **Figure 5.2-28** shows the UCSF helipad and illustrates its existing airspace surfaces in relation to the proposed construction cranes and their maximum working elevation. Based on the information provided and the evaluation of potential obstructions conducted for this study, the following observations can be made:

- The working radii of the central-west project construction crane would penetrate the helipad's Transitional Surface adjacent to primary Approach Surface (i.e., the westbound approach from the Bay) by up to approximately 23 feet (see Point No. 2 in Figure 5.2-28). The penetration would occur if this construction crane were to work over the southwest corner of the project site at an elevation of between approximately 232 to 254 feet msl. The potential penetration in this area would be a temporary obstruction to the helipad's Transitional Surface.

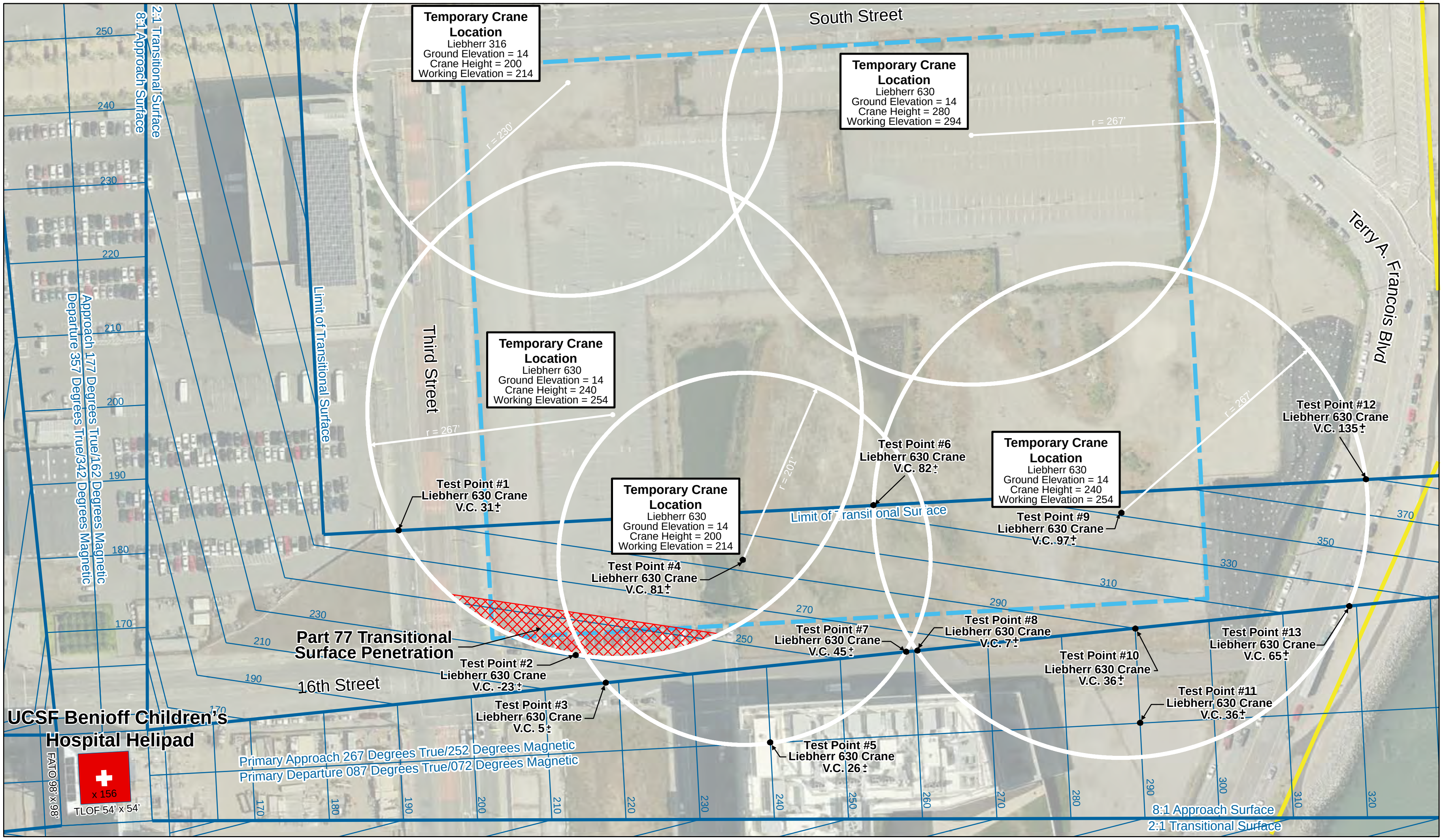
- The working radii of the two southern project construction cranes would extend under the helipad's primary Approach Surface and adjacent Transitional Surface, with minimum vertical clearances of 5 and 7 feet, respectively (see Points No. 3 and 8 in Figure 5.2-28)

- None of project construction crane masts would be located under the helipad's Approach Surfaces. However, the masts of the two southernmost project construction cranes would be located under the helipad's Transitional Surface adjacent to primary Approach Surface, but with vertical clearances of 81 and 91 feet, respectively.

- As shown in Figure 5.2-26, one of UCSF's alternative arrival/departure flight paths follows along the alignment of South Street. As shown in Figure 5.2-28, while the working radii of two project construction cranes would extend over South Street, they are not located under any of the Part 77 Approach or Transitional Surfaces. Assuming that an 8:1 "curved" Approach Surface was established along this segment of the alternate flight path and it intercepted the existing northern approach surface for a 90 degree turn[79] at an elevation of approximately 250 feet msl, the minimum amount of clearance over the construction crane in the northwest corner of the project site would be approximately 44 feet; and the minimum amount of clearance over the clearance over the construction crane in the northeast corner of the project site would be approximately 64 feet.

[78] Crane "heights" are expressed feet above ground level (agl). "Elevations" in Figure 5.2-28 are expressed in mean feet above sea level (msl) referencing NAVD 88 datum, which is commonly used for airport and heliport drawings and conducting airspace evaluations.

[79] Curved approach/departure surfaces have not been established for the helipad. Although FAA criteria for curved approach/departure surfaces would require a wider turn radius, this analysis assumed a tighter turn radius based on the use of existing approach/departure flight paths.



Mission Bay Redevelopment Plan Area Boundary

Project Site Boundary

0 100 Feet

SOURCE: Heliplanners, Inc., 2014 (UCSFMC Helipad Features, Airspace Contours, and Elevations); Golden State Warriors, 2015 (Proposed Site Plan, Tower Crane Plan, and Associated Elevations); ALTA/ACSM Land Title Survey, 2014 (Existing Ground Elevations); www.DataSF.org, 2012 (Aerial). Adapted by ESA, 2015.

NOTES: Elevations and airspace contours are expressed in mean feet above sea level (msl).
All elevation values reference NAVD88. All elevations are approximate.
V.C. = Vertical Clearance

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.2-28
Project Construction Cranes and UCSF
Benioff Children's Hospital Helipad Airspace Surfaces

In summary, based on the preliminary project construction plan for the project construction cranes, one of the project construction cranes would have the potential to result in a temporary penetration of a Part 77 Transitional Surface associated the helipad, which would be considered a potentially significant impact. If the preliminary project construction plan details were to change with respect to proposed tower crane size, location, or other factors, then the project would have the potential to result in greater and/or less airspace penetration effects than those reported above. **Mitigation Measure M-TR-9a**, **Crane Safety Plan for Project Construction**, identifies feasible measures that would reduce potential temporary impacts associated with the use of cranes during the construction period to less than significant. The objective of the crane safety plan is to ensure the safe use of the UCSF Benioff Children's Hospital helipad, and the safety for people residing or working in the project area during construction. Therefore, with implementation of Mitigation Measure M-TR-9a, this impact would be *less than significant with mitigation*.

Mitigation Measure M-TR-9a: Crane Safety Plan for Project Construction

Prior to construction, the project construction contractor shall develop a crane safety plan for the project construction cranes that would be implemented during the construction period. The crane safety plan shall identify appropriate measures to reduce, and where possible, avoid, potential conflicts that may be associated with the operation of the construction cranes in the vicinity of the UCSF Benioff Children's Hospital helipad airspace. These safety protocols shall be developed in consultation and coordination with OCII (or its designated representative) and UCSF, and the crane safety plan shall be subject to approval by OCII or its designated representative. The crane safety plan shall include, but may not be limited to, the following measures:

- Convey project crane activity schedule to UCSF and OCII
- If other projects on adjacent properties are under construction concurrent with the proposed project and are using tower cranes, the project sponsor shall participate in joint coordination with those project sponsors and OCII or its designated representative to ensure any potential cumulative construction crane effects on the UCSF helipad would be minimized.
- Use appropriate markings, flags, and/or obstruction lighting on all project construction cranes working in proximity to the helipad's airspace surfaces.
- Light all construction crane structures at night (e.g., towers, arms, and suspension rods) to enhance a pilot's ability to discern the location and height of the cranes.
- Inform crane operators of the location and elevation of the hospital helipad's Part 77 airspace surfaces and the need to minimize penetrations to the surfaces.
- Use construction methods that minimize the duration of Part 77 airspace surface penetrations that may occur.
- Issue a Notice to Airmen (NOTAM) to advise pilots in the area of the presence of construction cranes at the project site.

Comparison of Impact TR-9a to Mission Bay FSEIR Impact Analysis

At the time the Mission Bay FSEIR was prepared, no helipad was specifically proposed by UCSF in the Plan area. As such, the Mission Bay FSEIR did not discuss potential construction-related impacts from new development in the Plan area on a helipad. Addenda to the Mission Bay FSEIR were prepared in 2005 and 2008 that analyzed potential impacts associated with operation of a UCSF helipad (explained further above), however, those addenda also did not address potential construction-related impacts from new development in the Plan area on the helipad operations. However, because project construction impacts to the UCSF helipad airspace discussed in this SEIR would be less than significant with mitigation, the project would result in no new or substantially more severe significant impacts than was previously identified in the Mission Bay FSEIR, as addended.

Lighting

Impact TR-9b: Project construction lighting would not adversely affect helipad flight operations (Less than Significant)

As discussed in Chapter 3, Project Description, some construction activities would occur at night. Potential exterior nighttime construction would use temporary lighting to illuminate work areas immediately surrounding construction equipment and work site. This type of lighting is normally shielded to direct the light downward to the work area and/or diffused to reduce glare to workers and equipment operators. Given the proposed project's urban setting, the use of this type of lighting would be noticeable to pilots using the hospital helipad, but would not be expected to have a significant impact. Consequently this impact is determined to be *less than significant*.

Mitigation: Not required.

Comparison of Impact TR-9b to Mission Bay FSEIR Impact Analysis

As discussed above, Mission Bay FSEIR as addended did not address potential construction-related impacts from new development in the Plan area on the helipad operations. However, because project construction lighting impacts to UCSF helicopter pilots discussed in this SEIR would be less than significant, the project would result in no new or substantially more severe significant impacts than was previously identified in the Mission Bay FSEIR, as addended.

Impact Evaluation—Operation

Airspace

Impact TR-9c: Development of the proposed project would not obstruct UCSF helipad airspace surfaces. (Less than Significant)

As described in detail in Chapter 3, Project Description, the project development would include a multi-purpose event center on the east side of the project site, two office and retail buildings on the west side of the project site, and miscellaneous other structures, such as a food hall and gatehouse building. The proposed 11-story office and retail buildings would be the tallest buildings on the project site, with each building comprised of 6-story podiums (90 feet) and 5-story (70-foot) towers above. When accounting for up to an additional 20 feet for rooftop mechanical enclosures, the maximum heights of the proposed office and retail buildings would be 180 feet agl. The proposed event center building would be approximately 135 feet agl at its roof peak, and other locations on the roof up to 126 feet agl (e.g., at southeast corner at 16th Street). **Figure 5.2-29** illustrates the proposed location of the proposed tallest project buildings (i.e., the two office and retail buildings, and the event center) and their corresponding elevations (msl).[80,81]

Using the approach and methodology discussed under *Approach to Analysis* above, the project buildings were assessed to determine if they have the potential to penetrate the Part 77 Approach and Transitional airspace surfaces established for the UCSF Benioff Children's Hospital helipad. Figure 5.2-29 shows the UCSF helipad and illustrates its existing airspace surfaces in relation to the proposed project buildings. Based on the information provided by the project sponsor and the evaluation of potential obstructions conducted for this study, the following observations can be made:

- None of the proposed project structures, including the office and retail buildings and the event center, are located directly under any of the helipad's Approach Surfaces. Portions of the 16th Street tower/podium and event center are located under the Transitional Surface adjacent to the primary Approach Surface (the westbound approach from San Francisco Bay).
- None of the proposed project structures would penetrate the helipad's Approach or Transitional Surfaces.

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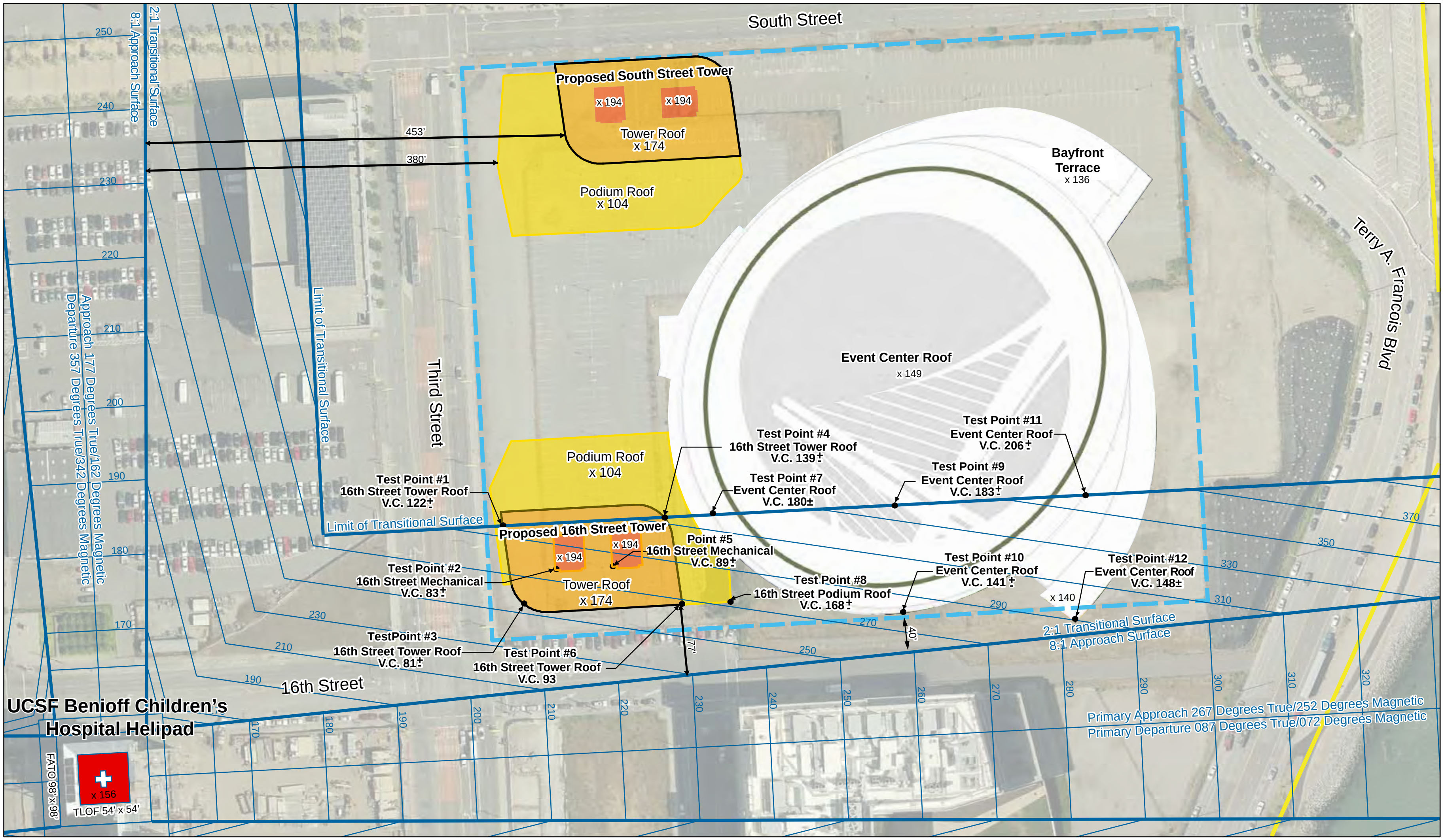
80 As discussed in Chapter 4, Plans and Policies, to accommodate the proposed project, the South Design for Development would be amended to allow an event center not to exceed 135 feet agl (building height limit is currently 90 feet); and to allow for two 160-foot agl towers (exclusive of rooftop mechanical enclosures) – the limit is currently one tower.

81 Building "heights" are expressed feet above ground level (agl). "Elevations" in Figure 5.2-19d are expressed in mean feet above sea level (msl) referencing NAVD 88 datum, which is commonly used for airport and heliport drawings and conducting airspace evaluations.



Mission Bay Redevelopment Plan Area Boundary

Project Site Boundary

0 100
Feet

SOURCE: Heliplanners, Inc., 2014 (UCSFMC Helipad Features, Airspace Contours, and Elevations); Golden State Warriors, 2015 (Proposed Site Plan and Associated Elevations); ALTA/ACSM Land Title Survey, 2014 (Existing Ground Elevations); www.DataSF.org, 2012 (Aerial). Adapted by ESA, 2015.

NOTES: Elevations and airspace contours are expressed in mean feet above sea level (msl).
All elevation values reference NAVD88. All elevations approximate.
V.C. = Vertical Clearance

Figure 5.2-29
Project Development and UCSF Benioff Children's Hospital Helipad Airspace Surfaces

Table 5.2-74 provides the estimated vertical clearance between the helipad's Transitional Surface and the underlying proposed principal structures (16th Street tower/podium and event center). As shown, the minimum vertical clearance between the 16th Street tower and the helipad Transitional Surface would be 81 feet at the southwest corner of the proposed 16th Street tower roof (Point #3; see location in Figure 5.2-29). The minimum vertical clearance between the proposed event center and the helipad Transitional Surface would be 141 feet (Point #10; see location in Figure 5.2-29).

TABLE 5.2-74
PART 77 AIRSPACE VERTICAL CLEARANCES - PROPOSED PRINCIPAL STRUCTURES

Test Point ID	Description	Elevation (feet msl)	Lowest Affected Part 77 Surface	Vertical Clearance (feet)	Part 77 Surface Penetration (feet)
1	16th Street Tower Roof	174	Transitional Surface	122	--
2	16th Street Tower Mechanical Enclosure	194	Transitional Surface	83	--
3	16th Street Tower Roof	174	Transitional Surface	81	--
4	16th Street Tower Roof	174	Transitional Surface	139	--
5	16th Street Tower Mechanical Enclosure	194	Transitional Surface	89	--
6	16th Street Tower Roof	174	Transitional Surface	93	--
7	Event Center Roof	138	Transitional Surface	180	--
8	16th Street Podium Roof	104	Transitional Surface	168	--
9	Event Center Roof	144	Transitional Surface	183	--
10	Event Center Roof	138	Transitional Surface	141	--
11	Event Center Roof	138	Transitional Surface	220	--
12	Event Center Roof at Southeast Corner	140	Transitional Surface	148	--

[a] See also location of test points in Figure 5.2-29.

SOURCE: Golden State Warriors Site Plan information, 2015; UCSF Mission Bay Medical Center Helipad Layout Drawing, 2015; ESA, 2015

Because the proposed buildings would not penetrate the helipad's Part 77 airspace surfaces and would not be obstructions to air navigation, the impact is determined to be *less than significant*.

Mitigation: Not required.

Comparison of Impact TR-9c to Mission Bay FSEIR Impact Analysis

At the time the Mission Bay FSEIR was prepared, no helipad was specifically proposed by UCSF in the Plan area. As such, the Mission Bay FSEIR did not address potential impacts associated with operation of a helipad in the Plan area. However, Addendum No. 5 to the Mission Bay FSEIR (September 2005) analyzed operation of a potential helipad contemplated under the UCSF Long Range Development Plan Amendment No. 2 – Hospital Replacement project; and Addendum No. 6 to the Mission Bay FSEIR (September 2008) further analyzed operation of this helipad as part of the UCSF Medical Center project.[82] Addenda No. 5 and 6 to the Mission Bay FSEIR determined that the UCSF hospital project, including operation of a proposed helipad, did not entail any substantial changes that would require major revisions to the Mission Bay FSEIR, nor would new significant impacts or a substantial increase in the severity of previously-identified significant effects occur, and no new information had emerged that would materially change any of the analyses or conclusions in the Mission Bay FSEIR. As discussed above, the impact of the proposed project buildings on the UCSF helipad airspace would be less than significant. Therefore, the project would result in no new or substantially more severe significant impacts than those previously identified in the Mission Bay FSEIR, as addended.

Lighting

Impact TR-9d: Certain project specialized exterior lighting could adversely affect UCSF helipad flight operations (Less than Significant with Mitigation)

A project lighting plan is not currently available for this analysis. However, for the purposes of this analysis, it is assumed the exterior lighting for the proposed project would include lighting on the event center façade and roof, lighting at the office and retail buildings, lighting in the proposed plazas, green roofs, and along walkways, and signage lighting. Nightlighting would also be emitted from certain interior areas of the office and retail buildings and the event center. In addition, headlights from project-generated vehicles would also be visible in the evening at project vehicular entrances and on surrounding roadways. As identified in the Project Description, the project would require an amendment to the Mission Bay South Signage Master Plan; this would provide guidelines for proposed exterior lighting for the event center. In the absence of information regarding specific proposed exterior lighting, this analysis provides a qualitative evaluation of potential impacts by discussing different types of possible exterior lighting and their potential to affect helipad flight operations.

Mixed-Uses Lighting

In general, the exterior lighting associated with the proposed mixed uses (i.e., non-event center uses) on the site, including the office and retail buildings would be typical of other mixed-use developments in the Mission Bay Plan area and elsewhere in the City. Given the likely common light sources and lighting intensity for these uses, and the existing urban setting of the site, the exterior lighting associated with non-event center uses, and any incidental interior lighting from these uses that may be visible, would be noticeable but would not expected to have a significant impact on helicopter pilots approaching or departing from the UCSF helipad.

[82] Please also see *Summary of the Mission Bay FSEIR and Other Applicable Environmental Review Documents in Mission Bay Plan Area* in the Setting for a discussion of environmental review conducted by UCSF for the helipad operations.

Event Center Lighting

Routine Lighting - Based on the operation of other enclosed arenas and event centers, it is likely that during routine night games and events at the event center, additional outdoor lighting could be used at the project site to illuminate walkways, event center entrances, and other potential miscellaneous outdoor structures like sponsor tents and concession areas, in the immediate vicinity of the event center. These lights would be typically building or pole mounted and shielded to direct light downward, or may include muted embedded pavement or stair lighting that would not emit bright light past ground level. Outdoor lighted signs announcing the event and/or associated programming could also be used. Given these common light sources and the urban setting of the proposed project, the outdoor lighting associated with the routine use of the enclosed event center would be noticeable, but would not be expected to have a significant impact on pilots using the UCSF helipad.

Specialized Lighting – The event center and/or certain games and/or events at the event center, or occasional outdoor events/performances in the proposed plazas, could incorporate specialized outdoor lighting systems and large display screens that may have the potential to adversely affect a pilot’s vision and may interfere with visual nighttime approaches and departures to/from the UCSF helipad. Although no specific information currently exists indicating the use of specialized exterior lighting systems at the proposed event center or for outdoor events/performances, potential lighting could include lights that are directed upward or may be of such intensity to affect pilots arriving to or departing from the helipad. These types of temporary or permanent lighting systems may include:

- high-intensity area and/or building exterior lighting
- outdoor stage lighting (that may be directed upward)
- large outdoor lighted displays and television/lighted screens
- high-intensity lights that may be directed upward (i.e., spot lights, rotating search lights, klieg lights)
- high-intensity flashing or strobe lights
- laser and laser displays (that may be directed upward)
- projection lighting
- fireworks
- light configurations that may unintentionally be similar to those associated with the hospital heliport landing area

The effect of nuisance light on a pilot can vary due to numerous factors (i.e., intensity, light direction, type, and distance of the light source), and the effect reported by pilots can also be somewhat subjective. In some cases, the effects can be distracting to the pilot. In other cases (i.e., lasers and spot lights directed at an aircraft), the effects can constitute a hazard.

Based on these facts, the use of certain specialized lighting systems identified above would have the potential to adversely affect a pilot’s vision and execution of a visual night time approach or departure to/from the UCSF helipad. Lights that adversely affect the night vision of pilots and interfere with the execution of a visual nighttime approach to the helipad would endanger the pilot, passengers, and people on the ground. Therefore, the possible use of these specialized lighting systems would be considered a potentially significant impact. **Mitigation Measure M-TR-9d**, **Event Center Exterior Lighting Plan**, identifies feasible measures that would reduce potential impacts associated with potential specialized lighting systems to less than significant. Therefore, this impact would be *less than significant with mitigation*.

Mitigation Measure M-TR-9d: Event Center Exterior Lighting Plan

The project sponsor shall develop an exterior lighting plan that incorporates measures to ensure specialized exterior lighting systems would not have an undue impact on helipad operations. Feasible measures shall be developed in consultation and coordination with San Francisco International Airport (SFO) staff knowledgeable of the effects of lighting on pilots and safe air navigation, and OCII (or its designated representative), and the exterior lighting plan shall be subject to approval by OCII or its designated representative. Measures shall include, but may not be limited to, the following:

- prohibit the use of high-intensity lights that are directed towards the UCSF helipad
- prohibit the use of high-intensity outdoor flashing lights or strobe lights in proximity to the hospital helipad's three approaches
- prohibit the use of outdoor lasers directed upward, and laser light shows that have not been subject to prior review by OCII in consultation with SFO staff knowledgeable of the effects of lighting on pilots and safe air navigation and, if necessary the FAA
- avoid outdoor fireworks proximate to flight paths unless (1) the SFFD approves the proposed use of fireworks, and (2) notice of the event is provided to UCSF
- avoid the use of light configurations similar to those associated with the UCSF helipad landing area locate primary outdoor lighted displays and television/lighted screens away from the project property line at 16th Street, South Street, or Third Street, where feasible
- advance notification and coordination of planned special event lighting with OCII and UCSF representatives
- develop exterior specialized lighting guidelines and ensure event organizers are informed of the hospital helipad, its approaches, and safety concerns related to outdoor nuisance lighting

Comparison of Impact TR-9d to Mission Bay FSEIR Impact Analysis

As discussed above under Impact TR-9c, while the Mission Bay FSEIR did not address potential impacts associated with operation of a helipad in the Plan area, Addenda No. 5 and 6 to the Mission Bay FSEIR did address operation of the UCSF helipad, and determined that the proposed helipad did not entail any substantial changes that would require major revisions to the Mission Bay FSEIR, nor would new significant impacts or a substantial increase in the severity of previously-identified significant effects occur, and no new information had emerged that would materially change any of the analyses or conclusions in the Mission Bay FSEIR. As discussed above, the impact of the project's exterior lighting on UCSF helicopter pilots would be less than significant with mitigation. Therefore, the project would result in no new or substantially more severe significant impacts than those previously identified in the Mission Bay FSEIR, as addended.

Cumulative Impacts

Impact C-TR-9: The project, in combination with other past, present, and reasonably foreseeable future projects, could result in significant adverse cumulative impacts to the UCSF helipad. (Less than Significant with Mitigation)

Under cumulative conditions, past, present, and reasonably foreseeable future development in the immediate project vicinity would have the potential to result in cumulative effects on the UCSF helipad airspace surfaces, and night lighting effects on the UCSF pilots.

In the immediate project vicinity, cumulative building development is anticipated on the currently undeveloped portions of Blocks 27, 25, X3, and 33, located north, west, southwest and south of the project site, respectively. As with the proposed site, these parcels are located in the vicinity of the UCSF helipad airspace surfaces and/or its arrival/departure flight paths. Of these, Blocks 25, X3, and 33 are planned for development by UCSF under its 2014 LRDP. As discussed above, the 2014 UCSF LRDP Final EIR determined that the implementation of the 2014 LRDP, including new UCSF development immediately west, southwest, and south of the project site, would have a less than significant impact for people residing or working near the helipad. It is also reasonable to assume that UCSF, as operator of its helipad, would design, construct, and operate all of its other planned development on its Mission Bay campus in consideration of ensuring safety operating conditions for the helipad and helicopter pilots. Furthermore, none of the planned development on Blocks 27, 25, X3, and 33 would include outdoor entertainment facilities, such that there would be no cumulative impact related to exterior specialized lighting.

However, depending on the construction schedules for the planned developments on Blocks 27, 25, X3, and 33, the construction of the proposed project in combination with other planned development could result in a cumulative adverse impact to the UCSF helipad. Mitigation Measure M-TR-9a would require that the project’s crane safety plan include a measure to coordinate the project crane activity schedule with UCSF and OCII. Furthermore, Mitigation Measure M-TR-9a would require that if other projects on adjacent properties are under construction concurrent with the proposed project and are using tower cranes, the sponsor would participate in joint coordination with those project sponsors and OCII to ensure any potential cumulative construction crane effects on the UCSF helipad would be minimized. With implementation of Mitigation Measures M-TR-9a, the contribution to cumulative impacts by the project would not be considerable, and the impact would be *less than significant with mitigation*.

Mitigation Measure M-TR-9a: Crane Safety Plan for Project Construction (see Impact TR-9)

Comparison of Impact C-TR-9 to Mission Bay FSEIR Impact Analysis

At the time the Mission Bay FSEIR was prepared, no helipad was specifically proposed by UCSF in the Plan area. As such, the Mission Bay FSEIR did not address potential impacts, including cumulative impacts, associated with operation of a helipad in the Plan area. Addenda No. 5 and 6 to the Mission Bay FSEIR did consider cumulative effects associated with operation of the UCSF helipad, and determined that the proposed helipad did not entail any substantial changes that would require major revisions to the Mission Bay FSEIR, nor would new significant impacts or a substantial increase in the severity of previously-identified significant effects occur, and no new information had emerged that would materially change any of the analyses or conclusions in the Mission Bay FSEIR.

As discussed above, the proposed project's contribution to cumulative construction impacts of the project on the UCSF helipad operations would be less significant with mitigation. Therefore, the project would result in no new or substantially more severe significant impacts than those previously identified in the Mission Bay FSEIR, as addended.

Draft Subsequent Environmental Impact Report

EVENT CENTER AND MIXED-USE DEVELOPMENT AT MISSION BAY BLOCKS 29-32

Office of Community Investment and Infrastructure Case No. ER 2014-919-97
San Francisco Planning Department Case No. 2014.1441E
State Clearinghouse No. 2014112045

Draft SEIR Publication Date: June 5, 2015
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CHAPTER 5 (continued)

Environmental Setting, Impacts, and Mitigation Measures

5.3 Noise and Vibration

5.3.1 Introduction

This section describes the existing noise environment in the project area and identifies the potential for noise and vibration associated with implementation of the proposed project to adversely affect established sensitive land uses or land use activities. The impact analysis evaluates the potential noise and vibration impacts of the proposed project and identifies mitigation measures to avoid or reduce adverse impacts.

5.3.2 Summary of Mission Bay FSEIR Noise Section

5.3.2.1 Mission Bay FSEIR Setting

The noise setting for the Mission Bay area discussed in the Mission Bay FSEIR differs from the existing setting today primarily in terms of the number of noise sources that exist in the area. Specifically, at the time of the Mission Bay FSEIR much of the Mission Bay area was underdeveloped. Since 1998, the development of the UCSF Mission Bay campus, AT&T Park and residential towers in North Mission Bay have introduced new noise sources to the area, particularly vehicle traffic. Additionally, the Muni Third Street light rail line has been constructed which is a new noise source along that corridor in front of the project site.

Another aspect of the noise setting that has changed since adoption of the 1998 SEIR is the number of noise sensitive uses that now exist in the Mission Bay area. In 1998 the Mission Bay area was developed primarily with industrial uses. Since that time residential uses have been developed including residential housing at the UCSF Mission Bay campus as well as in the north Mission Bay area. There have been no significant changes to the regulatory environment with regard to noise since certification of the 1998 FSEIR.

5.3.2.2 Mission Bay FSEIR Impacts and Mitigation Measures

Noise impacts assessed in the Mission Bay FSEIR included all of the Mission Bay plan area, including Blocks 29-32. The construction noise impact was identified as less than significant in the 1998 FSEIR for standard construction equipment. Noise from pile driving was identified as a significant impact mitigated to less than significant with Mitigation Measure G.1 to implement noise-reducing pile driving techniques.

The construction vibration impact was identified as less than significant in the 1998 FSEIR. Although the analysis acknowledged the potential existence of noise sensitive equipment in the area, it was determined that vibration from pile driving did not represent a physical impact on people or the environment, and was therefore less than significant under CEQA. A potential operational vibration impact was identified for the westernmost block of North Mission Bay due to proximity to the Caltrain tracks, which was mitigated to a less than significant level by implementation of Mitigation Measure G.2 to assess vibration levels and, if necessary, employ vibration-reducing foundation construction techniques for structure in that block.

Amplified sound was addressed in the 1998 FSEIR with respect to concert events at the San Francisco Giants ballpark. This impact was identified as less than significant with mitigation (implementation of a plan that limits concert events per year and limits the noise generated by these events to a 3 dBA increase over existing ambient levels) that was identified in the *San Francisco Giants Ballpark at China Basin Final EIR*.

Traffic noise increases were identified as less than significant in the 1998 FSEIR and no mitigation measures were required. Crowd noise from the Giants ballpark such as applause and cheering was assessed in combination with concert noise and found to be less than significant, and no mitigation measures were required for that impact.

5.3.3 Setting

5.3.3.1 Noise Background

Sound is characterized by various parameters that describe the rate of oscillation (frequency) of sound waves, the distance between successive troughs or crests in the wave, the speed that it travels, and the pressure level or energy content of a given sound. The sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound, and the decibel (dB) scale is used to quantify sound intensity. Because sound can vary in intensity by over one million times within the range of human hearing, a logarithmic loudness scale is used to keep sound intensity numbers at a convenient and manageable level. Since the human ear is not equally sensitive to all sound frequencies within the entire spectrum, human response is factored into sound descriptions in a process called “A-weighting,” expressed as “dBA.” The dBA, or A-weighted decibel, refers to a scale of noise measurement that approximates the range of sensitivity of the human ear to sounds of different frequencies. On this scale, the normal range of human hearing extends from about 0 dBA to about 140 dBA. An increase of 10-dBA in the level of a continuous noise represents a perceived doubling of loudness. The noise levels presented herein are expressed in terms of dBA, unless otherwise indicated. **Table 5.3-1** shows some representative noise sources and their corresponding noise levels in dBA.[1]

Planning for acceptable noise exposure must take into account the types of activities and corresponding noise sensitivity in a specified location for a generalized land use type. Some general guidelines are as follows: sleep disturbance can occur at levels above 35 dBA; interference with human speech begins at about 60 dBA; and hearing damage can result from prolonged exposure to noise levels in excess of 85 to 90 dBA.[2]

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1 United States Department of Housing and Urban Development (HUD), *The Noise Guidebook*, 1985, http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/environment/training/guidebooks/noise; divided into chapters with Chapter 1 at http://portal.hud.gov/hudportal/documents/huddoc?id=DOC_16414.pdf, accessed October 14, 2014.

2 United States Environmental Protection Agency, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, March 1974, http://www.fican.org/pdf/EPA_Noise_Levels_Safety_1974.pdf, accessed July 9, 2013.

TABLE 5.3-1
TYPICAL SOUND LEVELS MEASURED IN THE ENVIRONMENT

Examples of Common, Easily Recognized Sounds	Decibels (dBA) at 50 feet	Subjective Evaluations
Near Jet Engine	140	Deafening
Threshold of Pain (Discomfort)	130	
Threshold of Feeling – Hard Rock Band	120	
Accelerating Motorcycle (at a few feet away)	110	
Loud Horn (at 10 feet away)	100	Very Loud
Noisy Urban Street	90	
Noisy Factory	85	
School Cafeteria with Untreated Surfaces	80	Loud
Near Freeway Auto Traffic	60	Moderate
Average Office	50	
Soft Radio Music in Apartment	40	Faint
Average Residence Without Stereo Playing	30	
Average Whisper	20	Very Faint
Rustle of Leaves in Wind	10	
Human Breathing	5	
Threshold of Audibility	0	

NOTE: Continuous exposure above 85 dBA is likely to degrade the hearing of most people. Range of speech is 50 to 70 dBA.

SOURCE: United States Department of Housing and Urban Development, *The Noise Guidebook*, 1985.

Attenuation of Noise

Line sources of noise, such as roadway traffic, attenuate (lessen) at a rate of 3.0 to 4.5 dBA per doubling of distance from the source, based on the inverse square law and the equation for cylindrical spreading of noise waves over hard and soft surfaces.

Point sources of noise,[3] including stationary mobile sources such as idling vehicles or onsite construction equipment, attenuate at a rate of 6.0 to 7.5 dBA per doubling of distance from the source, based on the inverse square law and the equations for spherical spreading of noise waves over hard and soft surfaces. For the purposes of this analysis, it is assumed that noise from line

[3] Point sources and line sources are further defined by the California Department of Transportation (Caltrans) as follows:

> Sound from a small localized source (approximating a "point" source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates or drops off at a rate of 6 dBA for each doubling of the distance (6 dBA/DD). This decrease, due to the geometric spreading of the energy over an ever increasing area, is referred to as the inverse square law. However, highway traffic noise is not a single, stationary point source of sound. The movement of the vehicles makes the source of the sound appear to emanate from a line (line source) rather than a point when viewed over some time interval. This results in cylindrical spreading rather than the spherical spreading of a point source. (Source: Caltrans, *Technical Noise Supplement*, November 2009.)

and point sources to a distance of 200 feet attenuates at rates of between 3.0 and 6.0 dBA per doubling of distance, and the noise from line and point sources at a distance greater than 200 feet attenuates at a rate of 4.5 to 7.5 dBA per doubling of distance, to account for the absorption of noise waves due to ground surfaces such as soft dirt, grass, bushes, and intervening structures.[4]

Noise Descriptors

Time variations in noise exposure are typically expressed in terms of a steady-state energy level (L_{eq}) that represents the acoustical energy of a given measurement. L_{eq} is used to describe noise over a specified period of time, in terms of a single numerical value. The L_{eq} is the constant sound level that would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).The L_{90} is also a noise metric that can be used to describe existing ambient noise levels. Because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law requires that, for planning purposes, an artificial dBA increment be added to "quiet time" noise levels to form a 24-hour noise descriptor called the day-night noise level (DNL). DNL adds a 10-dBA penalty during the night hours (10:00 p.m. to 7:00 a.m.). The maximum noise level (L_{max}) is the maximum instantaneous noise level measured during the measurement period of interest.

Health Effects of Environmental Noise

The World Health Organization (WHO) is perhaps the best source of current knowledge regarding the health effects of noise impacts because European nations have continued to study noise and its health effects, while the United States Environmental Protection Agency all but eliminated its noise investigation and control program in the 1970s.[5] According to WHO, sleep disturbance can occur when continuous indoor noise levels exceed 30 dBA or when intermittent interior noise levels reach 45 dBA, particularly if background noise is low. With a bedroom window slightly open (a reduction from outside to inside of 15 dB), the WHO criteria suggest that exterior continuous (ambient) nighttime noise levels should be 45 dBA or below, and short-term events should not generate noise in excess of 60 dBA. WHO also notes that maintaining noise levels within the recommended levels during the first part of the night is believed to be effective for the ability of people to initially fall asleep.[6]

Other potential health effects of noise identified by WHO include decreased performance for complex cognitive tasks, such as reading, attention span, problem solving, and memorization; physiological effects such as hypertension and heart disease (after many years of constant exposure, often by workers, to high noise levels); and hearing impairment (again, generally after long-term occupational exposure, although shorter-term exposure to very high noise levels, for

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4 California Department of Transportation (Caltrans), *Technical Noise Supplement*, November 2009, http://www.dot.ca.gov/hq/env/noise/pub/tens_complete2009RedlineScreenProcess.pdf, accessed July 9, 2013.

5 The *San Francisco General Plan* Land Use Compatibility Guidelines for Community Noise, presented below in Figure 5.3-2, were created during the same era.

6 World Health Organization, Guidelines for Community Noise, Geneva, 1999, http://www.who.int/docstore/peh/noise/guidelines2.html, accessed July 9, 2013. A copy of this document is available for public review at the San Francisco Planning Department, 1650 Mission Street, Suite 400, in Case File No. 2007.0903E.

example, exposure several times a year to concert noise at 100 dBA, can also damage hearing). Finally, noise can cause annoyance and can trigger emotional reactions like anger, depression, and anxiety. WHO reports that, during daytime hours, few people are seriously annoyed by activities with noise levels below 55 dBA or moderately annoyed with noise levels below 50 dBA.

Vehicle traffic and continuous sources of machinery and mechanical noise contribute to ambient noise levels. Short-term noise sources, such as truck backup beepers, the crashing of material being loaded or unloaded, car doors slamming, and engines revving outside a nightclub, contribute very little to 24-hour noise levels but are capable of causing sleep disturbance and severe annoyance. The importance of noise to receptors depends on both time and context. For example, long-term high noise levels from large traffic volumes can make conversation at a normal voice level difficult or impossible, while short-term peak noise levels, if they occur at night, can disturb sleep.

5.3.3.2 Existing Noise Environment

Long-term environmental noise in urbanized areas is primarily dependent on vehicle traffic volumes and the mix of vehicle types. The existing ambient noise environment within the project area is dominated by vehicular traffic on Third Street and 16th Street. The San Francisco Municipal Railway (Muni) operated light rail service along Third Street contributes to the local noise environment. Sporting events and occasional outdoor concerts at AT&T Park totaling more than 82 events per year generate vehicle traffic that is routed south along Third Street, Illinois Street (south of Mariposa Street), and Terry A. Francois Boulevard in the area, resulting in increased periods of traffic-related noise before and particularly after events. Additionally, the newly operational UCSF Hospital, southwest of the project site on Third Street operates a helipad to accept transfers of critically ill persons from community hospitals to UCSF for the medical care. Neither the Muni light rail nor the AT&T Park were in operation at the time of certification of the Mission Bay FSEIR in 1998, although both were discussed in the cumulative noise analysis.

The San Francisco Department of Public Health (DPH) has mapped transportation noise throughout the City and County of San Francisco, based on modeled baseline traffic volumes derived from the San Francisco County Transportation Authority travel demand model.[7] DPH maps indicate the areas subject to noise levels over 60 dBA (DNL) and the range of DNL noise levels that occur on every street in San Francisco. The portions of these maps that cover the project area indicate that areas nearest Third Street between Channel Street and 16th Street experience roadway noise levels in excess of 70 dBA (DNL), while noise levels along Terry A. Francois Boulevard and 16th Street are generally between 65 and 70 dBA (DNL).

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7 San Francisco Department of Public Health (DPH), San Francisco City-wide Noise Map, August 2006, Available online at http://www.sfdph.org/dph/files/EHSdocs/ehsPublsdocs/Noise/noisemap2.pdf Accessed April 30, 2013.

Ambient Noise Measurements

Ambient long-term (24-hour) and short-term (15-minute) noise measurement data were collected in October of 2014 and April of 2015 in the project area to characterize noise conditions at locations in the project area; noise measurement locations are shown in **Figure 5.3-1**. To characterize ambient noise in the project area, short-term measurement data were collected at locations where residential and hospital land uses exist near the project site (Madrone Mission Bay residential towers on Mission Bay Boulevard North; and the new UCSF hospital southwest of the project site on Third Street), as described in **Table 5.3-2**. Long-term noise data were collected for the residential land use nearest the project site—the UCSF housing development (Hearst Tower)—located northwest of the project site on Third Street, and are presented in **Table 5.3-3**.

TABLE 5.3-2
SHORT-TERM AMBIENT NOISE LEVEL DATA IN THE PROJECT AREA

Measurement Location	Time	Noise Levels in dBA		
		Hourly L_{eq}	L_{90}	L_{max}
1. Madrone Mission Bay Residential Towers Nearby residential receptor 800 feet north of project site	3:10- 3:35 p.m.	70.1	59	88.9
2. UCSF Hospital 560 feet southwest of the Project site	8:56 – 9:11 a.m.	67.0	61	81.2

NOTE: See Figure 5.3-1 for noise measurement locations. L_{eq} represents the constant sound level; L_{max} is the maximum noise level. L90 is the background noise level. Time of day of short term monitoring reflect daytime hours during which construction activities could occur.

SOURCE: Environmental Science Associates, 2014, 2015.

TABLE 5.3-3
LONG- TERM AMBIENT NOISE LEVEL DATA IN THE PROJECT AREA

Measurement Location	Day-Night Noise level (DNL)	Noise Levels in dBA			
		Daytime hourly average Leq	Daytime hourly average L_{90}	Nighttime hourly average Leq	Nighttime hourly average L_{90}
3a. UCSF Mission Bay Housing Block 20 – No Giants Game Nearby residential receptor 400 feet from the Project site	75	71	61	68	55
3b. UCSF Mission Bay Housing Block 20 – With Giants Game Nearby residential receptor 400 feet from the Project site	75	71	61	68	56

NOTE: See Figure 5.3-1 for noise measurement locations. Nighttime noise levels represented are for the hours between 10:00 p.m. and 12:00 a.m. as the hours most likely to be affected by crowd egress from future events.

SOURCE: Environmental Science Associates, 2014.

SOURCE: Google Maps, ESA, 2014

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E: Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.3-1
Noise Monitoring Locations

The long term measurements were collected over a two-day period reflecting conditions both with and without a San Francisco Giants baseball game occurring at AT&T Park. As indicated in Table 5.3-3, the occurrence of the SF Giants game did not meaningfully affect the noise levels averaged over the 15 daytime hours (7:00 a.m. to 10:00 p.m.) or the 9 nighttime hours (10 p.m. to 7:00 a.m.). Data indicate that the SF Giants game traffic predominantly affects the hour after the end of the game by increasing noise levels approximately 2.9 dBA, while noise levels for the hours prior to the game are not noticeably increased.

5.3.3.3 Vibration Background

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. Several different methods are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe physical vibration impacts on buildings. Typically, groundborne vibration generated by human activities attenuates rapidly with distance from the source of the vibration. Sensitive receptors to vibration include people (especially residents, the elderly, and sick people), structures (especially older masonry structures), and vibration-sensitive equipment.

Another useful vibration descriptor is known as vibration decibels or VdBs. VdBs are generally used when evaluating human response to vibration, as opposed to structural damage (for which PPV is the more commonly used descriptor). Vibration decibels are established relative to a reference quantity, typically 1×10^{-6} inches per second.[8]

Sources of vibration in the project area primarily consist of Muni streetcars traveling along Third Street. Most motor vehicles and trucks have independent suspension systems that substantially reduce if not eliminate vibration generation, barring discontinuities in the roadway.

5.3.3.4 Sensitive Receptors

Sensitive receptors for noise are generally considered to include hospitals, nursing homes, senior citizen centers, schools, churches, libraries, and residences. The sensitive receptors nearest to the project site are residential and hospital uses, as identified in **Table 5.3-4**. The nearest library to the project site is 1,300 feet away on Owens Street; the nearest church is 3,100 feet away, and the closest school (El-Hi) is 2,800 feet away. The future Mission Bay school site is 1,900 feet away.

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[8] Federal Transit Administration, Transit Noise and Vibration Impact Assessment, 2006.

TABLE 5.3-4
SENSITIVE NOISE RECEPTORS IN THE PROJECT AREA

Receptor Type	Distance from Project Area
Residential: UCSF Mission Bay Housing Block 20 (Hearst Tower)	200 feet northwest
Residential: Madrone Mission Bay Residential Towers	800 feet to the north, on Mission Bay Boulevard North
UCSF Hospital: UCSF Benioff Children's Hospital facility at Mission Bay, plus the UCSF Betty Irene Moore Women's Hospital and the UCSF Bakar Cancer Hospital	560 feet to the southwest of the proposed Project

SOURCE: Environmental Science Associates, 2014.

5.3.4 Regulatory Framework

5.3.4.1 Federal Regulations

HUD Noise Abatement and Control

The U.S. Department of Housing and Urban Development (HUD) environmental noise regulations are set forth in 24 CFR, Part 51, Subpart B, Noise Abatement and Control. According to the regulations, "It is HUD's general policy to provide minimum national standards applicable to HUD programs to protect citizens against excessive noise in their communities and places of residence."[9] These regulations include criteria for assessing whether a HUD project is suitable for a particular site, given the background noise levels. HUD has defined the suitability of a site for new housing construction based on existing noise levels as follows:

- Acceptable—65 dB day-night average sound level (DNL) or less;
- Normally unacceptable—Exceeding 65 dB DNL but not exceeding 75 dB DNL; and
- Unacceptable—Exceeding 75 dB DNL.

The HUD regulations also include a goal (not a standard) that interior noise levels not exceed 45 dB DNL.[10] Sound attenuating features such as barriers or sound attenuating building materials shall be used to achieve the interior noise goal where feasible. Standard building construction generally provides 20 dB DNL of sound attenuation; therefore, if the exterior noise environment is classified as "acceptable," according to HUD standards, the interior noise environment should not exceed 45 dB DNL. The HUD regulations also encourage the use of quieter construction equipment and methods.[11]

9 HUD, Noise Abatement and Control, 24 CFR, Part 51, Subpart B.
10 24 CFR, Section 51.103(c)
11 24 CFR, Section 51.101(7)

Federal Aviation Administration

The Federal Aviation Administration (FAA) develops noise exposure maps that use average annual DNL noise contours around the airport as the primary noise descriptor. The FAA states that all land uses are considered compatible when aircraft noise effects are less than 65 decibels (dB) DNL. San Francisco International Airport is approximately seven miles south, and Oakland International Airport is approximately nine miles east, of the project site. The project site is outside the 55 dB CNEL noise contour of both airports.[12]

5.3.4.2 State Regulations

State regulations include requirements for the construction of new hotels, motels, apartment houses, and dwellings other than detached single-family dwellings that are intended to limit the extent of noise transmitted into habitable spaces. These requirements are collectively known as the California Noise Insulation Standards and are found in Title 24 of the California Code of Regulations.

The State of California updated its Building Code requirements with respect to sound transmission, effective January 2014. Section 1207 of the California Building Code (Title 24 of the California Code of Regulations) establishes material requirements in terms of sound transmission class (STC) [13] rating of 50 for all common interior walls and floor/ceiling assemblies between adjacent dwelling units or between dwelling units and adjacent public area. The previous code requirements (before 2014) set an interior performance standard of 45 dBA from exterior noise sources. This requirement will be re-instated in July of 2015.

5.3.4.3 Local Regulations

San Francisco General Plan

Land Use Compatibility Guidelines for Community Noise

The Environmental Protection Element of the *San Francisco General Plan* contains Land Use Compatibility Guidelines for Community Noise.[14] These guidelines, which are similar to but differ somewhat from state guidelines promulgated by the Governor's Office of Planning and Research, indicate maximum acceptable exterior noise levels for various newly developed land uses. The City's guidelines, which are presented in **Figure 5.3-2**, indicate exterior noise levels that might be inappropriate for sensitive land uses and would therefore require additional noise insulation considerations beyond standard practices. Though this figure presents a range of noise

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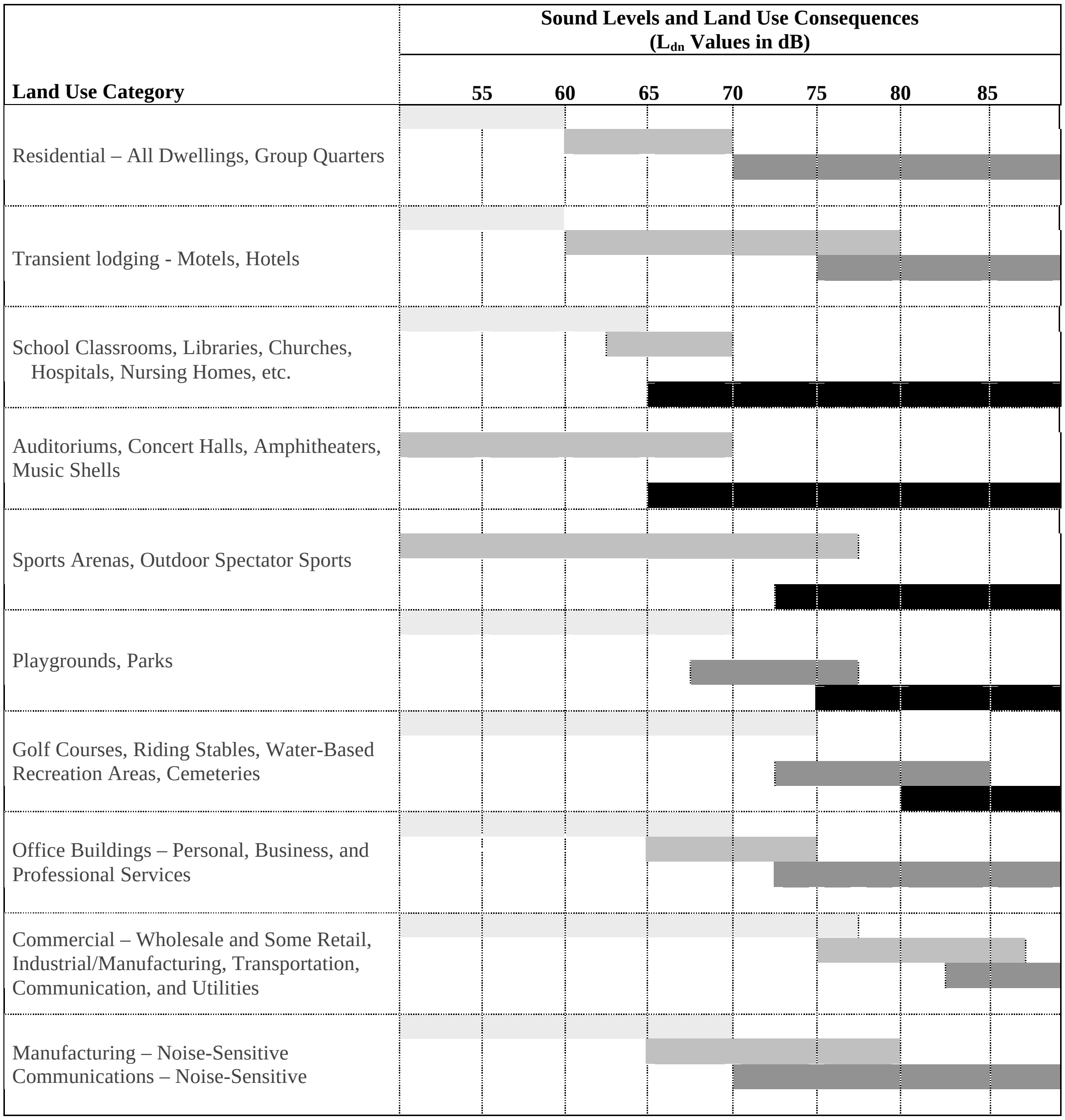
[12] San Francisco International Airport, Aircraft Noise Abatement Office, Mapping Tools, Internet Web Site: http://www.flyquietsfo.com/mapping_tools.asp, Accessed July 9, 2013, and Oakland International Airport, Fourth Quarter 2008 Noise Contours. Internet website: http://www2.oaklandairport.com/noise/pdfs/2008_Annual_Noise_Contour_Map.pdf, accessed July 9, 2013, March 2009.

[13] The STC is used as a measure of a materials ability to reduce sound. The STC is equal to the number of decibels a sound is reduced as it passes through a material.

[14] City and County of San Francisco, *San Francisco General Plan*, adopted on June 27, 1996, http://www.sf-planning.org/ftp/General_Plan/index.htm, accessed July 9, 2013.



Satisfactory, with no special noise insulation requirements.

New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design.

New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

New construction or development should generally not be undertaken.

SOURCE: San Francisco, 1996.
San Francisco General Plan,
adopted on June 27, 1996

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.3-2
San Francisco Land Use Compatibility Chart for Community Noise

levels that are considered compatible or incompatible with various land uses, the maximum "satisfactory" noise level is 60 dBA (DNL) for residential and hotel uses; 65 dBA (DNL) for school classrooms, libraries, churches, and hospitals; 70 dBA (DNL) for playgrounds, parks, office buildings, retail commercial uses, and noise-sensitive manufacturing/communications uses; and 77 dBA for other commercial uses such as wholesale, some retail, industrial/manufacturing, transportation, communications, and utilities. If these uses are proposed to be located in areas with noise levels that exceed these guidelines, a detailed analysis of noise reduction requirements will normally be necessary prior to final review and approval.

Noise-Related Policies

The following policies of the *San Francisco General Plan* Environmental Protection Element that relate to noise issues are relevant to the proposed project:

> ***Policy 10.1*:** Promote site planning, building orientation and design and interior layout that will lessen noise intrusion. Because sound levels drop as distance from the source increases, building setbacks can play an important role in reducing noise for the building occupants. Buildings sited with their narrower dimensions facing the noise source and sited to shield or be shielded by other buildings also help reduce noise intrusion. Although walls with no windows or small windows cut down on noise from exterior sources, in most cases it would not be feasible or desirable to eliminate wall openings. However, interior layout can achieve similar results by locating rooms whose use require more quiet, such as bedrooms, away from the street noise.

> ***Policy 10.2*:** Promote the incorporation of noise insulation materials in new construction. State-imposed noise insulation standards apply to all new residential structures except detached single-family dwellings. Protection against exterior noise and noise within a building is also important in many nonresidential structures. Builders should be encouraged to take into account prevailing noise levels and to include noise insulation materials as needed to provide adequate insulation.

> ***Policy 11.1*:** Discourage new uses in areas in which the noise level exceeds the noise compatibility guidelines for that use. New development should be examined to determine whether background and/or thoroughfare noise level of the site is consistent with the guidelines for the proposed use. If the noise levels for the development site….exceed the sound level guidelines established for that use, as shown in the accompanying land use compatibility chart, then either needed noise insulation features should be incorporated in the design or else the construction or development should not be undertaken.

> ***Policy 11.3*:** Locate new noise-generating development so that the noise impact is reduced. Developments which will bring appreciable traffic into or through noise-sensitive areas should be discouraged, if there are appropriate alternative locations where the noise impact would be less. For those activities—such as a hospital—that need a quiet environment, yet themselves generate considerable traffic, the proper location presents a dilemma. In those cases, the new development should locate where this traffic will not present a problem and, if necessary, incorporate the proper noise insulation.

San Francisco Noise Ordinance

In San Francisco, regulation of noise is stipulated in Article 29 of the Police Code (Regulation of Noise), which states that the City's policy is to prohibit unnecessary, excessive, and offensive noises from all sources subject to police power. Sections 2907 and 2908 of Article 29 regulate construction equipment and construction work at night, while Section 2909 provides for limits on stationary-source noise from machinery and equipment. Sections 2907 and 2908 are enforced by the Department of Building Inspection, and Section 2909 is enforced by the Department of Public Health. Summaries of these and other relevant sections are presented below.

Sections Regulating Construction Noise

Sections 2907(a) and (b) of the Police Code state that it shall be unlawful for any person, including the City and County of San Francisco, to operate any powered construction equipment, regardless of age or date of acquisition, if the operation of such equipment emits noise at a level in excess of 80 dBA when measured at a distance of 100 feet from such equipment, or an equivalent sound level at some other convenient distance. Exemptions from this requirement include:

- Impact tools and equipment with intake and exhaust mufflers recommended by the manufacturers and approved by the Director of Public Works as best accomplishing maximum noise attenuation; and

- Pavement breakers and jackhammers equipped with acoustically attenuating shields or shrouds recommended by the manufacturers and approved by the Director of Public Works as best accomplishing maximum noise attenuation.

Section 2908 prohibits any person, between the hours of 8:00 p.m. of any day and 7:00 a.m. of the following day, from erecting, constructing, demolishing, excavating for, altering, or repairing any building or structure if the noise level created is in excess of the ambient noise level by 5 dBA at the nearest property line unless a special permit has been applied for and granted by the Director of Public Works.

Sections Regulating Operational Noise

Section 2909 establishes a not-to-exceed noise standard for fixed sources of noise, such as building mechanical equipment and industrial or commercial processing machinery. Unlike the state building code (Title 24) standard, which is applicable to interior living space only, the standards in Section 2909(a), (b), and (c) are applicable outdoors, at the property line of the affected use, and vary based on the residential or commercial nature of the noise generator's use. For example, the noise limits for commercial and industrial properties (Section 2909(b)) provide that no person shall produce or allow to be produced a noise level more than 8 dBA above the local ambient level at the property plane. If the noise generated from commercial and industrial properties is generated from a licensed place of entertainment or other location subject to regulation by the Entertainment Commission, such use shall not produce or allow to be produced a noise level more than 8 dBC[15] above the local ambient level at the property plane in addition to the 8 dBA standard.

[15] C-weighted decibels include low-frequency sounds that are more common to amplified sound/concerts.

For noise generated by residential properties, the noise limits are 5 dBA above the ambient level at any point outside of the property plane of a residential use. The noise limits for public property provide that no person shall produce a noise level more than 10 dBA above the local ambient level at a distance of 25 feet or more on public property.

As is common for noise standards, the permitted noise level for fixed residential interior noise limits identified in Section 2909(d) is lower at night than during the day. For example, maximum noise levels at any sleeping or living room in any dwelling unit located on residential property must not exceed 45 dBA between 10:00 p.m. and 7:00 a.m., and 50 dBA between 7:00 a.m. and 10:00 p.m. None of the noise limits set forth in this section apply to activity for which the City and County of San Francisco has issued a permit that contains noise limit provisions that are different from those set forth in this article. Additionally, the Directors of Public Health, Public Works, or Building Inspection, or the Entertainment Commission, or the Chief of Police may grant variances to noise regulations, over which they have jurisdiction pursuant to Section 2916.

Article 1, Section 47.2 of the Police Code regulates the use of any sound amplifying equipment, whether truck-mounted or otherwise, within the City and County of San Francisco and consists of the following regulations:

1. The only sounds permitted are music or human speech.

2. Hours of operation permitted shall be between 9:00 a.m. and 10:00 p.m.; operation after 10:00 p.m. is permitted only at the location of a public event or affair of general public interest or as otherwise permitted by the Entertainment Commission.

3. Except as permitted by the Entertainment Commission, sound shall not be issued within 450 feet of hospitals, schools, churches, courthouses, public libraries, or mortuaries.

4. No sound truck with its amplifying device in operation shall traverse any one block in the City and County more than four times in any one calendar day.

5. Amplified human speech and music shall not be unreasonably loud, raucous, jarring, or disturbing to persons of normal sensitiveness within the area of audibility, nor louder than permitted in Subsections (6) and (7) hereof.

6. When the sound truck is in motion, the volume of sound shall be controlled so that it will not be audible for a distance in excess of 450 feet from its source; provided, however, that when the sound truck is stopped by traffic, the said sound amplifying equipment shall not be operated for longer than one minute at such a stop.

7. Except as permitted by the Entertainment Commission for public gatherings, in all cases where sound amplifying equipment remains at one location or when the sound truck is not in motion, the volume of sound shall be controlled so that it will not be audible for a distance in excess of 250 feet from the periphery of the attendant audience.

8. No sound amplifying equipment shall be operated unless the axis of the center of any sound reproducing equipment used shall be parallel to the direction of travel of the sound truck; provided, however, that any sound reproducing equipment may be so placed upon said sound truck as to not vary more than 15 degrees on either side of the axis of the center of the

> direction of travel and, provided further, that radial, nondirectional type of loudspeakers may be used on said sound trucks either alone or in conjunction with sound reproducing equipment placed within 15 degrees of the center line of the direction of travel.

San Francisco Entertainment Commission Permits

Section 90.1 of the San Francisco Administrative Code establishes the role of the San Francisco Entertainment Commission to regulate, promote and enhance the field of entertainment in San Francisco. The seven-member commission has powers to accept, review, and gather information to conduct hearings for entertainment-related permit applications and rule upon and issue, deny, condition, suspend, revoke or transfer entertainment-related permits in accordance with applicable laws and regulations. Additionally, the Entertainment Commission plans and coordinates the provision of City services for major events for which there is no recognized organizer, promoter, or sponsor.

The Entertainment Commission has permit authority over a variety of different permit types including Place of Entertainment permits, Outdoor Amplified Sound/Loudspeaker permits, and Limited Live Performance permits. Permit hearings require the applicant to provide proof of neighborhood outreach to the Commission. Such outreach must consist of at least two of four types of outreach: (1) presentation to a neighborhood, community or residential group; (2) presentation to the leadership of a local not-for-profit that deals with community support such as housing, at risk youth, health, or mental services; (3) a petition including an appropriate number of neighbor signatures according to the applicants business address; and/or (4) presentation to a business association if no community organization or not-for-profit exists near the venue.

The Commission also establishes Good Neighbor Policies for entertainment venues within the City. Applicable policies may include public notices urging patrons to leave the establishment and neighborhood in a quiet fashion, provision of employees at exit points, provision of adequate ventilation within venues, operation consistent with the requirements of San Francisco Municipal Code Sections 49 and 2900, and provision of a neighborhood liaison to address noise complaints.

Mission Bay Good Neighbor or Construction Noise Policy

The Mission Bay Good Neighbor Policy regarding construction noise is a standard policy of the Office of Community Investment and Infrastructure (OCII) that applies to all development within the Mission Bay Redevelopment Plan area. It specifies that:

> Pile driving or other extreme noise-generating activity (80 dBA at a distance of 100 feet) shall be limited to 8:00 a.m. to 5:00 p.m., Monday through Friday. No pile driving or other extreme noise-generating activity is permitted on Saturdays, Sundays, and holidays. Requests for pile driving on Saturdays may be considered on a case-by-case basis by the Office of Community Investment and Infrastructure (OCII) with approval at the sole discretion of the OCII Executive Director.

City holidays recognized under this policy include New Years Day, Dr. Martin Luther King Jr. Day, President's Day, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day, the day after Thanksgiving, and Christmas Day.

5.3.5 Impacts and Mitigation Measures

5.3.5.1 Significance Thresholds

For the impacts analyzed in this section, the project would have a significant impact related to noise and vibration if it were to:

- Result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;
- Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;

The complete list of CEQA significance criteria used in the noise analysis is included in the Initial Study (see Appendix NOP-IS, page 59), which also explains that criteria related to public airports are not applicable to the proposed project and why the proposed project would not be substantially affected by existing noise levels. No further analysis of these subjects is presented in this section. However, the potential impacts of noise from the operation of the private helipad at the UCSF hospital are addressed with regard to potential impacts on the project.

5.3.5.2 Approach to Analysis

Methodology for Analysis of Direct Impacts

Construction Impact Methodology – Noise

To assess potential short-term construction noise impacts, sensitive receptors and their relative exposure (considering structural barriers and distance) were identified. Combined intermittent noise levels from the simultaneous operation of onsite equipment expected to be used in project construction were estimated based on equipment noise data published by the Federal Highway Administration (FHWA), as shown in **Table 5.3-5**. The sources assessed were identified by the project sponsor as likely equipment to be used during project construction. The roadway noise construction model of the FHWA was then used to predict noise levels at the nearest receptors during both pile driving activity and non-impact construction activity.

Proposed construction activities would be required to comply with the San Francisco Noise Ordinance and the Mission Bay Good Neighbor Construction Noise Policy. The San Francisco Noise Ordinance prohibits construction activities between 8:00 p.m. and 7:00 a.m. and limits noise from any individual piece of construction equipment, except impact tools approved by the Department of Public Works, to 80 dBA at 100 feet. The Mission Bay Good Neighbor Construction Noise Policy limits pile driving or other extreme noise generating activity (80 dBA at a distance of

TABLE 5.3-5
TYPICAL NOISE LEVELS FROM CONSTRUCTION EQUIPMENT

Construction Equipment	Noise Level (dBA, Lmax at 50 feet)
Dump Truck	76
Air Compressor	78
Street Sweeper	82
Excavator	81
Scraper	84
Loader	79
Tractor/Dozer	82
Rapid Impact Compactor[a]	90
Auger Drill Rig	84
Crane, Mobile	81
Forklift[b]	84
Concrete saw	90
Grout-mixing Plant (pump)	81
Grandall Forklift	83
Concrete Mixer	79

NOTES:
[a] From Dietmar, et.al., Rapid Impact Compactor – An Innovative Dynamic Compaction Device for Soil Improvement, 2007.
[b] From Ventura County Construction Noise Threshold Criteria and Control Plan, 2010.

SOURCE: Federal Highway Administration, *Roadway Construction Noise Model User Guide*, 2006.

100 feet) to 8:00 a.m. to 5:00 p.m., Monday through Friday. As long as project construction activities comply with the noise ordinance, construction noise impacts from non-impact equipment would be considered less than significant. If construction activities using non-impact equipment would exceed these standards and the restrictions of the Mission Bay Good Neighbor Policy, then the noise effects would be potentially significant and mitigation measures would be required. The San Francisco Noise Ordinance does not identify any quantitative noise limit standard for impact equipment. To assess the potential impacts related to rapid impact compaction, this analysis employs the general construction noise assessment methodology and criteria suggested by the Federal Transit Administration (FTA).[16] This guidance identifies a 1-hour L_{eq} of 90 dBA for daytime and 80 dBA for nighttime construction noise exposure at residential uses. Commercial and industrial land use exposure to construction noise of 100 dBA is suggested as an assessment criterion.

In addition to the above criteria, to determine if the proposed project would result in a substantial temporary increase in noise levels in the project vicinity above levels existing without the project, persistent construction equipment noise related to an increase of 10 dBA over the existing noise

[16] U.S. Department of Transportation, Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment, May 2006.

levels would represent a perceived doubling of loudness and is considered a substantial temporary increase in noise levels warranting implementation of construction noise control measures. Consistent with FTA and FHWA methodology, this increase in construction noise is assessed relative to an hourly L_{eq} and also accounts for equipment percentage uses as inventoried by FHWA.

Construction Impact Methodology –Vibration

Vibration impacts are considered significant if they would either result in levels substantial enough to result in damage to nearby structures or buildings, or result in vibration levels generally accepted as an annoyance to sensitive land uses. Groundborne noise occurs when vibrations transmitted through the ground result in secondary radiation of noise. Groundborne noise is generally associated with transit trains through tunnels and underground blasting activities, neither of which is proposed as part of this project, and therefore, this analysis is focused on groundborne vibration.

The local regulations of the affected jurisdictions in the project area do not address vibration or provide numerical thresholds for identifying groundborne vibration impacts. In the absence of local regulatory significance thresholds for vibration from construction equipment, this evaluation uses the Caltrans-identified peak particle velocity (PPV) thresholds for adverse human reaction and risk of architectural damage to buildings. For adverse human reaction, this analysis applies the "strongly perceptible" threshold of 0.1 inches per second (in/sec) PPV.[17] For building damage, the threshold depends on the architectural characteristics of the potentially affected structure (see **Table 5.3-6**).

TABLE 5.3-6
CALTRANS GUIDELINE VIBRATION DAMAGE POTENTIAL THRESHOLD CRITERIA

Structure Type and Condition	Transient Vibration Sources[a]	Continuous Frequent Intermittent Vibration Sources[b]
	Maximum Peak Particle Velocity (PPV), inches per second (in/sec)	
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

NOTES:
[a] Transient sources create a single isolated vibration event, such as blasting or drop balls.
[b] Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

SOURCE: Caltrans, 2013.

[17] Caltrans, *Transportation and Construction Vibration Guidance Manual*, September 2013.

Operational Impact Methodology

Operational noise issues evaluated in this section include (1) noise generated by automobile and bus traffic that would occur during typical daily conditions with the project and during event conditions; and (2) compatibility of potential future uses with San Francisco Land Use Compatibility Guidelines for Community Noise. Traffic noise modeling was completed using the Federal Highway Administration Traffic Noise Model.

Traffic noise level significance is determined by comparing the increase in noise levels (traffic contribution only) to increments recognized by Caltrans as representing a perceptible increase in noise levels. Additionally, it is widely accepted methodology by both FTA[18] and the Federal Interagency Committee on Noise (FICON)[19] that thresholds should be more stringent for environments that are already noise impacted. Consequently, for noise environments where the ambient noise level is 65 dBA DNL or less, the significance threshold applied is an increase of 5 dBA or more, which Caltrans recognizes as a readily perceptible increase. In noise environments where the ambient noise level exceeds 65 dBA DNL, the significance threshold applied is an increase of 3 dBA or more, which Caltrans recognizes as a barely perceptible increase.[20]

Operational noise from non-transportation sources such as egress of patrons from events or sound amplification equipment in common areas are assessed based on noise increases of 8 dBA (for noise generated by commercial uses) over existing ambient (L_{90}) levels and any applicable restrictions of the City's noise ordinance and Police Code. Although these operational noise increases would be of limited duration, they would be expected to occur throughout the life of the project and are therefore considered permanent changes in noise conditions.

The proposed project would not introduce new operational vibration sources (e.g., impact equipment, streetcar and rail operations, and blasting activities), and therefore, there would be no operational vibration impacts, and operational vibration is not discussed further.

Methodology for Analysis of Cumulative Impacts

Cumulative Construction Impact Methodology

Cumulative construction noise impacts are assessed by review of the cumulative project list for proposed projects that could be constructed at the same time as the proposed project and are within close enough proximity (within 1,000 feet) to make a meaningful contribution to the construction noise impact of the proposed project. An approximation is made of the cumulative construction sound levels based on the Roadway Noise Construction Model and compared to FTA criteria for construction discussed above.

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18 Ibid.

19 Federal Interagency Committee on Noise, Federal Agency Review of Selected Airport Noise Analysis Issues, August 1992.

20 Caltrans, *Technical Noise Supplement to the Traffic Noise Analysis Protocol*, September 2013, p. 2-44.

Cumulative Operations Impact Methodology

Cumulative operational noise impacts are assessed by modeling cumulative plus project roadside noise levels and comparing the results with existing modeled roadside noise levels and to Caltrans perceptibility criteria discussed above.

5.3.5.3 Impact Evaluation

Project Impacts: Construction

Impact NO-1: Construction of the proposed project would not cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. (Less than Significant)

Construction activities for the proposed project are expected to occur over a 26-month period between 2015 and 2017. Construction phases would include demolition, site preparation, excavation and soil stabilization, augering and casting of piles, placement of infrastructure, placement of foundations for structures, and fabrication of structures. Demolition and construction activities would require the use of heavy trucks, material loaders, cranes, concrete saws, and other mobile and stationary construction equipment listed in Table 5.3-5 above. Piles would be cast in place into augured holes and would not require use of an impact or vibratory pile driver.

Other Construction Activities. Soil stabilization of the project site would involve rapid impact compaction. Rapid impact compaction is a ground improvement technique that densifies shallow, loose granular soils, using a hydraulic hammer which repeatedly strikes an impact plate. The energy is transferred to the underlying loose granular soils and rearranges the particles into a denser configuration. The impact locations are typically located on a grid pattern, the spacing of which is determined by the subsurface conditions and foundation loading and geometry.

Other construction activities such as general building construction would be less noise intrusive, involving cranes, forklifts saws, and nail guns. Trucks would be used to off-haul demolition wastes, which would also marginally increase hourly noise levels on Third Street, Mariposa Street, and Caesar Chavez Street.

Effect on Sensitive Receptors. Construction noise would be similar in magnitude to existing L_{eq} noise levels along Third Street, which are elevated due to relatively high traffic volumes on Third Street, operations of the Muni light rail line, and ongoing construction in the area, but greater than existing L_{eq} noise levels along the waterfront. However, land uses along the waterfront are recreational and are not considered noise-sensitive land uses. Thus, temporary construction noise impacts would not cause substantial increase in noise levels at nearby sensitive receptors; this impact would be *less than significant*.

Demolition/Mass Excavation. Demolition and mass excavation activities at the project site would involve three excavators, three loaders, three scrapers, and two bulldozers as well as two street sweepers and trucks to off-haul material. Noise levels at surrounding sensitive receptors from simultaneous operation of this equipment were calculated using the Roadway Noise

Construction Model. **Table 5.3-7** presents the resultant noise levels at each of the receptors. As can be seen from the Table 5.3-7, the contribution of excavation noise at residential receptors and the hospital would be less than 10 dBA over existing levels.

TABLE 5.3-7
NOISE LEVELS FROM CONSTRUCTION ACTIVITIES AT SENSITIVE RECEPTORS IN THE PROJECT AREA

	Noise Levels in dBA (Hourly Leq)					
Location	**Existing Leq**	**Mass Excavation**	**Compaction**	**Pile Installation**	**Shoring**	**Building Construction**
1. Madrone Mission Bay Residential Towers Nearby residential receptor 800 feet north of project site	70.1	63.8	64.0	67.7	61.6	66.0
2. UCSF Mission Bay Housing (Hearst Tower) Nearby residential receptor 200 feet from the project site	71.2	75.9	75.7	79.8	73.6	78.0
3. UCSF Hospital Nearby receptor 560 feet from the project site	67.0	66.9	66.8	70.8	64.6	69.1

NOTE: See Figure 5.3-1 for noise measurement locations. L_{eq} represents the constant sound level

SOURCE*:* Environmental Science Associates, 2015.

Rapid Impact Compaction. Construction of the proposed project would involve use of rapid impact compaction to stabilize soils on the project site. Up to three tractors with compactor attached could operate at a given time over a 3-month period. Using an estimated noise level of 90 dBA,[21] a mounted impact hammer (which is also rated at 90 dBA) was used as a proxy in the Roadway Noise Construction Model to estimate noise levels from simultaneous operation of the compactors. As can be seen from the Table 5.3-7, the contribution of compaction noise at residential receptors and the hospital would be less than 10 dBA over existing levels. Actual noise levels would likely be up to 10 dBA less than indicated in the table, as compaction would occur within an excavation pit and surrounding earth walls would provide additional attenuation of compaction noise, particularly at the western site perimeter where excavation would be deepest. Predicted noise levels from impact compaction would also be less than 80 dBA at any residential receptor and less than 100 dBA at any commercial receptor, which are thresholds suggested by FTA guidance and applied here for impact equipment (since they are not subject to the noise limit restrictions of the San Francisco construction noise ordinance).

[21] Dietmar, et.al., *Rapid Impact Compactor – An Innovative Dynamic Compaction Device for Soil Improvement*, June 2007.

Pile Installation. Piles for the proposed project would not be driven with an impact hammer, but rather cast in place with drilled auger holes. Pile installation activities at the project site would involve four drill rigs, four crawler cranes, two forklifts, four excavators, and concrete saws. Noise levels at surrounding sensitive receptors from simultaneous operation of this equipment were calculated using the Roadway Noise Construction Model. As can be seen from Table 5.3-7, the contribution of pile installation noise at residential receptors and the hospital would be less than 10 dBA over existing levels.

Shoring. Shoring activities at the project site would involve two drill rigs, cranes, two grout mixing plants, and two excavators. Noise levels at surrounding sensitive receptors from simultaneous operation of this equipment were calculated using the Roadway Noise Construction Model. As can be seen from Table 5.3-7, the contribution of shoring activity noise at residential receptors and the hospital would be less than 10 dBA over existing levels.

Building Construction. Building construction at the project site would involve operation of two concrete pumps, two bobcats, four excavators, eight cranes, eight grandall lifts, and a variety of small tools and equipment (e.g., chop saws, nail guns, etc.). This would be the longest phase of construction, occurring over a 21-month period. As can be seen from Table 5.3-7, the noise contribution of building construction activities at residential receptors and the hospital would be less than 10 dBA over existing levels.

Cumulative Project Construction Noise. The construction schedule indicates that excavation, compaction, pile installation, and shoring activities could take place concurrently during two months of the construction schedule. This would represent the worst case scenario in terms of cumulative construction noise from the project.

However, it would be impossible for all four activities to occur simultaneously at the same location (e.g., the nearest distance to a given receptor) and therefore, the cumulative noise level would not be the acoustical sum of these noise levels. To account for the geographic distribution of these potential simultaneous activities, only the noisiest activity (pile installation, due to the number of pieces of equipment) was assumed to occur at the nearest distance to a given receptor. All other activities were assumed to occur at a farther distance of 200 feet from pile installation activities. This adjustment was only meaningful for receptors No. 2 and 3 which are the closest to the project site. Predicted cumulative project construction noise levels are presented in **Table 5.3-8**, which shows that noise levels from concurrent construction activities would not exceed 10-dBA over the noise level criterion for any receptor. Therefore, this impact would be *less than significant.*

Other Construction Activities. During peak excavation activities, up to 400 truck trips could be generated to and from the site per day. These truck trips would increase hourly noise levels on Third Street, Mariposa Street, and Caesar Chavez Street. Assuming a 10-hour work day, the addition of 40 heavy duty truck trips to the existing peak hour traffic would increase traffic noise contributions by 2.3 dBA along Third Street during peak excavation activities. This would be a *less than significant* contribution to roadway noise levels.

TABLE 5.3-8
CUMULATIVE WORST CASE NOISE LEVELS FROM CONSTRUCTION ACTIVITIES AT SENSITIVE RECEPTORS IN THE PROJECT AREA

	Noise Levels in dBA (Hourly L_{eq})	
Location	**Existing Leq**	**Concurrent Excavation, Compaction, Pile Installation and Shoring Activities**
1. Madrone Mission Bay Residential Towers Nearby residential receptor 800 feet north of project site	70.1	70.9
2. UCSF Mission Bay Housing (Hearst Tower) Nearby residential receptor 200 feet from the project site	71.2	80.8
3. UCSF Hospital Nearby receptor 560 feet from the project site	67.0	72.8

NOTE: See Figure 5.3-1 for noise measurement locations. L_{eq} represents the constant sound level

SOURCE: Environmental Science Associates, 2015.

Summary of Impact NO-1

Construction activities at the project site over a 26-month period would result in temporary increases in noise levels in the project vicinity, which could be noticeable at nearby residential and hospital land uses. Peak cumulative construction activities would occur during a 3-month period in 2015–2016 and during this time, the increase in noise levels over existing conditions would be less than 10 dBA (without mitigation). All other periods of construction would similarly be under 10 dBA. Therefore, this impact would be *less than significant.* Nevertheless, human annoyance associated with the temporary increases in noise levels during construction could be reduced with implementation of **Improvement Measure I-NO-1**, compliance with the Mission Bay Good Neighborhood Construction Noise Policy.

Mitigation: Not required.

Improvement Measure I-NO-1: Mission Bay Good Neighbor Construction Noise Policy

The project sponsor shall comply with the Mission Bay Good Neighbor Policy and limit all extreme noise-generating construction activities to 8:00 a.m. to 5:00 p.m., Monday through Friday. No pile driving or other extreme noise generating activity is permitted on Saturdays, Sundays, and holidays.

Comparison of Impact NO-1 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR identified construction-related noise impact as less than significant with Mission Bay FSEIR Mitigation Measure G.1 to address noise from impact pile driving. Mission Bay FSEIR Mitigation Measure G.1 requires use of noise-reducing pile driving techniques and restricting the hours of operation. Because the proposed project would be installing piles using drilling and cast-in-place techniques, the project would be implementing Mission Bay FSEIR Mitigation Measure G.1 as part of the project, and as described above, construction noise impacts would be less than significant. Thus, Mission Bay FSEIR Mitigation Measure G.1 is neither warranted nor applicable to the proposed project.

Therefore, the project would result in no new or substantially more severe significant impacts related to construction noise than was previously identified in the Mission Bay FSEIR.

Impact NO-2: Construction of the proposed project would not expose people to or generate noise levels in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies. (Less than Significant)

Proposed construction would be required to comply with the San Francisco Noise Ordinance, which prohibits construction activities between 8:00 p.m. and 7:00 a.m. and limits noise from any individual piece of construction equipment, except impact tools approved by the Department of Public Works, to 80 dBA at 100 feet. Table 5.3-5, above, presents the maximum noise levels generated by construction equipment identified by the project sponsor as likely to be used during construction. All non-impact equipment would be consistent with the San Francisco Noise Ordinance. Consequently, the project would not generate noise levels in excess of standards established in the local, noise ordinance, and this impact would be *less than significant*.

Mitigation: Not required.

Comparison of Impact NO-2 to Mission Bay FSEIR Impact Analysis

The construction-related noise impact with respect to consistency with the San Francisco Noise Ordinance was identified as less than significant in the Mission Bay FSEIR. Consequently, the project would result in no new or substantially more severe significant impacts related to consistency with established noise standards than was previously identified.

Impact NO-3: Construction of the proposed project would not expose people and structures to or generate excessive groundborne vibration levels. (Less than Significant)

Groundborne vibration from construction activities that involve impact activities, primarily rapid impact compaction, could produce detectable vibration at nearby sensitive buildings and sensitive receptors unless proper precaution is followed.

There are no adopted state or local policies or standards for groundborne vibration. Vibration intensity is expressed as peak particle velocity (PPV), the maximum speed at which the ground moves while it temporarily shakes. Since groundshaking speeds are very slow, PPV is measured in inches per second. The average person is quite sensitive to ground motion and levels as low as 0.02 inch per second can be detected by the human body when background noise and vibration levels are low and levels of 0.1 inches per second are considered "strongly perceptible." The Federal Transit Administration has published guidance relative to vibration impacts (see

Table 5.3-6, above). According to Caltrans, new structures can be exposed to groundborne vibration PPV levels of up to 0.5 inch per second without experiencing structural damage.[22]

Building Damage

Rapid impact compaction activities are proposed during the first two to three months of construction. The magnitude of vibration caused by rapid impact compaction is a function of distance from the receptor or structure of concern and the nature of surrounding soils. Groundborne vibration from activities that involve impact tools could produce significant vibration. A recent study of vibration induced by rapid impact compaction indicates that compliance with a safe level of vibration with respect to building damage can be achieved provided that the activity occur no closer than 10 meters (33 feet) from a structure.[23] The nearest structure north, across South Street, and to the south, across 16th Street would be located farther than 75 feet away, while the nearest structure to the west would be over 100 feet away. Consequently, proposed compaction activities would result in *less than significant* vibration impacts with respect to building damage.

Human Annoyance

Vibration levels can also result in interference or annoyance impacts at residences or other land uses where people sleep, such as hotels and hospitals. Vibration impact criteria published by Caltrans relative to these land uses are stated in terms of PPV, in inches per second. For adverse human reaction, this analysis applies the "strongly perceptible" threshold of 0.1 inches per second PPV.[24]

The closest residence would be the UCSF Mission Bay Housing (Hearst Tower), approximately 200 feet from the project site while the nearest hospital would be approximately 560 feet away. A recent study of vibration induced by rapid impact compaction indicated that at a distance of 30 meters (100 feet), cumulative vibration energy results in maximum vibration level of 2.3 millimeters per second (0.09 inches per second).[25] Because sensitive land uses would be more than 100 feet away, worst-case cumulative vibration levels generated by rapid impact compaction would be below the strongly perceptible threshold. Therefore, due to the distance of receptors from the project site, impacts from vibration with respect to human annoyance would be *less than significant*.

Vibration-Sensitive Equipment

Land uses with operations that could be considered to have high sensitivity to vibrations include vibration-sensitive research and manufacturing, hospitals with vibration-sensitive equipment, and university research operations. The degree of sensitivity to vibration depends on the specific

[22] Caltrans, *Transportation and Construction Vibration Guidance Manual*, September 2013.
[23] Lauzon, Marc et.al., *Ground Vibrations Induced by Dynamic compaction and Rapid Impact Compaction*; submittal to the 2011 CGS Geotechnical Conference, 2011.
[24] Caltrans, *Transportation and Construction Vibration Guidance Manual*, September 2013
[25] Lauzon, Marc et.al., *Ground Vibrations Induced by Dynamic compaction and Rapid Impact Compaction*; submittal to the 2011 CGS Geotechnical Conference, 2011.

equipment that would be affected by the vibration as well as on the design of the specific building in which the equipment is located. Equipment such as electron microscopes and high resolution lithographic equipment can be very sensitive to vibration, and even normal optical microscopes can sometimes be difficult to use when vibration is well below the human annoyance level. Existing medical or research uses adjacent to the project site that contain vibration-sensitive equipment could experience vibration levels during construction that exceed 0.008 inches per second (65 VdB) and potentially disturb the operation of sensitive medical equipment. As discussed in the 1998 FSEIR, construction vibration effects on sensitive equipment would be a concern for users of research buildings and could be an inconvenience. However, these users are not considered sensitive receptors, and therefore, construction vibration effects are not considered a significant environmental effect under CEQA. Nevertheless, human annoyance associated with the temporary increases in noise levels during construction could be reduced with implementation of **Improvement Measure I-NO-2**, Neighbor Notification of Vibration-Inducing Construction Operations.

Summary of Impact NO-3

Rapid impact compaction during construction at the project site would not result in excessive vibration levels that would result in structural damage or human annoyance at nearby structures or at residential or hospital receptors. All other construction activity would generate lesser vibration levels and project construction vibration-related impacts would be *less than significant*. However, implementation of Improvement Measure I-NO-3, Neighbor Notification of Vibration-Inducing Construction Operations, could reduce the temporary human annoyance associated with land uses involving vibration-sensitive equipment during construction.

Mitigation: Not required.

Improvement Measure I-NO-3: Neighbor Notification of Vibration-Inducing Construction Activities

At least one week prior to the start of rapid impact compaction activities, the project sponsor shall notify owners and occupants within 500 feet of the project site of the dates, hours, and expected duration of such activities.

Comparison of Impact NO-3 to Mission Bay FSEIR Impact Analysis

The construction-related vibration impact was identified as less than significant in the Mission Bay FSEIR as a result of modern building design and equipment installation techniques. Similarly, as described above, the proposed project would result in less than significant vibration impacts. Therefore, the project would result in no new or substantially more severe significant impacts related to vibration than was previously identified in the Mission Bay FSEIR.

Project Impacts: Operations

Impact NO-4: Operation of the proposed project could result in exposure of persons to or generation of noise levels in excess of standards established in the *San Francisco General Plan* or San Francisco Noise Ordinance. (Less than Significant with Mitigation)

Operation of the event center and mixed-use development would result in the introduction of new noise sources, both stationary and mobile, to the project area. Stationary noise sources would include the operation of five back-up diesel generators for maintenance purposes and mechanical equipment as well as the operation of public address systems and amplification equipment not only interior to the event center but also for occasional outdoor performances and events at the proposed Third Street plaza. Mobile noise sources would include increased traffic and crowd egress noise on local streets.

The San Francisco Noise Ordinance contains restrictions on noise from stationary sources, whereas noise from mobile sources is regulated at the state and federal level, generally through manufacturer specification requirements. The San Francisco Noise Ordinance does not address or establish restrictions on mobile sources. Therefore, the potential for adverse noise effects from stationary sources is addressed in this impact, which is specific to the standards of the *San Francisco General Plan* or San Francisco Noise Ordinance. The potential impact of mobile source operations generated by the project is addressed below under Impact NO-5 with respect to permanent increases in hourly traffic noise levels in the project vicinity and not in this impact.

This impact also addresses land use compatibility of the proposed office and retail land uses with respect to the noise standards of the *San Francisco General Plan.* The *San Francisco General Plan* establishes land use compatibility standards for land uses throughout the City for determining the compatibility of new land uses with an existing or future noise environment. Additionally, the nearby UCSF Hospital has recently constructed a helipad, the noise impacts of which are addressed as a cumulative impact under Impact C-NO-3, below.

Stationary Noise Sources – Generators and Mechanical Equipment

The project anticipates installing on-site generators capable of providing up to three megawatts (MW) of emergency, standby and optional power to the event center in the case of temporary loss of normal utility power.[26] In addition, each office and retail building would have an on-site generator capable of approximately 0.75 MW, and the proposed food hall would have a generator capable of approximately 0.5 MW, to provide fire and life safety emergency power in the case of temporary loss of normal utility power to those uses.

Section 2909 of the City's Police Code establishes a not-to-exceed noise standard for fixed sources of noise, such as building mechanical equipment and industrial or commercial processing machinery.

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[26] Under such circumstance, the generators would provide power for fire alarms, fire command room, emergency lighting, elevators, smoke control and pressurization, fire pumps, audio system, and certain scoreboard equipment.

Unlike the state building code (Title 24) standard, which is applicable to interior living space only, the standards in Section 2909(a), (b), and (c) are applicable outdoors, at the property line of the affected use, and the standards vary based on the residential or commercial nature of the noise generator's use. The limits for noise generated by commercial and industrial properties such as the proposed project provide that no person shall produce or allow to be produced a noise level more than 8 dBA above the local ambient level at the property plane.

As is common for noise standards, the permitted noise level for fixed residential interior noise limits identified in Section 2909(d) is lower at night than during the day. For example, maximum noise levels at any sleeping or living room in any dwelling unit located on residential property must not exceed 45 dBA between 10:00 p.m. and 7:00 a.m., and 50 dBA between 7:00 a.m. and 10:00 p.m.

Under the proposed project, all emergency generators would be located within the parking structure on Lower Parking Level 1 and would be enclosed within dedicated rooms inside the lower level parking garage. Consequently, engine noise from generator testing is not expected to generate audible noise at receptors located outside of the event center and office structures. With the exception of emergency conditions during which these sources would be exempt from restrictions of the Noise Ordinance, all of these generators would be tested approximately once a week for less than one hour for maintenance purposes.

The majority of the mechanical equipment would be located on the rooftops of each office building tower. All mechanical equipment would be either fully screened or located within a fully enclosed penthouse room enclosure. At the lower levels for the office buildings, mechanical equipment would be located within fully enclosed equipment rooms. For the event center, all mechanical equipment would be located indoors within fully enclosed equipment rooms located on various levels of the building. The only mechanical equipment on the roof would be the cooling tower, which would be fully screened on all four sides. Consequently, all proposed mechanical equipment would be screened and located sufficiently distant from receptors to be operated within the restrictions of the noise ordinance.

Under the proposed project, the generators would be located in a subgrade parking garage at a distance of approximately 300 feet from the nearest existing residential land use and are not expected to increase ambient noise levels because of their protected, subgrade location. Thus, maintenance operations of the backup generators and other mechanical equipment would not result in noise levels in excess of standards established in the *San Francisco General Plan* or San Francisco Noise Ordinance, and the operational noise impacts from generators and other mechanical equipment would be *less than significant*.

Stationary Noise Source – Amplified Sound

For certain events, portions of the proposed outdoor plazas may be equipped with video screens and speakers, which would result in increased sound-level generation. This equipment could operate prior to and/or after some basketball games or events at the event center to generate excitement. In addition, as described in Chapter 3, Project Description, the proposed Third Street plaza would provide opportunities for public gatherings and events that may also involve amplified sound.

Promoters of any proposed outdoor events on the site's outdoor plaza that would use amplified sound or music would be required to obtain a permit from the City prior to the event. Section 1060.1 of the Police Code requires a permit to conduct, operate, or maintain a place of entertainment, limited live performance locale or one-time event within the City and County of San Francisco. Concerts on the plaza would require the promoter to obtain a Limited Live Performance Permit from the San Francisco Entertainment Commission, and this permit process would require a public hearing and include a neighborhood outreach requirement as discussed in the Setting section.

Article 1, Section 47.2 of the Police Code, while generally focused on truck-mounted amplification equipment, regulates the use of <u>any</u> sound amplifying equipment, whether truck-mounted or otherwise. Hours of operation are restricted to between 9:00 a.m. and 10:00 p.m., unless permitted by the San Francisco Entertainment Commission. As basketball games generally start at 7:30 p.m., operation of video screens and speakers on the plazas <u>prior</u> to basketball games would be consistent with these time restrictions of Article 1, Section 47.2. Operation of outdoor speakers on the plaza would require the applicant to obtain an Outdoor Amplified Sound/Loudspeaker Permit from the Entertainment Commission, and this permit process would require a public hearing as discussed in the Setting section. Notwithstanding this consistency with the Police Code, due to the as yet unknown nature of future outdoor events at the project site, the use of amplified sound equipment would still have the potential for *significant* noise impacts in excess of standards established in the San Francisco General Plan or San Francisco Noise Ordinance. Consequently, **Mitigation Measure M-NO-4a (Noise Control Plan for Outdoor Amplified Sound)** is identified to ensure that sound levels generated by amplified equipment would be consistent with Section 2909 of the City's Police Code, which establishes a not-to-exceed (except through a variance) noise standard for fixed sources of noise and from licensed place of entertainment or other location subject to regulation by the Entertainment Commission. For noise generated from a commercial property, the relevant noise limits are 8 dBA above the ambient L_{90} level at any point outside of the property plane of the commercial use. For a Place of Entertainment, the low-frequency dBC criterion would additionally apply, where no noise or music shall exceed the low frequency ambient criterion by more than 8 dBC.

The proposed event center would also host approximately 45 concerts a year, in addition to other events (see Chapter 3, Table 3-3), which would operate amplified sound equipment within the event center. The proposed arena would be considered a place of entertainment and the applicant would be required to obtain a Place of Entertainment permit from the Entertainment Commission, and this permit process would require a public hearing and include a neighborhood outreach requirement as discussed in the Setting section. The Entertainment Commission Good Neighbor Policy for nighttime entertainment activities requires permit holders to provide a cell phone point of contact to all interested neighbors that will be answered at all times by a manager or other responsible person who has the authority to adjust volume and respond to other complaints whenever entertainment is provided. Design of the proposed event center includes layers of doors and an intervening concourse, which would serve to minimize leakage of concert/event noise within the event center to the outside areas. Additionally, the proposed 160-foot office towers with 90-foot podium structure, and the proposed gatehouse building located on the west side of the site would provide a barrier between the event center and sensitive land uses to the northwest and southwest, which would further attenuate any potential leakage of interior concert/event noise. However, due to uncertainties as to the nature and extent of future events within the arena and lack of available details of interior acoustical treatments at the time of this planning-level CEQA review, implementation **of Mitigation Measure M-NO-4b (Noise Control Plan for Place of Entertainment Permit)** would ensure that noise levels from concerts, basketball games, and other events would comply with the noise ordinance, and this impact would be *less than significant with mitigation*.

Noise Exposure of Proposed Event Center and Office Uses

The project proposes development of office and retail land uses, which are generally not considered noise-sensitive uses. Noise monitoring in the project area indicates existing noise levels to be 75 DNL (day-night noise level) at the setback of Third Street (see Table 5.3-3 above). These levels represent the noise exposure levels which the proposed uses at the site would be subject to.

Policy 11.1 of the *San Francisco General Plan* identifies use of sound level guidelines established for a particular land use, as shown in the land use compatibility chart (see Figure 5.3-2, above). For sports event centers, an exterior sound level of 77 DNL or less is conditionally acceptable but that conventional construction with closed windows and fresh air supply systems will normally suffice. For office land uses such as those proposed under the project, the land use compatibility chart indicates that noise exposure of 75 DNL or less is conditionally acceptable but that conventional construction with closed windows and fresh air supply systems will normally suffice. Because both the event center and office and retail buildings would be constructed using modern materials and techniques which include ventilation systems and non-operable windows, these land uses would be consistent with the compatibility standards of the General Plan. Consequently, exposure to noise levels in excess of standards in the local general plan would be *less than significant*.

Summary of Impact NO-4, Operational Noise from Stationary Sources

Operation of the proposed project would introduce new stationary noise sources that would be subject to the requirements of the San Francisco Noise Ordinance. These new sources include generators and mechanical equipment, as well as the potential for amplified sound within the Third Street plaza. Due to the proposed enclosed and subgrade location for generators, enclosed location for majority of the event center mechanical equipment, and the rooftop locations and proposed mechanical screens for mechanical equipment for the office and retail buildings, predicted noise levels from proposed new stationary sources would not meaningfully contribute to the existing monitored ambient noise levels in the project area, and the project would therefore be consistent with the restrictions of the noise ordinance.

The proposed project would also introduce new land uses, and these new uses would be exposed to noise levels of up to 75 DNL. However, modern building techniques and materials as well as inclusion of non-operable windows and ventilation systems would be sufficient to ensure that the project would comply with land use compatibility requirements of the *San Francisco General Plan*, and this impact would be less than significant.

With respect to amplified sound, either interior to the event center or in open-air plazas on the project site, the predicted sound levels and hours of occurrence would be consistent with the noise ordinance. However, due to uncertainties as to the nature and extent of future outside events at the Third Street plaza, implementation **of Mitigation Measure M-NO-4a (Noise Control Plan for Outdoor Amplified Sound)** would ensure that noise levels from amplified sound exterior to the event center would comply with the noise ordinance. In addition, implementation of **Mitigation Measure M-NO-4b, Noise Control Plan for Place of Entertainment Permit,** would ensure that noise levels from concerts, basketball games, and other events would comply with the noise ordinance, regardless of current unknowns as to the nature of future events within the arena. Therefore, this impact would be *less than significant with mitigation*.

Mitigation Measure M-NO-4a: Noise Control Plan for Outdoor Amplified Sound

The project sponsor shall develop and implement a Noise Control Plan for operations at the proposed entertainment venues to reduce the potential for noise impacts from public address and/or amplified music. This Noise Control Plan shall contain the following elements:

- The project sponsor shall comply with noise controls and restrictions in applicable entertainment permit requirements for outdoor concerts.
- Speaker systems shall be directed away from the nearest sensitive receptors to the degree feasible.
- Outdoor speaker systems shall be operated consistent with the restrictions of Section 2909 of the San Francisco Police Code, and conform to a performance standard of 8 dBA and dBC over existing ambient L_{90} noise levels at the nearest residential use.

Mitigation Measure M-NO-4b: Noise Control Plan for Place of Entertainment Permit

As part of the Place of Entertainment Permit process, the project sponsor shall develop and implement a Noise Control Plan for operations at the proposed entertainment venue to reduce the potential for noise impacts from interior event noise. This Noise Control Plan shall, at a minimum, contain the following elements:

- The project sponsor shall comply with noise controls and restrictions in applicable entertainment permit requirements.
- The establishment shall provide adequate ventilation within the structures such that doors and/or windows are not left open for such purposes resulting in noise emission from the premises.
- There shall be no noise audible outside the establishment during the daytime or nighttime hours that violates the San Francisco Municipal Code Section 49 or 2900 et. seq. Further, absolutely no sound from the establishment shall be audible inside any surrounding residences or businesses that violates San Francisco Police Code section 2900.
- Permit holder shall take all reasonable measures to insure the sidewalks adjacent to the premises are not blocked or unnecessarily affected by patrons or employees due to the operations of the premises and shall provide security whenever patrons gather outdoors.

- Permit holder shall provide a cell phone number to all interested neighbors that will be answered at all times by a manager or other responsible person who has the authority to adjust volume and respond to other complaints whenever entertainment is provided.

Comparison of Impact NO-4 to Mission Bay FSEIR Impact Analysis

The operational noise impact with respect to noise from generators and mechanical equipment was not specifically addressed in the Mission Bay FSEIR. However, this project impact would be less than significant, so under the project, there would be no new or substantially more severe impacts from what were disclosed in the Mission Bay FSEIR.

The operational noise impact with respect to amplified sound was addressed in the Mission Bay FSEIR with respect to outdoor concert events at the AT&T ballpark. This impact was identified as less than significant with mitigation in the *San Francisco Giants Ballpark at China Basin Final EIR*, which included implementation of a plan limiting the frequency of events and establishing a 3 dBA increase over existing ambient noise levels as a performance standard. As described above, the proposed project impact would be similar, so there would be no new or substantially more severe impacts from what were disclosed in the Mission Bay FSEIR.

Impact NO-5: Operation of the proposed project would cause a substantial permanent increase in ambient noise levels in the project vicinity. (Significant and Unavoidable with Mitigation)

As described in Impact NO-4, above, this impact addresses the introduction of new mobile noise sources with respect to the potential for permanent, long-term increases in ambient noise levels in the project vicinity. Mobile noise sources include vehicular traffic noise and crowd noise.

Mobile Noise Source – Vehicular Traffic Noise with Transit Service Plan

Increased vehicular traffic associated with the proposed project would increase noise levels along existing roadways. Under the Muni Special Event Transit Service Plan included as part of the project, light rail service on the T Third line would be increased, and three special event shuttles would be implemented, including a 16th Street BART Shuttle, Van Ness Avenue Shuttle, and Transbay Terminal/Ferry Building Shuttle. Increases in noise from traffic on existing roadways are assessed by modeling existing and future roadway noise levels and comparing the resulting increase to standards published by FICON. For noise environments where the ambient noise level is 65 dBA DNL or less, the applicable significance threshold is an increase of 5 dBA or more, which Caltrans recognizes as a readily perceptible increase. In noise environments where the ambient noise level exceeds 65 dBA DNL, the applicable significance threshold is an increase of 3dBA or more, which Caltrans recognizes as a barely perceptible increase.

Increased traffic noise with the Muni Special Event Transit Service Plan was assessed for four separate scenarios, consistent with those analyzed in Section 5.2, Transportation and Circulation. First, roadside noise levels were modeled for existing conditions (year 2015 inclusive of traffic from foreseeable development that would be operational by the time of project completion) during the weekday peak hour (4 to 6 p.m.) and compared to conditions with the addition of proposed project traffic inclusive of a convention event at the arena. Second, roadside noise levels were modeled for existing conditions during the weekday "evening" hour (6 to 8 p.m.) and compared to conditions with the addition of pre-basketball game traffic. A third scenario assessed roadside noise levels with and without basketball game traffic during the weekday "late" hour (9 to 11 p.m.) reflecting the contributions of post basketball game traffic. Lastly, a scenario assessed roadside noise levels with and without basketball game traffic during the Saturday evening peak hour (7 to 9 p.m.).

Noise levels were determined for this analysis using the Federal Highway Administration (FHWA) Traffic Noise Prediction Model based on baseline and future traffic projections developed as part of the transportation analysis (see Section 5.2, Transportation and Circulation). Modeled weekday and weekend traffic noise level estimates for the six roadway segments are presented in **Table 5.3-9**. Noise levels in Table 5.3-9 represent conditions with and without the project for all four analyzed project scenarios.

As shown in Table 5.3-9, weekday traffic noise level increases would be less than significant for receptors along Third Street where noise levels would increase by less than 3 dBA for all scenarios analyzed. Roadside noise levels along 16th Street and Mariposa Street would increase by as much as 4.9 dBA. However, the existing traffic noise levels along these streets is below 65 dBA and therefore the applicable threshold would be 5 dBA, which would not be met or exceeded. Thus, the roadside noise impact along these two streets would be less than significant.

Roadside noise levels at multi-family receptors adjacent to Illinois Street and Terry Francois Boulevard would increase by more than 5 dBA under several scenarios. Specifically, during the "late night" (9 to 11 p.m.) scenario post-basketball game traffic would increase roadside noise levels along Illinois Street and Terry Francois Boulevard by 10.0 and 6.8 dBA, respectively. Finally, under the Saturday "evening" scenario, basketball game traffic would increase roadside noise levels along Illinois Street by 7.2 dBA. Consequently, roadside noise level increases at multi-family receptors adjacent to Illinois Street and Terry Francois Boulevard would be a significant noise impact. While this impact would occur only for a few hours per event, given that there would be up to 225 events per year, this impact is considered a *significant* permanent increase in noise levels.

Physical noise mitigation (i.e., installation of noise barriers) does not represent a feasible mitigation measure for these event-driven noise impacts. Section 5.2, Transportation and Circulation, of this EIR identifies transportation-related mitigation measures, which would likely not reduce potential noise impacts at most of these roadway segments, where traffic volumes would need to be reduced by half of the projected volumes for noise levels to be reduced below thresholds. Mitigation in terms of rerouting project traffic would have the potential to result in secondary traffic-related impacts or transfer of noise impacts from one roadway to another. Consequently, operational noise impacts during events with implementation of the Muni Special Event Transit Service Plan would be *significant and unavoidable*, with no feasible mitigation that would reduce roadside noise levels even with implementation of transportation mitigation measures identified under Impact TR-2 in Section 5.2, Transportation and Circulation.

TABLE 5.3-9
MODELED TRAFFIC NOISE LEVELS,
PROPOSED PROJECT WITH MUNI SPECIAL EVENT TRANSIT SERVICE PLAN [a]

Roadway Segment	Existing (2015)	Existing plus Convention	dBA Difference	Significant Increase?
Weekday Peak Hour Noise Levels (4 PM – 6 PM)				
Third Street between South Street and China Basin Street	69.1	69.8	0.7	No
Third Street between 16th Street and Mariposa Street[b]	69.9	69.9	<0.1	No
Illinois Street between Mariposa Street and 20th Street	60.3	64.2	3.9	No
Terry Francois Boulevard between South Street and China Basin Street	59.8	59.8	<0.1	No
16th Street between Third Street and I-280	66.4	67.5	1.1	No
Mariposa Street between Third Street and I-280	65.5	66.7	1.2	No
Roadway Segment	**Existing (2015)**	**Existing plus Basketball Game**	**dBA Difference**	**Significant Increase?**
Weekday Evening Noise Levels (6 PM – 8 PM)				
Third Street between South Street and China Basin Street	68.5	69.7	1.2	No
Third Street between 16th Street and Mariposa Street[b]	69.1	69.1	<0.1	No
Illinois Street between Mariposa Street and 20th Street	58.2	63.1	4.9	No
Terry Francois Boulevard between South Street and China Basin Street	57.5	57.9	0.4	No
16th Street between Third Street and I-280	65.6	67.0	1.4	No
Mariposa Street between Third Street and I-280	65.4	67.6	2.2	No
Roadway Segment	**Existing (2015)**	**Existing plus Basketball Game**	**dBA Difference**	**Significant Increase?**
Weekday Late Noise Levels (9 PM – 11 PM)				
Third Street between South Street and China Basin Street	63.4	62.5	-0.9[c]	No
Third Street between 16th Street and Mariposa Street[b]	63.7	63.7	<0.1	No
Illinois Street between Mariposa Street and 20th Street	52.1	62.2	**10.1**	**Yes**
Terry Francois Boulevard between South Street and China Basin Street	53.4	60.2	**6.8**	**Yes**
16th Street between Third Street and I-280	60.2	63.3	3.1	No
Mariposa Street between Third Street and I-280	59.7	64.4	4.7	No
Roadway Segment	**Existing (2015)**	**Existing plus Basketball Game**	**dBA Difference**	**Significant Increase?**
Saturday Evening Noise Levels (6 PM – 8 PM)				
Third Street between South Street and China Basin Street	64.7	67.1	2.4	No
Third Street between 16th Street and Mariposa Street[b]	65.1	65.2	0.1	No
Illinois Street between Mariposa Street and 20th Street	54.7	61.9	**7.2**	**Yes**
Terry Francois Boulevard between South Street and China Basin Street	54.0	54.9	0.9	No
16th Street between Third Street and I-280	61.4	64.0	2.6	No
Mariposa Street between Third Street and I-280	60.4	64.9	4.5	No

NOTES:

[a] Road center to receptor distance is assumed to be 50 feet for values shown in this table. Noise levels were determined using the Federal Highway Administration (FHWA) traffic noise model. The average speed on these segments is assumed to be 25, 30 or 35 miles per hour, depending on the roadway. For all other assumptions, refer to Appendix NO. In an existing ambient noise environment of 65 dBA or greater, an incremental increase is considered significant if the noise increase is equal to or greater than 3.0 dBA. In an existing ambient noise environment below 65 dBA, an incremental increase is considered significant if the noise increase is equal to or greater than 5.0 dBA.

[b] This portion of Third Street would not see meaningful increases in traffic volumes during events due to project access limitations and egress routing during events.

[c] Traffic routing during event egress would be conducted such that volumes on Third Street would be reduced compared to a non-event scenario.

SOURCE: ESA 2015

Mobile Noise Source – Vehicular Traffic Noise, Without the Muni Special Event Transit Service Plan

Under this project scenario, it is assumed that the proposed Muni Special Event Transit Service Plan is not implemented, thus resulting in higher vehicle trip generation (see Section 5.2, Transportation and Circulation, for discussion of the rationale for analyzing this scenario). Increased vehicular traffic associated with the proposed project would further increase noise levels along roadways used to access the project site beyond the levels identified above.

Modeled weekday and weekend traffic noise level estimates for the six roadway segments without the Muni Special Event Transit Service Plan are presented in **Table 5.3-10**. Noise levels in Table 5.3-10 represent conditions with and without the project for all four analyzed project scenarios.

As shown in Table 5.3-10, without the Muni Special Event Transit Service Plan weekday traffic noise level increases would be less than significant for receptors along 3rd Street where noise levels would increase by less than 3 dBA for all scenarios analyzed. Roadside noise levels along Mariposa Street would increase by more than 5 dBA during the weekday late and Saturday evening hours which would be a significant increase that would not occur under the with Muni Special Event Transit Service Plan scenario.

Roadside noise levels at multi-family receptors adjacent to Illinois Street and Terry Francois Boulevard would increase by more than 5 dBA under several scenarios. Specifically, under the weekday p.m. peak hour and evening hours, roadside noise levels along Illinois Street would increase by more than 5 dBA with the addition of convention event traffic, the latter of which would not occur under the with- Muni Special Event Transit Service Plan scenario. During the “late night” (9 to 11 p.m.) scenario, post-basketball game traffic would increase roadside noise levels along Illinois Street and Terry Francois Boulevard by 9.8 and 6.7 dBA, respectively. Finally, under the Saturday “evening” scenario, basketball game traffic would increase roadside noise levels along Illinois Street by 7.8 dBA. Consequently, roadside noise level increases at multi-family receptors adjacent to Illinois Street and Terry Francois Boulevard would be a significant noise impact.

Physical noise mitigation (i.e., installation of noise barriers) does not represent a feasible mitigation measure for these event-driven noise impacts. Mitigation in terms of rerouting project traffic would have the potential to result in secondary traffic-related impacts or transfer of noise impacts from one roadway to another. Consequently, operational noise impacts during events without implementation of the Muni Special Event Transit Service Plan would be significant, with no feasible mitigation that would reduce roadside noise levels even with implementation of transportation mitigation measures identified under Impact TR-2 in Section 5.2, Transportation and Circulation.

While this impact would occur only for a few hours per event, given that there would be up to 225 events per year, the increased traffic associated with project operations would result in a *significant and unavoidable* permanent increase in noise levels along certain local roadway under conditions either with or without implementation of the Muni Special Event Transit Service Plan.

TABLE 5.3-10
MODELED TRAFFIC NOISE LEVELS,
PROPOSED PROJECT WITHOUT MUNI SPECIAL EVENT TRANSIT SERVICE PLAN[a]

Roadway Segment	Existing (2015)	Existing plus Convention	dBA Difference	Significant Increase?
Weekday Peak Hour Noise Levels (4 PM – 6 PM)				
Third Street between South Street and China Basin Street	69.1	69.8	0.7	No
Third Street between 16th Street and Mariposa Street[b]	69.9	69.9	<0.1	No
Illinois Street between Mariposa Street and 20th Street	60.3	64.2	3.9	No
Terry Francois Boulevard between South Street and China Basin Street	59.8	59.8	<0.1	No
16th Street between Third Street and I-280	66.4	67.5	1.1	No
Mariposa Street between Third Street and I-280	65.5	66.7	1.2	No
Roadway Segment	**Existing (2015)**	**Existing plus Basketball Game**	**dBA Difference**	**Significant Increase?**
Weekday Evening Noise Levels (6 PM – 8 PM)				
Third Street between South Street and China Basin Street	68.5	70.1	1.6	No
Third Street between 16th Street and Mariposa Street	69.1	69.2	0.1	No
Illinois Street between Mariposa Street and 20th Street	58.2	63.6	**5.4**	**Yes[b]**
Terry Francois Boulevard between South Street and China Basin Street	57.5	58.0	0.5	No
16th Street between Third Street and I-280	65.6	67.3	1.7	No
Mariposa Street between Third Street and I-280	65.4	67.9	2.5	No
Roadway Segment	**Existing (2015)**	**Existing plus Basketball Game**	**dBA Difference**	**Significant Increase?**
Weekday Late Noise Levels (9 PM – 11 PM)				
Third Street between South Street and China Basin Street	63.4	62.7	-0.7[c]	No
Third Street between 16th Street and Mariposa Street[b]	63.7	64.1	0.4	No
Illinois Street between Mariposa Street and 20th Street	52.1	61.9	**9.8**	**Yes**
Terry Francois Boulevard between South Street and China Basin Street	53.4	60.1	**6.7**	**Yes**
16th Street between Third Street and I-280	60.2	65.1	4.9	No
Mariposa Street between Third Street and I-280	59.7	65.0	**5.3**	Yes[b]
Roadway Segment	**Existing (2015)**	**Existing plus Basketball Game**	**dBA Difference**	**Significant Increase?**
Saturday Evening Noise Levels (6 PM – 8 PM)				
Third Street between South Street and China Basin Street	64.7	67.8	3.1	No
Third Street between 16th Street and Mariposa Street[b]	65.1	65.4	0.3	No
Illinois Street between Mariposa Street and 20th Street	54.7	62.5	**7.8**	**Yes**
Terry Francois Boulevard between South Street and China Basin Street	54.0	55.0	1.0	No
16th Street between Third Street and I-280	61.4	64.4	3.0	No
Mariposa Street between Third Street and I-280	60.4	65.5	**5.1**	**Yes[b]**

NOTES:
[a] Road center to receptor distance is assumed to be 50 feet for values shown in this table. Noise levels were determined using the Federal Highway Administration (FHWA) traffic noise model. The average speed on these segments is assumed to be 25 or 30 miles per hour, depending on the roadway. For all other assumptions, refer to Appendix NO. In an existing ambient noise environment of 65 dBA or greater, an incremental increase is considered significant if the noise increase is equal to or greater than 3.0 dBA. In an existing ambient noise environment below 65 dBA, an incremental increase is considered significant if the noise increase is equal to or greater than 5.0 dBA.
[b] This is a significant impact under the no Muni Special Event Transit Service Plan scenario that would not occur under the with Muni Special Event Transit Service Plan scenario.
[c] Traffic routing during event egress would be conducted such that volumes on Third Street would be reduced compared to a non-event scenario.

SOURCE: ESA 2015

Mobile Noise Source – Crowd Noise

Noise generated by event patrons and retail customers could result in increased noise along surrounding streets, particularly during the evening and nighttime hours (depending on the event timing) and at the end of scheduled games/events when large numbers of people would be departing the event center and walking on local streets to access their transit connections or access their vehicles at local parking locations. The proposed arena would be considered a place of entertainment and the applicant would be required to obtain a Place of Entertainment permit from the San Francisco Entertainment Commission, and this permit process would require a public hearing and include a neighborhood outreach requirement as discussed in the Setting section. The Commission has established a good neighbor policy for entertainment venues within the City that includes eight policies that address noise generation (see Regulatory Framework, above).

A variety of transit options would be available to event patrons under the Muni Special Event Transit Service Plan. Section 5.2, Transportation and Circulation, indicates that during the late evening egress hours (9 to 11 p.m.) of a weekday basketball or concert event, over 4,500 people would take transit options and that over 3,000 people would be using the northbound Muni T-Line platform, which is approximately 70 feet from and facing the UCSF Hearst Tower housing building. Observations of current platform occupancy during these hours indicate that fewer than 10 persons are typically present on the platform at any one time. Consequently, the proposed project would result in a substantial increase in people gathering in the median of Third Street across from the UCSF Hearst Tower housing complex during the targeted 45-minute post-event egress period for approximately 45 basketball games per year and up to 60 additional full capacity concerts and other sporting events per year (see Table 3-3 of the Project Description). In addition to this, there could be smaller capacity family events or daytime conventions.

To estimate noise levels from departing crowds after an event, noise monitoring of crowd egress to the Muni T-Line platform after a San Francisco Giants baseball game at AT&T Park was conducted in April 2015. Short-term noise monitoring was located at a setback of approximately 70 feet from the 2nd and King Street (Ballpark) platform. Although the 320-foot-long Ballpark platform is longer than the existing 160-foot T-Line platform across from the project site, the proposed project would include extension of this platform from 160 to 320 feet (see Section 5.2, Transportation and Circulation); therefore this noise measurement would be representative of future project conditions. However, it should be noted that the measured data from the Ballpark platform also included vehicle traffic on King Street and crowd noise on the north side of the street; consequently, these noise measurements may overestimate the magnitude of the potential impact at the project site.

Monitored noise levels during the egress period when the game ended averaged 69 dBA, L_{90}, with an L_{max} of 90.2 dBA. These noise levels may be compared to the existing noise level that was monitored in 2014 during the 10:00 p.m. hour at the UCSF Housing (Hearst Tower) (with no game at AT&T Park), which was 55 dBA, L_{90} and L_{max} of 89.8 dBA. The L_{90} data indicates that existing noise levels at the UCSF Hearst Tower residential building during quieter periods would be substantially increased by crowds gathering to board northbound Muni service on event days.

Given that the residential units in this building are elevated up to 15 stories, shielding does not represent a feasible option to mitigating this crowd noise impact. Relocating the northbound platform away from Hearst Tower would also likely be an infeasible option due to resultant secondary impacts to Muni operations of the T-Line. Consequently, the noise impact resulting from the increase in noise levels from crowds gathering at the Muni T-Line platform during quieter nighttime periods would be *significant and unavoidable.* Under the scenario where the proposed Muni Special Event Transit Service Plan is not implemented, it is likely that greater numbers of patrons would seek access to the Muni T-Line platform resulting in exacerbation of this significant and unavoidable impact.

Nevertheless, it should be noted that these noise increases at the Muni platform would be of limited duration, with post game dispersion rate of about 45 minutes and would only occur on event nights. The project sponsor, as part of its site management practices, would implement the San Francisco Entertainment Commission's Good Neighbor Policy for nighttime entertainment activities, urging patrons to respect the quiet of the neighborhood as they leave the area and providing a phone number to all interested neighbors to respond to complaints. Furthermore, it is assumed that the Hearst Towers have been designed to Title 24 noise insulation standards to mitigate exterior noise levels to a 45 dBA interior performance standard, although this standard would likely not be met if the windows are open.

Other than Hearst Tower, the UCSF Hospital is located approximately 900 feet from the southbound Muni platform and would not be expected to experience a substantial noise increase from crowd egress. An additional UCSF housing building is proposed for Block 15, west of Fifth Street, but this location, while quieter is located over 1,000 feet away from the proposed arena and transit platform and would be shielded by intervening buildings, including the Sandler Neuroscience Building, Arthur and Toni Remberock Hall, and Hearst Tower.

Summary of Impact NO-5, Operational Noise from Mobile Sources

Noise levels generated by crowds prior to, during, and after events is expected to result in a substantial increase in noise levels at the receptor adjacent to the northbound Muni T-Line transit platform, particularly during nighttime egress hours of 9 p.m. to 11 p.m., and this impact would be *significant and unavoidable*.

Operation of the proposed project would introduce new mobile noise sources that would contribute to ambient noise levels in the project vicinity. Increases in roadway traffic noise would be *significant and unavoidable* during events either with or without implementation of the Muni Special Event Transit Service Plan, even with implementation of **Mitigation Measure M-TR-2c, Additional Strategies to Reduce Transportation Impacts** and **Mitigation Measure M-TR-11c, Additional Strategies to Reduce Transportation Impacts of Overlapping Events**, as described in Section 5.2, Transportation and Circulation. These measures identify additional transportation demand management strategies beyond those already incorporated in the proposed project that the project sponsor would pursue in collaboration with the City.

Mitigation Measure M-TR-2c: Additional Strategies to Reduce Transportation Impacts (see Section 5.2, Transportation and Circulation, Impact TR-2)

Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events (see Section 5.2, Transportation and Circulation, Impact TR-2)

Comparison of Impact NO-5 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR identified traffic noise increases as less than significant and no mitigation was required. The FSEIR also assessed crowd noise in combination with outdoor concert noise (cheering within the outdoor ballpark). Noise from patron egress was not assessed.

Consequently, the significant and unavoidable traffic and crowd noise impact identified in Impact NO-5 would be a *new significant and unavoidable* impact of the proposed project not previously identified in the Mission Bay FSEIR. This is a result not only of traffic generated by events at the proposed arena but also because of new sensitive receptors subsequently developed along Illinois Street and adjacent to Terry Francois Boulevard. In addition, neither the UCSF Hearst Tower housing building nor the Muni T-line platform were constructed at the time of the Mission Bay FSEIR impact analysis.

Cumulative Impacts

Impact C-NO-1: Construction activities of the proposed project combined with cumulative construction noise in the project area could cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity during construction. (Less than Significant with Mitigation)

The geographic scope of analysis for cumulative noise and vibration construction impacts encompasses sensitive receptors within approximately 500 feet of the proposed project site. Beyond 500 feet, the contributions of noise from other projects would be greatly attenuated through both distance and intervening structures and their contribution would be expected to be minimal. Section 5.1, Impact Overview, presents the list of reasonably foreseeable future projects in the vicinity that could contribute to cumulative construction noise, which in particular would include the construction activities associated with implementation of the University of California, San Francisco (UCSF) Long Range Development Plan (LRDP) for the Mission Bay campus and other nearby Mission Bay development projects with construction schedules that could overlap with project construction. Some of the listed cumulative projects are sufficiently distant to not meaningfully contribute to construction noise impact.

Mission Bay Blocks 33/34 is identified as a variant in the 2014 UCSF LRDP and was analyzed as a pre-2020 project. Phase 1 of this 500,000 gsf office development is scheduled to start construction in 2016, which would occur simultaneously with construction of the proposed project. The UCSF LRDP EIR found that at the Mission Bay campus site, proposed construction activities between 2015 and 2019 include new construction at Block 15 housing, Block 33 research building, Block 33/34 parking garage, and the cancer outpatient building. These construction projects, which could occur concurrently, were identified as resulting in a significant cumulative impact on the noise environment in the site vicinity, largely as a result of pile driving activities. Construction of the proposed project would contribute to this already identified cumulative impact, either through compounding the extent and/or magnitude of construction noise in the project vicinity or through extending the duration of construction noise in the project vicinity. UCSF development located at Block 25B (across Third Street) is scheduled for construction in 2023. Additionally, the Cancer Outpatient Building is scheduled for construction starting 2018. Consequently, both of these cumulative projects would occur after completion of proposed project construction and would not combine with the proposed project in a cumulative construction noise impact.

The Uber/ARE project on Blocks 26/27 is estimated to start construction by the end of 2015, and construction could be concurrent with the proposed project. This project is immediately north of the project site, across South Street, and immediately across Third Street from the nearest sensitive receptor to the project site, the UCSF Mission Bay housing at Hearst Tower. Construction of the proposed project would contribute to cumulative construction noise from this adjacent project.

Additionally, as described in Chapter 3, Project Description, the realignment of Terry A. Francois Boulevard and development of Bayfront Park, both directly east of the project site are expected to be completed by the time the proposed project is in operation. Therefore, construction activities associated with the roadway realignment and park would likely overlap with construction of the proposed project, further contributing to cumulative construction noise. Thus, even though construction noise generated by the proposed project alone would not result in a significant noise impact, the proposed project's contribution to the cumulative noise impact from overlapping construction activities in the immediate project vicinity could be cumulatively considerable, and a potentially significant impact. However, implementation of **Mitigation Measure M-C-NO-1, Construction Noise Control Measures**, would reduce the project's contribution to cumulative construction noise impacts to a less-than-significant level. Given that this measure would implement construction-related noise control measures for a project that does not include impact pile-driving, which was the principal activity and focus of the significant and unavoidable finding of the UCSF LRDP EIR, the cumulative contribution of the proposed project's construction noise impact would be *less than significant with mitigation*.

Mitigation Measure M-C-NO-1: Construction Noise Control Measures.

Contractors shall employ site-specific noise attenuation measures during construction to reduce the generation of construction noise. These measures shall be included in a Noise Control Plan that shall be submitted for review and approval by the OCII or its designated representative to ensure that construction noise is reduced to the degree feasible. Measures specified in the Noise Control Plan and implemented during project construction shall include, at a minimum, the following noise control strategies:

- Equipment and trucks used for construction shall use the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds).

- Construction equipment with lower noise emission ratings shall be used whenever possible, particularly for air compressors.

- Sound-control devices no less effective than those provided by the manufacturer shall be provided on all construction equipment.

- Impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10 dBA. External jackets on the tools themselves shall be used where feasible; this could achieve a reduction of 5 dBA. Quieter procedures, such as use of drills rather than impact tools, shall be used where feasible.

- Stationary noise sources such as material stockpiles and vehicle staging areas shall be located as far from adjacent receptors as possible.

- Enclosures and mufflers for stationary equipment shall be provided, impact tools shall be shrouded or shielded, and barriers shall be installed around particularly noisy activities at the construction sites so that the line of sight between the construction activities and nearby sensitive receptor locations is blocked to the extent feasible.

- Unnecessary idling of internal combustion engines shall be prohibited.

- Construction-related vehicles and equipment shall be required to use designated truck routes to travel to and from the project sites as determined with consultation with the SFMTA as part of the permit process prior to construction (see **Improvement Measure I-TR-1**: **Construction Management Plan and Public Updates)**.

- The project sponsor shall designate a point of contact to respond to noise complaints. The point of contact must have the authority to modify construction noise-generating activities to ensure compliance with the measures above and with the San Francisco Noise Ordinance.

Comparison of Impact C-NO-1 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR did not contain an analysis of cumulative construction noise impacts *per se*, although as a program EIR, the Mission Bay FSEIR analyzed the construction noise impact of the Mission Bay Redevelopment Plan as a whole, covering development throughout an area over 300 acres in size, which is essentially a cumulative analysis. As described above in Impact NO-1, the FSEIR identified construction-related noise impacts as less than significant with mitigation to address noise from impact pile driving. Consequently, the cumulative construction noise analysis for the proposed project would have the same significance conclusions as identified in the Mission Bay FSEIR, and there would be no new or substantially more severe significant impact than previously identified.

Impact C-NO-2: Operation of the proposed project when considered with other cumulative development would cause a substantial permanent increase in ambient noise levels in the project vicinity. (Significant and Unavoidable with Mitigation)

Operational noise impacts of the proposed project would primarily result from increased traffic on the local roadway network. Cumulative plus project traffic data were used to estimate the cumulative operational noise increases shown in **Table 5.3-11**. Significant cumulative increases in ambient roadside noise levels are predicted to occur at three of the six road segments analyzed.

While cumulative noise levels are predicted to increase by 3 dBA or more along Third Street, as can be seen from Table 5.3-10, the project contribution to this increase is less than 1.5 dBA which would not be considered a cumulatively considerable contribution, based on FICON guidance for transportation noise which indicates that noise increases of 1.5 dBA warrant further analysis. Therefore, this cumulative increase along Third Street is not a cumulative noise increase of the proposed project.

However, a significant cumulative noise increase would occur along Illinois Street during Saturday basketball events. Additionally, cumulative noise levels along Mariposa Street during Saturday basketball events would increase by more than 5 dBA with the project contributing more than 1.5 dBA of this increase. This would result in a cumulatively considerable noise impact of the proposed project. Noise from crowds gathering at the Muni T-Line platform across from Hearst Tower following the end of events would also contribute to cumulative, long-term increases in noise levels.

Operation of the proposed project would contribute to ambient noise levels in the project vicinity. Cumulative increases in roadway traffic noise would be *significant and unavoidable* during events even with implementation of transportation mitigation measures identified in Section 5.2, Transportation and Circulation.

> **Mitigation Measure M-TR-2c: Additional Strategies to Reduce Transportation Impacts** (see Section 5.2, Transportation and Circulation, Impact TR-2)
>
> **Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events** (see Section 5.2, Transportation and Circulation, Impact TR-2)

Comparison of Impact C-NO-2 to Mission Bay FSEIR Impact Analysis

Traffic noise increases were identified in the Mission Bay FSEIR as less than significant and no mitigation was required. Consequently, the significant and unavoidable cumulative traffic noise impact identified in Impact C-NO-2 would be a new significant and unavoidable impact of the proposed project not previously identified in the 1998 FSEIR. This is a result not only of traffic generated by events at the proposed arena but also because of new sensitive receptors subsequently developed along Illinois Street and Mariposa Street.

TABLE 5.3-11
MODELED CUMULATIVE TRAFFIC NOISE LEVELS

Roadway Segment	Existing	Cumulative without Project	Cumulative plus Convention Event	Project Contribution	dBA Difference Over Existing	Significant Increase?
Weekday Peak Hour Noise Levels (4 PM – 6 PM)						
Third Street between South Street and China Basin Street	69.1	71.8	72.2	0.4	3.1	No[a]
Third Street between 16th Street and Mariposa Street	69.9	71.8	71.8	<0.1	1.9	No
Illinois Street between Mariposa Street and 20th Street	60.3	61.2	64.6	3.4	4.3	No
Terry Francois Boulevard between South Street and China Basin Street	59.8	61.9	61.9	<0.1	2.1	No
16th Street between Third Street and I-280	66.4	67.2	68.2	1.0	1.8	No
Mariposa Street between Third Street and I-280	65.5	67.1	68.0	0.9	2.5	No
Roadway Segment	**Existing**	**Cumulative without Project**	**Cumulative plus Basketball Event**	**Project Contribution**	**dBA Difference Over Existing**	**Significant Increase?**
Weekday Peak Hour Noise Levels (4 PM – 6 PM)						
Third Street between South Street and China Basin Street	69.1	71.8	72.1	0.3	3.0	No[a]
Third Street between 16th Street and Mariposa Street	69.9	71.8	71.9	0.1	2.0	No
Illinois Street between Mariposa Street and 20th Street	60.3	61.2	63.6	2.4	3.3	No
Terry Francois Boulevard between South Street and China Basin Street	59.8	61.9	62.0	0.1	2.2	No
16th Street between Third Street and I-280	66.4	67.2	67.9	0.7	1.5	No
Mariposa Street between Third Street and I-280	65.5	67.1	67.8	0.7	2.3	No
Roadway Segment	**Existing**	**Cumulative without Project**	**Cumulative plus Basketball Event**	**Project Contribution**	**dBA Difference Over Existing**	**Significant Increase?**
Saturday Evening Noise Levels (6 PM – 8 PM)						
Third Street between South Street and China Basin Street	64.7	67.5	68.9	1.4	4.2	No[a]
Third Street between 16th Street and Mariposa Street	65.1	67.3	67.5	0.2	2.4	No
Illinois Street between Mariposa Street and 20th Street	54.7	57.8	62.7	4.9	8.0	**Yes**
Terry Francois Boulevard between South Street and China Basin Street	54.0	58.2	58.5	0.3	4.5	No
16th Street between Third Street and I-280	61.4	62.4	64.6	0.2	3.2	No
Mariposa Street between Third Street and I-280	60.4	62.7	65.9	3.2	5.5	**Yes**

NOTES: Road center to receptor distance is assumed to be 50 feet for values shown in this table. Noise levels were determined using the Federal Highway Administration (FHWA) traffic noise model. The average speed on these segments is assumed to be 25, 30 or 35 miles per hour, depending on the roadway. For all other assumptions, refer to Appendix NO. The incremental increase is considered significant if the noise increase is equal to or greater than 3 dBA with an ambient noise environment greater than 65 dBA.

[a] Although a cumulative noise impact would occur along Third Street, because the projects would contribute less than 1.5 dBA to this increase, the projects contribution is not considered cumulatively considerable.

SOURCE: ESA 2015

Impact C-NO-3: Occupants of the proposed project would not be substantially affected by noise from future operations of the helipad at the adjacent UCSF Hospital. (Less than Significant)

Beginning in 2015, the UCSF Medical Center began operating a helipad that has occasional helicopter operations. Because helicopter overflights would be isolated occurrences, their single event instantaneous noise level would be of brief duration and would be greater than ambient noise levels noise contributions, with a maximum noise level of 85 dBA expected (based on a 95 dB single event noise exposure level[27]). The relative infrequency and acoustical nature of a helicopter overflight noise varies distinctly from traffic generation and other steady-state project noise sources such that the summing of the acoustical energy of ambient noise and helicopter operations is not a meaningful cumulative analysis. In other words, during the brief periods of helicopter overflight, helicopter noise will dominate over the ambient noise levels, rendering the cumulative contribution of other ambient sources insignificant. Therefore, future helicopter noise is assessed as an isolated event.

Noise modeling for helicopter operations at the UCSF Medical Center at Mission Bay was presented as part of the *Final EIR, UCSF Medical Center at Mission Bay*.[28] This modeling indicated that the 65 dB CNEL[29] noise contour during average day and busy-day helicopter operations extends to the east across Third Street, but does not include the project site. Because the event center, office and retail land uses proposed by the project are not considered noise sensitive land uses and because the 65 dB CNEL contour does not extend onto the project site, the cumulative noise impacts of operations of the UCSF Medical Center helipad would be *less than significant*.

Mitigation: Not required.

Comparison of Impact C-NO-3 to Mission Bay FSEIR Impact Analysis

An addendum to the Mission Bay FSEIR was prepared in 2008 that addressed the noise impacts of operations of the UCSF Medical Center helipad. This analysis only identified operational noise impacts to residential areas to the south and east of the hospital helipad and mitigation measures were identified to address these impacts. However, the residual noise impact, after mitigation, was determined to be significant and unavoidable for residential uses. The proposed project would not include residential or other noise sensitive land uses, so there would be no new or substantially more severe significant impacts from what were disclosed in the FSEIR and associated addenda.

[27] The single event noise exposure level, or SENEL is a noise metric that normalizes the sound energy of a single event such as an aircraft fly-over over the period when the sound level is within 10 dB of the Lmax. As stated on Page 19 of the cited report (UCSF, *UCSF Medical Center at Mission Bay—Residential Sound Reduction Program for Helicopter Operations, Final Supplemental Environmental Impact Report*, 2009), the SENEL is typically 10 dB higher than the Lmax for aircraft noise.,

[28] UCSF, *UCSF Medical Center at Mission Bay—Residential Sound Reduction Program for Helicopter Operations, Final Supplemental Environmental Impact Report*, 2009.

[29] CNEL is roughly equivalent to DNL, usually within 1 dBA

5.4 Air Quality

5.4.1 Introduction

This section discusses the existing air quality conditions in the project area, presents the regulatory framework for air quality management, and analyzes the potential for the proposed project to affect existing air quality conditions, both regionally and locally, due to activities that emit criteria and non-criteria air pollutants. It also analyzes the types and quantities of emissions that would be generated on a temporary basis due to proposed construction activities as well as those generated over the long term due to proposed operation of project elements. The analysis determines whether those emissions are significant in relation to applicable air quality standards and identifies feasible mitigation measures for significant adverse impacts. The section also includes an analysis of cumulative air quality impacts. The potential for odor impacts was addressed in the Initial Study (Appendix NOP-IS, page 60), which found that the proposed project would not result in new significant impacts or substantially increase the severity of impacts on air quality with respect to odors. Therefore, odor impacts are not addressed in this SEIR. Emissions of greenhouse gases resulting from the proposed project's potential impacts on climate change and the state's goals for greenhouse gas emissions pursuant to Assembly Bill 32 are presented and discussed in Section 5.5, Greenhouse Gas Emissions.

The analysis in this section is based on a review of existing air quality conditions in the region and air quality regulations administered by the United States Environmental Protection Agency (USEPA), the California Air Resources Board (CARB), and the Bay Area Air Quality Management District (BAAQMD). This analysis includes methodologies identified in the updated BAAQMD *CEQA Air Quality Guidelines* (May 2012).

5.4.2 Summary of Mission Bay FSEIR Section

5.4.2.1 Mission Bay FSEIR Setting

The air quality setting for the Mission Bay area discussed in the Mission Bay FSEIR differs from the existing setting today in terms of air quality conditions, the regulatory environment, and in the level of available information with respect to health risks and hazards. Specifically, at the time of the Mission Bay FSEIR, localized concentrations of criteria air pollutants were higher than what are monitored today as many of the regulatory improvements implemented since then have improved air quality conditions. As an example, the FSEIR reported that carbon monoxide standards were occasionally exceeded in San Francisco and that particulate emission standards were regularly exceeded in San Francisco. Since 1998, the effect of reformulated gasoline and other regulatory changes has resulted in no carbon monoxide violations in the past 15 years and a reduction in the number of violations of the particulate matter standard despite subsequent strengthening of the ambient particulate standards.

In 1998 when the Mission Bay FSEIR was certified, the BAAQMD had published CEQA Air Quality Guidelines, however, those guidelines differed substantially from the BAAQMD guidelines published in 2012 and used in this SEIR. For example, the earlier guidelines did not recommend quantification of construction-related emissions of criteria pollutants.

5.4.2.2 Mission Bay FSEIR Impacts and Mitigation Measures

Air quality impacts assessed in the Mission Bay FSEIR included Mission Bay Blocks 29-32 as a part of the over 300-acre area analyzed in the Redevelopment Plan. The Mission Bay FSEIR identified a significant and unavoidable impact from operational vehicle emissions, while criteria pollutant emissions from stationary sources were identified as less than significant due to new source review requirements. Mitigation Measure F.1 was identified to reduce vehicle trips associated with development, although the Mission Bay FSEIR acknowledged that reduction of vehicle emissions below thresholds was not reasonably attainable because projected emissions were so far above the thresholds. Mitigation Measure F.1 essentially implemented Mitigation Measures E.46 through E.50 of the Mission Bay FSEIR Transportation analysis:

- E.46: Establishment of Transportation Management Organizations—This measure has already been implemented. See Section 5.2, Transportation and Circulation.
- E.47: Transportation System Management Plan—These measures, as applicable to the proposed project, have been incorporated into the Mission Bay South Owner Participation Agreement, and thus are assumed to be part of the project. See Section 5.2, Transportation and Circulation
- E.48: Constrain parking at UCSF—This measure was not adopted.[1]
- E.49: Good faith efforts to assist in implementation of ferry service—This measure does not apply to the proposed project, as it is currently being implemented by the Water Emergency Transportation Authority.
- E.50: Telecommuting/flexible hours—This measure was incorporated into Measure E.47.

The impact analysis also included modeling of carbon monoxide (CO) concentrations for 13 intersections in the project area. While modeling indicated that several of these intersections would potentially experience CO concentrations in excess of state and federal standards under existing plus project conditions, modeling under future year (2015) plus project conditions indicated that these violations would not be realized in the future due to planned improvements in the vehicle fleet and reformulated gasoline.

The Plan-level impact analysis conducted in the Mission Bay FSEIR assessed the consistency of population increases from development under the entire proposed plan with the growth assumptions of the applicable Clean Air Plan at the time, the *'97 Clean Air Plan*. This analysis

[1] Mission Bay FSEIR Mitigation Measure E.48 was not adopted by the San Francisco Board of Supervisors. See CEQA Findings, October 14, 1998. San Francisco Board of Supervisors Resolution No. 854-98, regarding adopting environmental findings (and a statement of overriding considerations) pursuant to the California Environmental Quality Act and State guidelines in connection with adoption of the Mission Bay North and Mission Bay South Redevelopment Plans and various other actions necessary to implement such plans.

identified a significant Plan-level air quality impact as population growth under the Plan would have exceeded that of the *'97 Clean Air Plan*.

The Mission Bay FSEIR also identified air pollutant emissions from construction and demolition activities as a less-than-significant air quality impact with implementation of Mitigation Measure F.2, which requires a menu of 14 particulate emission control measures.

Operational health risk impacts were identified as potentially significant in the Mission Bay FSEIR and mitigation was identified, but because of lack of a specific development proposal, this impact was identified as significant and unavoidable with mitigation.

The Mission Bay FSEIR mitigation measures for impacts due to emissions of toxic air contaminants (TAC) during project operations include the following:

- F.3: Require applicant to demonstrate receipt of BAAQMD permit for stationary TAC sources.
- F.4: Establish meteorological station in Mission Bay.
- F.5: Reduce exposure to dry cleaning facilities in the area that use perchloroethylene[2] and other toxic contaminants.
- F.6: Creation of buffer zones for pre-school and child care centers from TAC sources.

5.4.3 Setting

5.4.3.1 Climate and Meteorology

The project area is located within the San Francisco Bay Area Air Basin (SFBAAB). The air basin's moderate climate steers storm tracks away from the region for much of the year, although storms generally affect the region from November through April. San Francisco's proximity to the onshore breezes stimulated by the Pacific Ocean provide for generally very good air quality in the project area.

Temperatures in the project area average in the mid-50s annually, generally ranging from the low 40s on winter mornings to mid-70s during summer afternoons. Daily and seasonal oscillations of temperature are small because of the moderating effects of the nearby San Francisco Bay. In contrast to the steady temperature regime, rainfall is highly variable and confined almost exclusively to the "rainy" period from November through April. Precipitation may vary widely from year to year as a shift in the annual storm track of a few hundred miles can mean the difference between a very wet year and drought conditions.

Atmospheric conditions such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air

[2] In 2006, USEPA updated its air toxics rule for dry cleaners that requires operators to control percloroethylene (perc) emissions at individual dry cleaners. The rule includes a phase-out of perc use at dry cleaners located in residential buildings by December 21, 2022, along with requirements that already have reduced perc emissions at other dry cleaners.

pollutants regionally. The project area lies within the Peninsula climatological subregion. Marine air traveling through the Golden Gate is a dominant weather factor affecting dispersal of air pollutants within the region. Wind measurements collected on the San Francisco mainland indicate a prevailing wind direction from the west and an average annual wind speed of 10.3 miles per hour.[3] Increased temperatures create the conditions in which ozone formation can increase.

5.4.3.2 Ambient Air Quality – Criteria Air Pollutants

As required by the 1970 federal Clean Air Act, the USEPA initially identified six criteria air pollutants that are pervasive in urban environments and for which state and federal health-based ambient air quality standards have been established. USEPA calls these pollutants "criteria air pollutants" because the agency has regulated them by developing specific public-health-based and welfare-based criteria as the basis for setting permissible levels. Ozone, carbon monoxide (CO), particulate matter (PM), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead are the six criteria air pollutants originally identified by USEPA. Since that time, subsets of particulate matter have been identified for which permissible levels have been established. These include particulate matter of 10 microns in diameter or less (PM_{10}) and particulate matter of 2.5 microns in diameter or less ($PM_{2.5}$).

The BAAQMD is the regional agency with jurisdiction for regulating air quality within the nine county SFBAAB. The region's air quality monitoring network provides information on ambient concentrations of criteria air pollutants at various locations in the San Francisco Bay Area. **Table 5.4-1** presents a five-year summary for the period 2010 to 2014 of the highest annual criteria air pollutant concentrations, collected at the air quality monitoring station operated and maintained by the BAAQMD at 16th and Arkansas Streets (Potrero Hill), approximately one half mile west of the project site. Table 5.4-1 also compares measured pollutant concentrations with the most stringent applicable ambient air quality standards (state or federal). Concentrations shown in bold indicate an exceedance of the standard.

Ozone

Ozone is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving reactive organic gases (ROG, also sometimes referred to as volatile organic compounds or VOC by some regulating agencies) and nitrogen oxides (NOx). The main sources of ROG and NOx, often referred to as ozone precursors, are combustion processes (including motor vehicle engines) and the evaporation of solvents, paints, and fuels. In the Bay Area, automobiles are the single largest source of ozone precursors. Ozone is referred to as a regional air pollutant because its precursors are transported and diffused by wind concurrently with ozone production through the photochemical reaction process. Ozone causes eye irritation, airway constriction, and shortness of breath and can aggravate existing respiratory diseases, such as asthma, bronchitis, and emphysema.

[3] http://www.wrcc.dri.edu/htmlfiles/westwinddir.html#CALIFORNIA, accessed on February 19, 2014.

TABLE 5.4-1
SUMMARY OF SAN FRANCISCO AIR QUALITY MONITORING DATA (2010–2014)

Pollutant	Most Stringent Applicable Standard	Number of Days Standards Were Exceeded and Maximum Concentrations Measured[a]				
		2010	2011	2012	2013	2014
Ozone						
- Days 1-Hour Standard Exceeded		0	0	0	0	0
- Maximum 1-Hour Concentration (pphm)	>9 pphm[b]	8	7	7	7	8
- Days 8-Hour Standard Exceeded		0	0	0	0	0
- Maximum 8-Hour Concentration (pphm)	>7 pphm[c]	5	5	5	6	7
Carbon Monoxide (CO)						
- Days 1-Hour Standard Exceeded		0	0	0	0	0
- Maximum 1-Hour Concentration (ppm)	>20 ppm[b]	1.8	1.8	2.0	1.8	1.8
- Days 8-Hour Standard Exceeded		0	0	0	0	0
- Maximum 8-Hour Concentration (ppm)	>9 ppm[b]	1.4	1.2	1.2	1.4	1.0
Suspended Particulates (PM_{10})						
- Days 24-Hour Standard Exceeded[d]		0	0	1	0	0
- Maximum 24-Hour Concentration (μg/m^3)	>50 μg/m^3 [b]	40	46	**51**	44	36
Suspended Particulates ($PM_{2.5}$)						
- Days 24-Hour Standard Exceeded[d]		1	3	2	1	2
- Maximum 24-Hour Concentration (μg/m^3)	>35 μg/m^3 [e]	**36**	**45**	**47**	**36**	**49**
- Annual Average (μg/m^3)	>12 μg/m^3 [b, c]	9.7	10.5	9.5	8.2	10.1
Nitrogen Dioxide (NO_2)						
- Days 1-Hour Standard Exceeded		0	0	1	0	0
- Maximum 1-Hour Concentration (pphm)	>10 pphm[c]	9	9	**12**	7	8

NOTES:
Bold values are in excess of applicable standard.
ppm = parts per million; pphm = parts per hundred million
μg/m^3 = micrograms per cubic meter
ND = No data or insufficient data.

[a] Number of days exceeded is for all days in a given year, except for particulate matter. PM_{10} and $PM_{2.5}$ are monitored every six days and therefore the number of days exceeded is out of approximately 60 annual samples.
[b] State standard, not to be exceeded.
[c] Federal standard, not to be exceeded.
[d] Based on a sampling schedule of one out of every six days, for a total of approximately 60 samples per year.
[e] Federal standard was reduced from 65 μg/m^3 to 35 μg/m^3 in 2006.

SOURCE: BAAQMD, Bay Area Air Pollution Summary, 209 – 2014. Available online at: http://www.baaqmd.gov/Divisions/Communications-and-Outreach/Air-Quality-in-the-Bay-Area/Air-Quality-Summaries.aspx. Accessed April 21, 2015.

Table 5.4-1 shows that, according to published data, the most stringent applicable standards for ozone (state 1-hour standard of 9 parts per hundred million [pphm] and the federal 8-hour standard of 8 pphm) were not exceeded in San Francisco between 2010 and 2014.

Carbon Monoxide (CO)

CO is an odorless, colorless gas usually formed as the result of the incomplete combustion of fuels. The single largest source of CO is motor vehicles; the highest emissions occur during low travel speeds, stop-and-go driving, cold starts, and hard acceleration. Exposure to high concentrations of

CO reduces the oxygen-carrying capacity of the blood and can cause headaches, nausea, dizziness, and fatigue; impair central nervous system function; and induce angina (chest pain) in persons with serious heart disease. Very high levels of CO can be fatal. As shown in Table 5.4-1, the more stringent state CO standards were not exceeded between 2010 and 2014. Measurements of CO indicate hourly maximums ranging between 9 to 10 percent of the more stringent state standard, and maximum 8-hour CO levels that are approximately 11 to 16 percent of the allowable 8-hour standard.

Particulate Matter (PM_{10} and $PM_{2.5}$)

Particulate matter is a class of air pollutants that consists of heterogeneous solid and liquid airborne particles from man-made and natural sources. Particulate matter is measured in two size ranges: PM_{10} for particles less than 10 microns in diameter, and $PM_{2.5}$ for particles less than 2.5 microns in diameter. In the Bay Area, motor vehicles generate about one-half of the air basin's particulates, through tailpipe emissions as well as brake pad and tire wear. Wood burning in fireplaces and stoves, industrial facilities, and ground-disturbing activities such as construction are other sources of such fine particulates. These fine particulates are small enough to be inhaled into the deepest parts of the human lung and can cause adverse health effects. According to the CARB, studies in the United States and elsewhere "have demonstrated a strong link between elevated particulate levels and premature deaths, hospital admissions, emergency room visits, and asthma attacks," and studies of children's health in California have demonstrated that particle pollution "may significantly reduce lung function growth in children." The CARB also reports that statewide attainment of particulate matter standards could prevent thousands of premature deaths, lower hospital admissions for cardiovascular and respiratory disease and asthma-related emergency room visits, and avoid hundreds of thousands of episodes of respiratory illness in California.[4] Among the criteria pollutants that are regulated, particulates appear to represent a serious ongoing health hazard. As long ago as 1999, the BAAQMD was reporting, in its *CEQA Air Quality Guidelines*, that studies had shown that elevated particulate levels contribute to the death of approximately 200 to 500 people per year in the Bay Area. High levels of particulate matter can exacerbate chronic respiratory ailments, such as bronchitis and asthma, and have been associated with increased emergency room visits and hospital admissions.

Table 5.4-1 shows that an exceedance of the state PM_{10} standard occurred on one monitored occasion between 2010 and 2014 in San Francisco. It is estimated that the state 24-hour PM_{10} standard of 50 micrograms per cubic meter ($\mu g/m^3$) was exceeded on up to 6 days per year between 2010 and 2014.[5] It is estimated that the state 24-hour $PM_{2.5}$ standard was exceeded on up to 48 days per year between 2010 and 2014.[4] The federal state annual average standard was not exceeded between 2010 and 2014.

4 California Air Resources, Board, "Recent Research Findings: Health Effects of Particulate Matter and Ozone Air Pollution," November 2007. A copy of this document is available for public review at the San Francisco Planning Department, 1650 Mission Street, Suite 400, in Case File No. 2014.1441E

5 PM_{10} and $PM_{2.5}$ are sampled every sixth day; therefore, actual days over the standard can be estimated to be six times the numbers listed in the table.

$PM_{2.5}$ is of particular concern because epidemiologic studies have demonstrated that people who live near freeways and high-traffic roadways have poorer health outcomes, including increased asthma symptoms and respiratory infections and decreased pulmonary function and lung development in children.[6]

Nitrogen Dioxide (NO_2)

NO_2 is a reddish brown gas that is a byproduct of combustion processes. Automobiles and industrial operations are the main sources of NO_2. Aside from its contribution to ozone formation, NO_2 can increase the risk of acute and chronic respiratory disease and reduce visibility. NO_2 may be visible as a coloring component on high pollution days, especially in conjunction with high ozone levels. Table 5.4.1 shows that the current state standard for NO_2 is being met in San Francisco. In 2010, the USEPA implemented a new 1-hour NO_2 standard presented in **Table 5.4-2**. Currently, the CARB is recommending that the Bay Area air basin be designated as an attainment area for the new standard.[7] This new federal standard was exceeded on one day at the San Francisco station between 2010 and 2014.

The USEPA has also established requirements for a new monitoring network to measure NO_2 concentrations near major roadways in urban areas with a population of 500,000 or more. Sixteen new near-roadway monitoring sites are required in California, three of which will be in the Bay Area. These monitors are planned for Berkeley, Oakland, and San Jose. The Oakland station commenced operation in February 2014 and the San Jose station commenced in March of 2015 while the Berkeley station is expected to be operational in summer 2015. The new monitoring data may result in a need to change area designations in the future. The CARB will revise the area designation recommendations, as appropriate, once the new monitoring data become available.

Sulfur Dioxide (SO_2)

SO_2 is a colorless acidic gas with a strong odor. It is produced by the combustion of sulfur-containing fuels such as oil, coal, and diesel. SO_2 has the potential to damage materials and can cause health effects at high concentrations. It can irritate lung tissue and increase the risk of acute and chronic respiratory disease.,[8] Pollutant trends suggest that the air basin currently meets and will continue to meet the state standard for SO_2 for the foreseeable future.

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6 San Francisco Department of Public Health, Assessment and Mitigation of Air Pollutant Health Effect from Intra-urban Roadways: Guidance for Land Use Planning and Environmental Review, May 2008, p. 7. A copy of this document is available for public review at the San Francisco Planning Department, 1650 Mission Street, Suite 400, in Case File No. 2014.1441E.

7 CARB, Recommended Area Designations for the 2010 Nitrogen Dioxide Standards, Technical Support Document, January 2011, http://www.airquality.org/plans/federal/no2/NO2Enclosure_1.pdf. Accessed February 25, 2015.

8 BAAQMD, *CEQA Air Quality Guidelines*, May 2011, http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/BAAQMD%20CEQA%20Guidelines%20May%202011.ashx; p. C-16.

TABLE 5.4-2
STATE AND FEDERAL AMBIENT AIR QUALITY STANDARDS AND ATTAINMENT STATUS

Pollutant	Averaging Time	State (SAAQs[a]) Standard	State (SAAQs[a]) Attainment Status	Federal (NAAQS[b]) Standard	Federal (NAAQS[b]) Attainment Status
Ozone	1 hour	0.09 ppm	**N**	NA	See Note c
	8 hour	0.07 ppm	**N**[d]	0.075 ppm	**N**/Marginal
Carbon Monoxide (CO)	1 hour	20 ppm	A	35 ppm	A
	8 hour	9 ppm	A	9 ppm	A
Nitrogen Dioxide (NO_2)	1 hour	0.18 ppm	A	0.100 ppm	U
	Annual	0.030 ppm	NA	0.053 ppm	A
Sulfur Dioxide (SO_2)	1 hour	0.25 ppm	A	0.075	A
	24 hour	0.04 ppm	A	0.14	A
	Annual	NA	NA	0.03 ppm	A
Particulate Matter (PM_{10})	24 hour	50 μg/m³	**N**	150 μg/m³	U
	Annual[e]	20 μg/m³ [f]	**N**	NA	NA
Fine Particulate Matter ($PM_{2.5}$)	24 hour	NA	NA	35 μg/m³	**N**
	Annual	12 μg/m³	**N**	12 μg/m³	U/A
Sulfates	24 hour	25 μg/m³	A	NA	NA
Lead	30 day	1.5 μg/m³	A	NA	NA
	Cal. Quarter	NA	NA	1.5 μg/m³	A
Hydrogen Sulfide	1 hour	0.03 ppm	U	NA	NA
Visibility-Reducing Particles	8 hour	See Note g	U	NA	NA

NOTES:
A = Attainment; **N** = Nonattainment; U = Unclassified; NA = Not Applicable, no applicable standard; ppm = parts per million; μg/m³ = micrograms per cubic meter.

[a] SAAQS = state ambient air quality standards (California). SAAQS for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1-hour and 24-hour), nitrogen dioxide, particulate matter, and visibility-reducing particles are values that are not to be exceeded. All other state standards shown are values not to be equaled or exceeded.
[b] NAAQS = national ambient air quality standards. NAAQS, other than ozone and particulates, and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The 8-hour ozone standard is attained when the three-year average of the fourth highest daily concentration is 0.08 ppm or less. The 24-hour PM10 standard is attained when the three-year average of the 99th percentile of monitored concentrations is less than the standard. The 24-hour PM2.5 standard is attained when the three-year average of the 98th percentile is less than the standard.
[c] The United States Environmental Protection Agency (USEPA) revoked the national 1-hour ozone standard on June 15, 2005.
[d] This state 8-hour ozone standard was approved in April 2005 and became effective in May 2006.
[e] State standard = annual geometric mean; national standard = annual arithmetic mean.
[f] In June 2002, the California Air Resources Board (CARB) established new annual standards for PM2.5 and PM10.
[g] Statewide visibility-reducing particle standard (except Lake Tahoe Air Basin): Particles in sufficient amount to produce an extinction coefficient of 0.23 per kilometer when the relative humidity is less than 70 percent. This standard is intended to limit the frequency and severity of visibility impairment due to regional haze and is equivalent to a 10-mile nominal visual range.

SOURCE: Bay Area Air Quality Management District (BAAQMD), Standards and Attainment Status, 2015, http://hank.baaqmd.gov/pln/air_quality/ambient_air_quality.htm, accessed October 13 2014; and U.S. EPA National Ambient Air Quality Standards, 2012, http://www.epa.gov/air/criteria.html, accessed October 13, 2014.

In 2010, the USEPA implemented a new 1-hour SO_2 standard presented in Table 5.4-2. The USEPA has initially designated the SFBAAB as an attainment area for SO_2. Similar to the new federal standard for NO_2, the USEPA has established requirements for a new monitoring network to measure SO_2 concentrations beginning in January 2013.[9] No additional SO_2 monitors are required for the Bay Area because the BAAQMD jurisdiction has never been designated as non-attainment for SO_2 and no State Implementation Plans or maintenance plans have been prepared for SO_2.[10]

Lead

Leaded gasoline (phased out in the United States beginning in 1973), paint (on older houses, cars), smelters (metal refineries), and manufacture of lead storage batteries have been the primary sources of lead released into the atmosphere. Lead has a range of adverse neurotoxic health effects, which put children at special risk. Some lead-containing chemicals cause cancer in animals. Lead levels in the air have decreased substantially since leaded gasoline was eliminated. Ambient lead concentrations are only monitored on an as-warranted, site-specific basis in California. On October 15, 2008, the USEPA strengthened the national ambient air quality standard for lead by lowering it from 1.5 $\mu g/m^3$ to 0.15 $\mu g/m^3$. The USEPA revised the monitoring requirements for lead in December 2010.[11] These requirements focus on airports and large urban areas resulting in an increase in 76 monitors nationally.[12] Lead monitoring stations in the Bay Area are located at Palo Alto Airport, Reid-Hillview Airport (San Jose), and San Carlos Airport. Non-airport locations for lead monitoring are Redwood City and San Jose.

Air Quality Index

The USEPA developed the Air Quality Index (AQI) scale to make the public health impacts of air pollution concentrations easily understandable. The AQI, much like an air quality "thermometer," translates daily air pollution concentrations into a number on a scale between 0 and 500. The numbers in the scale are divided into six color-coded ranges, with numbers 0-300 as outlined below.

- Green (0-50) indicates "good" air quality. No health impacts are expected when air quality is in the green range.
- Yellow (51-100) indicates air quality is "moderate." Unusually sensitive people should consider limited prolonged outdoor exertion.
- Orange (101-150) indicates air quality is "unhealthy for sensitive groups." Active children and adults, and people with respiratory disease, such as asthma, should limit outdoor exertion.

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9 U.S. EPA,2010a, *Fact Sheet: Revisions to the Primary National Ambient Air Quality Standard, Monitoring Network, and Data Reporting Requirements for Sulfur Dioxide*, June 2, 2010; http://www.epa.gov/air/sulfurdioxide/pdfs/20100602fs.pdf

10 BAAQMD, *2012 Air Monitoring Network Plan*, July 2013, www.baaqmd.gov/Divisions/Technical-Services/Ambient-Air-Monitoring/AAMN-Plan.aspx; p. 30

11 U.S. EPA, 2010b, *Fact Sheet Revisions to Lead Ambient Air Quality Monitoring Requirements*, http://www.epa.gov/air/lead/pdfs/Leadmonitoring_FS.pdf, accessed October 13, 2014.

12 U.S. EPA, Fact Sheet Revisions to Lead Ambient Air Quality Monitoring Requirements, http://www.epa.gov/air/lead/pdfs/Leadmonitoring_FS.pdf, accessed May 6, 2015.

- Red (151-200) indicates air quality is "unhealthy." Active children and adults, and people with respiratory disease, such as asthma should avoid prolonged outdoor exertion; everyone else, especially children, should limit prolonged outdoor exertion.
- Purple (201-300) indicates air quality is "very unhealthy." Active children and adults, and people with respiratory disease, such as asthma, should avoid prolonged outdoor exertion; everyone else, especially children, should limit outdoor exertion.

The AQI numbers refer to specific amounts of pollution in the air. They are based on the federal air quality standards for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, PM_{10}, and $PM_{2.5}$. In most cases, the federal standard for these air pollutants corresponds to the number 100 on the AQI chart. If the concentration of any of these pollutants rises above its respective standard, it can be unhealthy for the public. In determining the air quality forecast, local air districts, including the BAAQMD, use the anticipated concentration measurements for each of the major pollutants, convert them into AQI numbers, and determine the highest AQI for each zone in a district.

Readings below 100 on the AQI scale would not typically affect the health of the general public (although readings in the moderate range of 50 to 100 may affect unusually sensitive people). Levels above 300 rarely occur in the United States, and readings above 200 have not occurred in the Bay Area in decades.[13] Historical BAAQMD data indicate that the SFBAAB experienced air quality in the Red level (unhealthy) on two days between the years 2009 to 2013. As shown in **Table 5.4-3**, the SFBAAB had a total of 19 orange-level (unhealthy for sensitive groups) days in 2009, 14 days in 2010, 12 days in 2011, 8 days in 2012, and 15 days 2013.

TABLE 5.4-3
AIR QUALITY INDEX STATISTICS FOR THE SAN FRANCISCO BAY AREA AIR BASIN

	Number of Days by Year				
AQI Statistics for City of San Francisco	**2009**	**2010**	**2011**	**2012**	**2013**
Unhealthy for Sensitive Groups (Orange)	19	14	12	8	15
Unhealthy (Red)	0	1	0	0	1

SOURCE: Bay Area Air Quality Management District, 2014.

5.4.3.3 Toxic Air Contaminants and Local Health Risks and Hazards

In addition to criteria air pollutants, individual projects may emit toxic air contaminants (TACs). TACs collectively refer to a diverse group of air pollutants that are capable of causing chronic (i.e., of long duration) and acute (i.e., severe but short term) adverse effects to human health, including carcinogenic effects. Human health effects of TACs include birth defects, neurological damage, cancer, and death. There are hundreds of different types of TACs with varying degrees

13 Bay Area Air Quality Management District, 2014. Website: sparetheair.org/Stay-Informed/Todays-Air-Quality/Air-Quality-Index.aspx, accessed May 15, 2015.

of toxicity. Individual TACs vary greatly in the health risk they present; at a given level of exposure, one TAC may pose a hazard that is many times greater than another.

Unlike criteria air pollutants, TACs do not have ambient air quality standards but are regulated by the BAAQMD using a risk-based approach to determine which sources and pollutants to control as well as the degree of control. A health risk assessment (HRA) is an analysis which estimates human health exposure to toxic substances, and when considered together with information regarding the toxic potency of the substances, provides quantitative estimates of health risks.[14]

Air pollution does not affect every individual in the population in the same way, and some groups are more sensitive to adverse health effects than others. Land uses such as residences, schools, children's day care centers, hospitals, and nursing and convalescent homes are considered to be the most sensitive to poor air quality because the population groups associated with these uses have increased susceptibility to respiratory distress or, as in the case of residential receptors, their exposure time is greater than for other land uses. Therefore, these groups are referred to as sensitive receptors. Exposure assessment guidance typically assumes that people in residences would be exposed to air pollution 24 hours per day, 350 days per year, for 70 years. Therefore, assessments of air pollutant exposure to residents typically result in the greatest adverse health outcomes of all population groups.

Exposures to fine particulate matter ($PM_{2.5}$) are strongly associated with mortality, respiratory diseases, and lung development in children, and other endpoints such as hospitalization for cardiopulmonary disease.[15] In addition to $PM_{2.5}$, diesel particulate matter (DPM) is also of concern. The California Air Resources Board (CARB) identified DPM as a TAC in 1998, primarily based on evidence demonstrating cancer effects in humans.[16] The estimated cancer risk from exposure to diesel exhaust is much higher than the risk associated with any other TAC routinely measured in the region.

San Francisco Modeling of Air Pollutant Exposure Zones

In an effort to identify areas of San Francisco most adversely affected by sources of TACs, San Francisco partnered with the BAAQMD to inventory and assess air pollution and exposures from vehicles, stationary, and area sources within San Francisco. Citywide dispersion modeling was conducted using AERMOD[17] to assess the emissions from the following primary sources:

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14 In general, a health risk assessment is required if the BAAQMD concludes that projected emissions of a specific air toxic compound from a proposed new or modified source suggest a potential public health risk. The applicant is then subject to a health risk assessment for the source in question. Such an assessment generally evaluates chronic, long-term effects, estimating the increased risk of cancer as a result of exposure to one or more TACs.

15 SFDPH, *Assessment and Mitigation of Air Pollutant Health Effects from Intra-Urban Roadways: Guidance for Land Use Planning and Environmental Review,* May 2008.

16 California Air Resources Board (ARB), Fact Sheet, "The Toxic Air Contaminant Identification Process: Toxic Air Contaminant Emissions from Diesel-fueled Engines," October 1998.

17 AERMOD is the USEPA's preferred/recommended steady state air dispersion plume model. For more information on AERMOD and to download the AERMOD Implementation Guide see www.epa.gov/ttn/scram/dispersion_prefrec.htm#aermod (accessed May 20, 2014).

roadways, permitted stationary sources, port and maritime sources, and Caltrain. Emissions of PM_{10} (DPM is assumed equivalent to PM_{10}), $PM_{2.5}$, and total organic gases (TOG) were modeled on a 20 meter by 20 meter receptor grid covering the entire City. The results represent a comprehensive assessment of existing cumulative exposures to air pollution throughout the City. The methodology and technical documentation for modeling citywide air pollution is available in the document entitled, *The San Francisco Community Risk Reduction Plan: Technical Support Documentation*.[18]

Model results identified areas in the City with poor air quality, termed "Air Pollutant Exposure Zones," based on the following health-protective criteria: (1) cumulative $PM_{2.5}$ concentrations greater than 10 $\mu g/m^3$, and/or (2) excess cancer risk from the contribution of emissions from all modeled sources greater than 100 per one million population. An additional health vulnerability layer was incorporated in the Air Pollutant Exposure Zone for those San Francisco ZIP codes in the worst quintile of Bay Area Health Vulnerability scores (ZIP Codes 94102, 94103, 94105, 94124, and 94130). In these areas, the standard for identifying areas as being within the zone were lowered to: (1) excess cancer risk from the contribution of emissions from all modeled sources greater than 90 per one million population, and/or (2) cumulative $PM_{2.5}$ concentrations greater than 9 $\mu g/m^3$. Lastly, all parcels within 500 feet of a major freeway were also included in the Air Pollutant Exposure Zone, consistent with findings in CARB's *Air Quality and Land Use Handbook: A Community Health Perspective*, which suggests air pollutant levels decrease substantially at about 500 feet from a freeway.[19]

The proposed project at Mission Bay Blocks 29-32 is not located within an Air Pollutant Exposure Zone.

Fine Particulate Matter

In April 2011, the USEPA published *Policy Assessment for the Particulate Matter Review of the National Ambient Air Quality Standards*. In this document, USEPA staff concludes that the then-current federal annual $PM_{2.5}$ standard of 15 $\mu g/m^3$ should be revised to a level within the range of 13 to 11 $\mu g/m^3$, with evidence strongly supporting a standard within the range of 12 to 11 $\mu g/m^3$. Air Pollutant Exposure Zones for San Francisco are based on the health protective $PM_{2.5}$ standard of 11 $\mu g/m^3$, as supported by the USEPA's Particulate Matter Policy Assessment, although lowered to 10 $\mu g/m^3$ to account for uncertainty in accurately predicting air pollutant concentrations using emissions modeling programs.

[18] Bay Area Air Quality Management District, San Francisco Department of Public Health, and San Francisco Planning Department, *The San Francisco Community Risk Reduction Plan: Technical Support Documentation*, December 2012. Available online at ftp.baaqmd.gov/pub/CARE/SFCRRP/ SF_CRRP_Methods_and_Findings _v9.pdf Accessed February 25, 2015.

[19] California Air Resources Board, *Air Quality and Land Use Handbook: A Community Health Perspective*, April 2005 (hereinafter "ARB Air Quality and Land Use Handbook"). Available at http://www.arb.ca.gov/ch/handbook.pdf. Accessed January 29, 2015.

Excess Cancer Risk

The 100 per one million persons (100 excess cancer risk) criterion discussed above is based on USEPA guidance for conducting air toxic analyses and making risk management decisions at the facility and community-scale level.[20] As described by the BAAQMD, the USEPA considers a cancer risk of 100 per million to be within the "acceptable" range of cancer risk. Furthermore, in the 1989 preamble to the benzene National Emissions Standards for Hazardous Air Pollutants (NESHAP) rulemaking,[21] the USEPA states that it "…strives to provide maximum feasible protection against risks to health from hazardous air pollutants by (1) protecting the greatest number of persons possible to an individual lifetime risk level no higher than approximately one in one million and (2) limiting to no higher than approximately one in ten thousand [100 in one million] the estimated risk that a person living near a plant would have if he or she were exposed to the maximum pollutant concentrations for 70 years." The 100 per one million excess cancer cases is also consistent with the ambient cancer risk in the most pristine portions of the Bay Area based on BAAQMD regional modeling.[22]

In addition to monitoring criteria pollutants, both the BAAQMD and CARB operate TAC monitoring networks in the SFBAAB. These stations measure 10 to 15 TACs, depending on the specific station. The TACs selected for monitoring are those that have traditionally been found in the highest concentrations in ambient air and therefore tend to produce the most significant risk. The nearest BAAQMD ambient TAC monitoring station to the project area is the station at 16th and Arkansas Streets in San Francisco. **Table 5.4-4** shows ambient concentrations of carcinogenic TACs measured at the Arkansas Street station, approximately one half mile west of the project site. The estimated cancer risk from a lifetime exposure (70 years) to these substances is also reported in the table. When TAC measurements at this station are compared to ambient concentrations of various TACs for the Bay Area as a whole, the cancer risks associated with mean TAC concentrations in San Francisco are similar to those for the Bay Area as a whole. Therefore, the estimated average lifetime cancer risk resulting from exposure to TAC concentrations monitored at the San Francisco station do not appear to be any greater than for the Bay Area as a region.

Roadway-Related Pollutants

Motor vehicles are responsible for a large share of air pollution, especially in California. Vehicle tailpipe emissions contain diverse forms of particles and gases, and vehicles also contribute to particulates by generating road dust through tire wear. Epidemiologic studies have demonstrated that people living in proximity to freeways or busy roadways have poorer health outcomes, including increased asthma symptoms and respiratory infections and decreased pulmonary function and lung development in children. Air pollution monitoring conducted in conjunction

[20] BAAQMD, *Revised Draft Options and Justification Report, California Environmental Quality Act Thresholds of Significance,* October 2009, page 67.
[21] 54 Federal Register 38044, September 14, 1989.
[22] BAAQMD, *Revised Draft Options and Justification Report, California Environmental Quality Act Thresholds of Significance,* October 2009, page 67.

TABLE 5.4-4
2013 ANNUAL AVERAGE AMBIENT CONCENTRATIONS OF CARCINOGENIC TOXIC AIR CONTAMINANTS MEASURED AT BAAQMD MONITORING STATION, 10 ARKANSAS STREET, SAN FRANCISCO

Substance	Concentration	Cancer Risk per Million[a]
Gaseous TACs	**(ppb)**	
Acetaldehyde	0.56	3
Benzene	0.20	19
1,3-Butadiene	0.036	13
Carbon Tetrachloride	0.085	23
Formaldehyde	1.37	10
Perchloroethylene	0.012	0.5
Methylene Chloride	0.124	0.4
Chloroform	0.023	0.6
Trichloroethylene	0.01	0.1
Particulate TACs	**(ng/m^3)**	
Chromium (Hexavalent)	0.053	8
Total Risk for All TACs		**77.6**

NOTES:
TACs = toxic air contaminants; BAAQMD = Bay Area Air Quality Management District; ppb = part per billion; ng/m^3 = nanograms per cubic meter.

[a] Cancer risks were estimated by applying published unit risk values to the measured concentrations.

SOURCE: California Air Resources Board, *Ambient Air Toxics Summary-2013*, available online at: http://www.arb.ca.gov/adam/toxics/sitesubstance.htmlAccesssed February 25, 2015.

with epidemiologic studies has confirmed that roadway-related health effects vary with modeled exposure to particulate matter and nitrogen dioxide. In traffic-related studies, the additional non-cancer health risk attributable to roadway proximity was seen within 1,000 feet of the roadway and was strongest within 300 feet.[23] As a result, the CARB recommends that new sensitive land uses not be located within 500 feet of a freeway or urban roads carrying 100,000 vehicles per day. In 2008, the City and County of San Francisco (CCSF) adopted amendments to the Health Code (discussed below under "Regulatory Framework"), by adding Article 38 (amended in 2014) requiring urban infill sensitive use projects within the Air Pollutant Exposure Zone to address air pollution hazards through design and ventilation requirements.

Diesel Particulate Matter (DPM)

The CARB identified diesel particulate matter (DPM) as a toxic air contaminant in 1998, primarily based on evidence demonstrating cancer effects in humans. The exhaust from diesel engines includes hundreds of different gaseous and particulate components, many of which are toxic. Mobile sources such as trucks and buses are among the primary sources of diesel emissions, and concentrations of DPM are higher near heavily traveled highways. The CARB estimated average

[23] California Air Resources Board, *Air Quality and Land Use Handbook: A Community Health Perspective*, April 2005 (hereinafter "ARB Air Quality and Land Use Handbook"). Available at http://www.arb.ca.gov/ch/handbook.pdf. Accessed February 25, 2015.

Bay Area cancer risk from exposure to diesel particulate, based on a population-weighted average ambient diesel particulate concentration, is about 480 in one million, as of 2000, which is much higher than the risk associated with any other toxic air pollutant routinely measured in the region. The statewide risk from DPM as determined by the CARB declined from 750 in one million in 1990 to 570 in one million in 1995; by 2000, CARB estimated the average statewide cancer risk from DPM at 540 in one million.[24,25]

In 2000, the CARB approved a comprehensive Diesel Risk Reduction Plan to reduce diesel emissions from both new and existing diesel-fueled vehicles and engines. Subsequent CARB regulations apply to new trucks and diesel fuel. With new controls and fuel requirements, 60 trucks built in 2007 would have the same particulate exhaust emissions as one truck built in 1988.[26] The regulation is anticipated to result in an 80-percent decrease in statewide diesel health risk in 2020 as compared with the diesel risk in 2000. Despite notable emission reductions, the CARB recommends that proximity to sources of DPM emissions be considered in the siting of new sensitive land uses. The CARB notes that these recommendations are advisory and should not be interpreted as defined "buffer zones," and that local agencies must balance other considerations, including transportation needs, the benefits of urban infill, community economic development priorities, and other quality of life issues. With careful evaluation of exposure, health risks, and affirmative steps to reduce risk where necessary, the CARB's position is that infill development, mixed use, higher density, transit-oriented development, and other concepts that benefit regional air quality can be compatible with protecting the health of individuals at the neighborhood level.[27]

Contaminated Soil

The Mission Bay FSEIR Contaminated Soil and Groundwater section included Mitigation Measures J.1a through J.1k requiring preparation of a Risk Management Plan or Plans (RMP) incorporating specific measures that would provide for the management of risks associated with exposure to contaminated soil and groundwater and would be protective of human health and the aquatic environment. The potential for exposure impacts from contaminated soil was addressed in the Initial Study (Appendix NOP-IS, page 120), which found that compliance with the RMP, as required by the deed restriction, would ensure that human health and environmental risks during and after development of the proposed project would be within acceptable levels.

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24 CARB, *California Almanac of Emissions and Air Quality - 2009 Edition*, Table 5-44 and Figure 5-12, http://www.arb.ca.gov/aqd/almanac/almanac09/chap509.htm, accessed May 16, 2011.

25 This calculated cancer risk value from ambient air exposure in the Bay Area can be compared against the lifetime probability of being diagnosed with cancer in the United States, from all causes, which for men is more than 40 percent (based on a sampling of 17 regions nationwide), or greater than 400,000 in one million, according to the American Cancer Society. (American Cancer Society, " last revised October. 1, 2014, available online at http://www.cancer.org/cancer/cancerbasics/lifetime-probability-of-developing-or-dying-from-cancer.)

26 Pollution Engineering, *New Clean Diesel Fuel Rules Start*. July, 2006 Available online at http://www.pollutionengineering.com/articles/85480-new-clean-diesel-fuel-rules-start. Accessed April 15, 2013.

27 California Air Resources Board, *Air Quality and Land Use Handbook: A Community Health Perspective*, April 2005 (hereinafter "ARB Air Quality and Land Use Handbook"). Available at http://www.arb.ca.gov/ch/handbook.pdf.Accessed February 25, 2015.

Naturally Occurring Asbestos

The potential for exposure impacts from naturally occurring asbestos was addressed in the Initial Study (Appendix NOP-IS, page 115), which found that this impact would be potentially significant because no sampling has been conducted to establish the asbestos content in the fill materials that would be excavated during construction. This impact would be reduced to a less-than-significant level with implementation of Mitigation Measure M-HZ-1b, identified in the Initial Study, requiring the project sponsor to implement a geologic investigation to assess the naturally occurring asbestos content of the fill materials. This mitigation also requires the project sponsor to implement the requirements of the asbestos Air Toxics Control Measure (ATCM), including implementation of a Dust Mitigation Plan for naturally-occurring asbestos, if the investigation determines that the asbestos content of the fill is 0.25 percent or greater. Implementation of this measure would ensure that if naturally occurring asbestos is present, no visible dust crosses the project boundaries, and the measure could also require air monitoring to demonstrate compliance with this criterion if deemed necessary by the BAAQMD. Rock containing naturally occurring asbestos that would be disposed of off-site would not be considered a hazardous waste under California regulations.[28]

5.4.3.4 Sensitive Receptors

Air quality does not affect every individual in the population in the same way, and some groups are more sensitive to adverse health effects than others. Population subgroups sensitive to the health effects of air pollutants include: the elderly and the young; population subgroups with higher rates of respiratory disease, such as asthma and chronic obstructive pulmonary disease; and populations with other environmental or occupational health exposures (e.g., indoor air quality) that affect cardiovascular or respiratory diseases. The BAAQMD defines sensitive receptors as children, adults, and seniors occupying or residing in residential dwellings, schools, day care centers, hospitals, and senior-care facilities. Workers are not considered sensitive receptors because all employers must follow regulations set forth by the Occupation Safety and Health Administration (OSHA) to ensure the health and well-being of their employees.[29]

The proximity of sensitive receptors to motor vehicles is an air pollution concern, especially in San Francisco where building setbacks are limited and roadway volumes are higher than most other parts of the Bay Area. Vehicles also contribute to particulates by generating road dust and through tire wear.

The closest (within 1,000 feet) sensitive receptors to the project site are inventoried in **Table 5.4-5**. As shown in Table 5.4-5, sensitive receptors include residential uses north and west of the project site (including UCSF Hearst Tower) and the new UCSF Hospital located to the southwest. The nearest day care facility is on the UCSF Mission Bay campus 1,300 feet to the west. Other residential uses to the south are over 1,000 feet away, south of Mariposa Street. None of the receptors in

28 Department of Toxic Substances Control, 2000. *Letter to Jon A. Morgan, Director, Environmental Management Department, County of El Dorado. Naturally Occurring Asbestos.* January 20.

29 BAAQMD, Recommended Methods for Screening and Modeling Local Risks and Hazards, May 2011, page 12.

Table 5.4-5 are located within an Air Pollutant Exposure Zone, nor are there any sensitive receptors within 1,000 feet of the project site that are located within an Air Pollutant Exposure Zone.

TABLE 5.4-5
SENSITIVE RECEPTORS IN THE PROJECT SITE VICINITY

Receptor Type	Distance and Direction from the Project Site
Residential: UCSF Mission Bay Housing (Hearst Tower), Block 22	200 feet northwest
Residential: Madrone Mission Bay Residential Towers	800 feet to the north, on Mission Bay Boulevard North
Hospital: UCSF Benioff Children's Hospital facility at Mission Bay, plus the UCSF Betty Irene Moore Women's Hospital and the UCSF Bakar Cancer Hospital	300 feet southwest

SOURCE: Environmental Science Associates, 2015

5.4.3.5 Existing Stationary Sources of Air Pollution

The BAAQMD's inventory of permitted stationary sources of emissions show eight permitted stationary emission facilities present within or near the 1,000-foot zone of influence of the project site. The sources at these permitted facilities are made up of boilers, stationary diesel engines for back-up power generators or fire water pump engines, which are for emergency use only, and one body shop. The UCSF Mission Bay Campus has the largest number of permitted sources (34) which, besides generators and boilers, also include an ethylene oxide sterilizer. Additionally UCSF has two exempt sources (fume hoods and a methane gas blower).

5.4.3.6 Major Roadways Contributing to Air Pollution

Third, 16th Street and Mariposa Streets are arterial streets in the existing local roadway system within 1,000-feet of the project site that carry at least 10,000 vehicles in annual average daily traffic based on the City's SF CHAMP roadway model.[30] This traffic contributes to concentrations of $PM_{2.5}$, DPM, and other air contaminants emitted from motor vehicles near the street level. Both Interstate 280 and the Caltrain rail line are located over 1,000 feet from the project site. Aside from the surrounding major roadways, no other areas of mobile-source activity or otherwise "non-permitted" sources (e.g., railyards, trucking distribution facilities, and high-volume fueling stations) are located within 1,000 feet of the project site.

[30] San Francisco Metropolitan Transportation Agency, Chained Activity Modeling Process version 4.3.0, Average Daily Traffic Volumes, provided to ESA August 2, 2012.

5.4.4 Regulatory Framework

5.4.4.1 Federal Regulations

The 1970 Clean Air Act (last amended in 1990) requires that regional planning and air pollution control agencies prepare a regional air quality plan to outline the measures by which both stationary and mobile sources of pollutants will be controlled in order to achieve all standards by the deadlines specified in the act. These ambient air quality standards are intended to protect the public health and welfare, and they specify the concentration of pollutants (with an adequate margin of safety) to which the public can be exposed without adverse health effects. They are designed to protect those segments of the public most susceptible to respiratory distress, including asthmatics, the very young, the elderly, people weak from other illness or disease, or persons engaged in strenuous work or exercise. Healthy adults can tolerate occasional exposure to air pollution levels that are somewhat above ambient air quality standards before adverse health effects are observed.

The current attainment status for the SFBAAB, with respect to federal standards, is summarized above in Table 5.4-2. In general, the SFBAAB experiences low concentrations of most pollutants when compared to federal standards, except for ozone and particulate matter (PM_{10} and $PM_{2.5}$), for which standards are exceeded periodically (see Table 5.4-1).

There have been changes to the federal regulatory environment with respect to air quality since certification of the Mission Bay FSEIR in 1998. In June 2004, the Bay Area was designated as a marginal nonattainment area of the national 8-hour ozone standard.[31] The USEPA lowered the national 8-hour ozone standard from 0.080 to 0.075 parts per million (ppm) effective May 27, 2008. In April 2012, the USEPA designated the Bay Area as a marginal nonattainment region for the 0.075 ppm ozone standard established in 2008 (USEPA, 2012b). The Bay Area Air Basin is in attainment for other criteria pollutants, with the exception of the 24-hour standards for PM_{10} and $PM_{2.5}$, for which the Bay Area is designated as "Unclassified." "Unclassified" is defined by the Clean Air Act as any area that cannot be classified, on the basis of available information, as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

5.4.4.2 State Regulations

California Clean Air Act

While the federal Clean Air Act established national ambient air quality standards, individual states retained the option to adopt more stringent standards and to include other pollution sources. California had already established its own air quality standards when federal standards were established, and because of the unique meteorological problems in California, there is considerable diversity between the state and national ambient air quality standards, as shown in Table 5.4-2. California ambient standards tend to be at least as protective as national ambient standards and are

[31] "Marginal nonattainment area" means an area that has a design value of 0.076 up to but not including 0.086 ppm. A design value is the mathematically determined pollutant concentration at a particular site that must be reduced to, or maintained at or below the National Ambient Air Quality Standard to assume attainment.

often more stringent. Since certification of the Mission Bay FSEIR in 1998, the state has adopted an ambient air quality standard for $PM_{2.5}$ and strengthened the ambient ozone standards.

In 1988, California passed the California Clean Air Act (California Health and Safety Code Sections 39600 et seq.), which, like its federal counterpart, called for the designation of areas as attainment or nonattainment, but based on state ambient air quality standards rather than the federal standards. As indicated in Table 5.4-2, the Bay Area Air Basin is designated as "nonattainment" for state ozone, PM_{10}, and $PM_{2.5}$ standards. The Bay Area Air Basin is designated as "attainment" for other pollutants.

Toxic Air Contaminants

In 2005, the CARB approved a regulatory measure to reduce emissions of toxic and criteria pollutants by limiting the idling of new heavy-duty diesel vehicles. The regulations generally limit idling of commercial motor vehicles (including buses and trucks) within 100 feet of a school or residential area for more than five consecutive minutes or periods aggregating more than five minutes in any one hour. Buses or vehicles also must turn off their engines upon stopping at a school and must not turn their engines on more than 30 seconds before beginning to depart from a school. Also, state law Senate Bill 352 (SB 352) was adopted in 2003 and limits locating public schools within 500 feet of a freeway or busy traffic corridor (Section 17213 of the Education Code; Section 21151.8 of the Public Resources Code).

The Carl Moyer Memorial Air Quality Standards Attainment Program (Carl Moyer Program)

The Carl Moyer Program is a grant program that reduces air pollution from vehicles and equipment by providing funds to replace or retrofit older equipment or engines with cleaner-than-(U.S. EPA) required engines, equipment, and other sources of air pollution such as ground support equipment at airports. Money collected through the Carl Moyer Program complements California's regulatory program by providing incentives to effect early or extra emission reductions, especially from emission sources in environmental justice communities and areas disproportionately impacted by air pollution. The Carl Moyer Program funds clean air projects involving a wide variety of vehicles and equipment, including:

- Repower: The replacement of an in-use engine with another, cleaner engine.
- Retrofit: An emission control system employed exclusively with an in-use engine, vehicle or piece of equipment.
- New purchases: Vehicles or equipment certified to optional, lower emission standards.
- Fleet modernization or equipment replacement: The replacement of an older vehicle or piece of equipment that still has remaining useful life with a newer, cleaner vehicle or piece of equipment. The old vehicle/equipment is scrapped. Equipment may include on-road heavy-duty vehicle and off-road equipment replacement as well as emergency vehicles (Fire Apparatus) and lawn and garden equipment replacement.

- Vehicle retirement (or car scrap): Paying owners of older, more polluting vehicles that still have remaining useful life to voluntarily retire those vehicles earlier than they would have otherwise

The Carl Moyer program establishes a cost effectiveness standard that a proposed clean air project must meet in order to receive funding under the program. On March 27, 2015, the cost effectiveness limit was updated to $18,030 per weighted ton of ROG, NOx and PM in resulting emissions reductions.[32] The program has established guidelines and criteria for the funding of emissions reduction projects. The BAAQMD administers the Carl Moyer program within the SFBAAB.

5.4.4.3 Regional and Local Regulations and Plans

Bay Area Air Quality Management District

The BAAQMD is the regional agency with jurisdiction over the nine-county region located in the SFBAAB. The Association of Bay Area Governments (ABAG), Metropolitan Transportation Commission (MTC), county transportation agencies, cities and counties, and various non-governmental organizations also participate in the efforts to improve air quality through a variety of programs. These programs include the adoption of regulations and policies, as well as implementation of extensive education and public outreach programs. BAAQMD is responsible for attaining and/or maintaining air quality in the region within federal and state air quality standards. Specifically, BAAQMD has the responsibility to monitor ambient air pollutant levels throughout the region and to develop and implement strategies to attain the applicable federal and state standards.

BAAQMD does not have authority to regulate emissions from motor vehicles. Specific rules and regulations adopted by the BAAQMD limit the emissions that can be generated by various stationary sources, and identify specific pollution reduction measures that must be implemented in association with various activities. These rules regulate not only emissions of the six criteria air pollutants, but also TAC emissions sources are subject to these rules and are regulated through the BAAQMD's permitting process and standards of operation. Through this permitting process, including an annual permit review, the BAAQMD monitors the generation of stationary emissions and uses this information in developing its air quality plans. Any sources of stationary emissions constructed as part of the project would be subject to the BAAQMD Rules and Regulations. Both federal and State ozone plans rely heavily upon stationary source control measures set forth in BAAQMD's Rules and Regulations.

Per its Policy and Procedure Manual, the BAAQMD requires implementation of Best Available Control Technology for Toxics and would deny an *Authority to Construct* or a *Permit to Operate* for any new or modified source of TACs that exceeds a cancer risk of 10 in one million or a chronic or acute hazard index of 1.0. The permitting process under BAAQMD Regulation 2 Rule 5 requires a

[32] California Air Resources Board. Memorandum Re: Carl Moyer Program: Review and Update of the Cost-Effectiveness Limit and Capital Recovery Factors for 2015. March 27, 2015. Available online at: http://www.arb.ca.gov/msprog/mailouts/msc1509/msc1509.pdf. Accessed April 24, 2015.

Health Risk Screening Analysis, the results of which are posted on the District's website. These permitting requirements would ensure that the health risks of the project on the environment would be less than significant.

BAAQMD's Strategic Incentives Division (SID) provides incentive funding for projects that improve air quality, reduce air quality health impacts and protect the climate. Funding is primarily focused on mobile source projects that reduce or eliminate pollution from cars, trucks, marine vessels, locomotives, agricultural equipment or construction equipment. Since 1992, the SID division has awarded over $400 million in grant funding for cost-effective emission reduction projects and the program oversees approximately 1,000 projects funded by state, federal and local monies every year.

One such program administered by the SID is its Vehicle Buy Back Program (VBB). The VBB Program is a voluntary program that takes older vehicles off the road. Under this program, BAAQMD pays $1,000 for an operating and registered 1994 and older vehicle. The vehicles are then scrapped by vehicle dismantlers contracted by BAAQMD. Each vehicle removed from Bay Area roads results in an estimated reduction of 75 pounds of air pollution annually. The VBB Program is funded through the Air District's Carl Moyer, Mobile Source Incentive Fund and Transportation Fund for Clean Air (TFCA) programs. Eligibility requirements for the Vehicle Buy Back Program include:

- Vehicle must be 1994 model year or older;
- Vehicle must be currently registered as operable and must be drivable;
- Vehicle must have been registered in the Bay Area for the past 24 months;
- Vehicles within 60 days of a required smog check must take and pass their smog check.

Bay Area Air Quality Planning Relative to State and Federal Standards

Air quality plans developed to meet federal requirements are referred to as State Implementation Plans. The federal and state Clean Air Acts require plans to be developed for areas designated as nonattainment (with the exception of areas designated as nonattainment for the state PM_{10} standard). Since certification of the Mission Bay FSEIR in 1998, the most recent Bay Area ozone plan prepared in response to federal air quality planning requirements is the 2001 Ozone Attainment Plan. The State ozone plan has been updated multiple times since certification of the FSEIR.

The *2010 Bay Area Clean Air Plan* was adopted on September 15, 2010, by the BAAQMD, in cooperation with the Bay Area MTC, the Bay Conservation and Development Commission (BCDC), and ABAG. The primary objectives of the plan are to improve local and regional air quality, protect public health, and minimize climate change impacts. The *2010 Clean Air Plan* updates and replaces the *2005 Ozone Strategy* in accordance with the requirements of the California Clean Air Act to implement "all feasible measures" to reduce ozone; provide a control strategy to reduce ozone, particulate matter, toxic air contaminants, and greenhouse gases in a single, integrated plan; review progress in improving air quality in recent years; and establish emission control measures to be adopted or implemented in the 2010–2012 time frame. The control strategy includes stationary-source control measures to be implemented through

BAAQMD regulations; mobile-source control measures to be implemented through incentive programs and other activities; and transportation control measures to be implemented through transportation programs in cooperation with the MTC, local governments, transit agencies, and others. The *2010 Clean Air Plan* also represents the Bay Area's most recent triennial assessment of the region's strategy to attain the state one-hour ozone standard.[33]

San Francisco General Plan Air Quality Element

The *San Francisco General Plan* (General Plan) includes the 1997 Air Quality Element.[34] The objectives specified by the City include the following:

> ***Objective 1*****:** Adhere to state and federal air quality standards and regional programs.
>
> ***Objective 2*****:** Reduce mobile sources of air pollution through implementation of the Transportation Element of the General Plan.
>
> ***Objective 3*****:** Decrease the air quality impacts of development by coordination of land use and transportation decisions.
>
> ***Objective 4*****:** Minimize particulate matter emissions from road and construction sites.
>
> ***Objective 5*****:** Link the positive effects of energy conservation and waste management to emission reductions.

San Francisco Construction Dust Control Ordinance

Since certification of the Mission Bay FSEIR in 1998, the City has adopted San Francisco Health Code Article 22B and San Francisco Building Code Section 106.A.3.2.6, which collectively constitute the Construction Dust Control Ordinance (adopted in July 2008). The ordinance requires that all site preparation work, demolition, or other construction activities within San Francisco that have the potential to create dust or to expose or disturb more than 10 cubic yards or 500 square feet of soil comply with specified dust control measures whether or not the activity requires a permit from the Department of Building Inspection (DBI). For projects over one-half acre, the Dust Control Ordinance requires that the project sponsor submit a Dust Control Plan for approval by the San Francisco Department of Public Health (DPH) prior to issuance of a building permit by the DBI.

Building permits will not be issued without written notification from the Director of Public Health that the applicant has a site-specific Dust Control Plan, unless the Director waives the requirement. The Construction Dust Control Ordinance requires project sponsors and contractors responsible for construction activities to control construction dust on the site or implement other practices that result in equivalent dust control that are acceptable to the Director of Public Health.

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[33] BAAQMD, *2010 Clean Air Plan*. Available online at http://www.baaqmd.gov/Divisions/Planning-and-Research/Plans/Clean-Air-Plans.aspx Accessed on April 15, 2013.

[34] San Francisco Planning Department, Air Quality Element of the *San Francisco General Plan*, July 1997, updated in 2000.

Dust suppression activities may include watering of all active construction areas sufficiently to prevent dust from becoming airborne; increased watering frequency may be necessary whenever wind speeds exceed 15 miles per hour. Reclaimed water must be used if required by Article 21, Section 1100 et seq. of the San Francisco Public Works Code.

The project site is over 11 acres in size, and therefore the project sponsor would be required to prepare a Dust Control Plan.

San Francisco Health Code Provisions for Urban Infill Development (Article 38)

San Francisco adopted Article 38 of the San Francisco Health Code in 2008, with revisions taking effect in December 2014. The revised code requires that sensitive land use developments within the Air Pollutant Exposure Zone incorporate Minimum Efficiency Reporting Value (MERV) 13 equivalent ventilation systems to remove particulates from outdoor air. This regulation also applies to conversion of uses to a sensitive use (e.g., residential, senior care-facilities, day care centers, etc.). Article 38 would not be applicable to the proposed project because it does not include any sensitive uses.

5.4.5 Impacts and Mitigation Measures

5.4.5.1 Significance Thresholds

For the impacts analyzed in this section, the project would have a significant impact related to air quality if it were to:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors);
- Expose sensitive receptors to substantial pollutant concentrations; or
- Result in a cumulative air quality impact in combination with past, present and reasonably foreseeable future projects in the vicinity.

The complete list of CEQA significance criteria relevant to the air quality analysis is included in the Initial Study (see Appendix NOP-IS, page 60), which also explains why the proposed project would not result in new significant impacts or substantially increase the severity of impacts on air quality with respect to odors. Therefore, odors are not addressed in this SEIR.

5.4.5.2 Approach to Analysis

Air quality analysis conducted for this impact assessment employs the emission factors, models and tools distributed by a variety of agencies including CARB, the California Air Pollution Officers Association (CAPCOA), the California Office of Environmental Health Hazard Assessment (OEHHA) and USEPA. Additionally, the analysis includes methodologies identified in the BAAQMD *CEQA Air Quality Guidelines* (May 2012).

Methodology for Analysis of Impacts

In general, the proposed project would result in two types of air quality impacts. First, the project would result in air pollution through construction activity. Second, the project would generate air pollutants during project operations, due to increased vehicle travel and new stationary sources (i.e., five new diesel emergency generators). This section describes the methodology used to evaluate project impacts related to consistency with the Clean Air Plan, emissions of criteria pollutants, and local health risks and hazards.

Each of these types of direct impacts are in turn separated into impacts from criteria air pollutant emissions, which are generally regional in nature, and impacts associated with exposure to toxic air contaminants (TACs) and $PM_{2.5}$, which is a localized health risk. The assessment of criteria air pollutant impacts addresses the second and third bulleted significance thresholds identified above. The assessment of localized health risk and exposure impacts addresses the fourth bulleted significance thresholds identified above.

Air Quality Plan

The applicable air quality plan is the BAAQMD's 2010 Clean Air Plan, which identifies measures to reduce emissions and ambient concentrations of air pollutants; safeguard public health by reducing exposure to air pollutants that pose the greatest health risk, with an emphasis on protecting the communities most heavily affected by air pollution; and reduce greenhouse gas emissions. Consistency with the Clean Air Plan can be determined if the project supports the goals of the Clean Air Plan, includes applicable control measures from the Clean Air Plan, and if the project would not disrupt or hinder implementation of any control measures from the Clean Air Plan. Consistency with this plan is the basis for determining whether the proposed project would conflict with or obstruct implementation of an applicable air quality plan, the first bulleted significance criterion identified above.

Criteria Air Pollutants

As described above under Regulatory Framework, the SFBAAB experiences low concentrations of most pollutants when compared to federal or State standards and is designated as either in attainment or unclassified for most criteria pollutants, with the exception of ozone, $PM_{2.5}$, and PM_{10}, for which these pollutants are designated as non-attainment for either the State or federal standards.

By definition, regional air pollution is largely a cumulative impact in that no single project is sufficient in size to, by itself, result in non-attainment of air quality standards. Instead, a project's individual emissions are considered to contribute to the existing, cumulative air quality conditions. If a project's contribution to cumulative air quality conditions is considerable, then the project's impact on air quality would be considered significant.[35]

Table 5.4-6 identifies criteria air pollutant significance thresholds followed by a discussion of each threshold. Projects that would result in criteria pollutant emissions below these significance thresholds would not violate an air quality standard, contribute substantially to an air quality violation, or result in a cumulatively considerable net increase in criteria air pollutants within the SFBAAB.

TABLE 5.4-6
CRITERIA AIR POLLUTANT THRESHOLDS

Pollutant	Construction Thresholds Average Daily Emissions (pounds per day)	Operational Thresholds	
		Average Daily Emissions (pounds per day)	Maximum Annual Emissions (tons per year)
ROG	54	54	10
NOx	54	54	10
PM_{10}	82 (exhaust)	82	15
$PM_{2.5}$	54 (exhaust)	54	10
Fugitive Dust	Construction Dust Ordinance or other Best Management Practices	Not applicable	

SOURCE: BAAQMD, CEQA Air Quality Guidelines. June 2011. Available at www.baaqmd.gov

The potential for a project to result in a cumulatively considerable net increase in criteria air pollutants that may contribute to an existing or projected air quality violation is based on the State and federal Clean Air Acts emissions limits for stationary sources. To ensure that new stationary sources do not cause or contribute to a violation of an air quality standard, BAAQMD Regulation 2, Rule 2 requires that any new source that emits criteria air pollutants above a specified emissions limit must offset those emissions. For ozone precursors ROG and NOx, the offset emissions level is an annual average of 10 tons per year (or 54 pounds (lbs.) per day).[36] These levels represent emissions below which new sources are not anticipated to contribute to an air quality violation or result in a considerable net increase in criteria air pollutants that could result in increased health effects.

[35] Bay Area Air Quality Management District, *CEQA Air Quality Guidelines*, May 2012.
[36] Bay Area Air Quality Management District, *Revised Draft Options and Justification Report, California Environmental Quality Act Thresholds of Significance*, page 17, October 2009.

The federal New Source Review (NSR) program was created under the federal Clean Air Act to ensure that stationary sources of air pollution are constructed in a manner that is consistent with attainment of federal health-based ambient air quality standards. For PM_{10} and $PM_{2.5}$, the emissions limit under NSR is 15 tons per year (82 lbs. per day) and 10 tons per year (54 lbs. per day), respectively. These emissions limits represent levels at which a source is not expected to have a significant impact on air quality.[37]

Although the regulations specified above apply to new or modified stationary sources, land use development projects generate ROG, NO_x, PM_{10}, and $PM_{2.5}$ emissions as a result of increases in vehicle trips, energy use, architectural coating, and construction activities. Therefore, the identified thresholds can be applied to the construction and operational phases of land use projects. Those projects that would result in emissions below these thresholds would not be considered to contribute to an existing or projected air quality violation or result in a considerable net increase in ozone precursors or particulate matter. Due to the temporary nature of construction activities, only the average daily thresholds are applicable to construction phase emissions.

Fugitive dust emissions are typically generated during construction phases. Studies have shown that the application of best management practices (BMPs) at construction sites significantly control fugitive dust[38]and individual measures have been shown to reduce fugitive dust by anywhere from 30 to 90 percent.[39] The BAAQMD has identified a number of BMPs to control fugitive dust emissions from construction activities.[40] San Francisco's Construction Dust Control Ordinance requires a number of fugitive dust control measures to ensure that construction projects do not result in visible dust. This analysis assumes that the project would implement the requirements of the Construction Dust Control Ordinance, which is the basis for determining the significance of air quality impacts due to fugitive dust emissions.

Other Criteria Pollutants

Regional concentrations of CO in the Bay Area have not exceeded the state standards in the past 11 years and SO_2 concentrations have never exceeded the standards. The primary source of CO emissions from development projects is vehicle traffic. Construction-related SO_2 emissions represent a negligible portion of the total basin-wide emissions and construction-related CO emissions represent less than five percent of the Bay Area total basin-wide CO emissions. As discussed previously, the Bay Area is in attainment for both CO and SO_2. Furthermore, the BAAQMD has demonstrated, based on modeling, that in order to exceed the California ambient air quality standard of 9.0 ppm (8-hour average) or 20.0 ppm (1-hour average) for CO, project traffic in addition to existing traffic would need to exceed 44,000 vehicles per hour at affected intersections (or 24,000 vehicles per hour where vertical and/or horizontal mixing is limited). The transportation analysis indicates that the intersection in the project area with the greatest volumes would be Fifth

37 Bay Area Air Quality Management District, *Revised Draft Options and Justification Report, California Environmental Quality Act Thresholds of Significance,* page 16, October 2009.
38 Western Regional Air Partnership, *WRAP Fugitive Dust Handbook,* September 7, 2006. Available online at wrapair.org/forums/dejf/fdh/content/FDHandbook_Rev_06.pdf (accessed February 16, 2012).
39 Bay Area Air Quality Management District, *Revised Draft Options and Justification Report, California Environmental Quality Act Thresholds of Significance*, October 2009, page 27.
40 Bay Area Air Quality Management District, *CEQA Air Quality Guidelines*, May 2011.

and Harrison Streets with hourly volumes of 5,432 in year 2040 with the project and convention traffic, which is less than 24,000. Therefore, given the Bay Area's attainment status and the limited CO and SO_2 emissions that could result from the project, the project would not result in a cumulatively considerable net increase in CO or SO_2, and quantitative analysis is not required.

Local Health Risks and Hazards

In addition to criteria air pollutants, individual projects may emit TACs. As part of this project, Ramboll Environ conducted a health risk assessment (HRA) for the proposed project to provide quantitative estimates of health risks from exposures to TACs.

The threshold of significance used to evaluate health risks from new sources of TACs associated with the project is based on the potential for the proposed project to substantially affect the extent and severity of the Air Pollutant Exposure Zone[41] at sensitive receptor locations. The health protective standards used for determining the Air Pollutant Exposure Zone and evidence supporting these standards are discussed in the Setting section above and were developed in consultation with BAAQMD staff as part of the preparation of a Community Risk Reduction Plan.[42] The project site is not within an identified health vulnerable zip code; therefore the Air Pollutant Exposure Zone criteria for this location is based on: (1) cumulative $PM_{2.5}$ concentrations greater than 10 $\mu g/m^3$, and/or (2) excess cancer risk from the contribution of emissions from all modeled sources greater than 100 per one million population. For projects that could result in sensitive receptor locations meeting the Air Pollutant Exposure Zone criteria that otherwise would not occur without the project, a proposed project that would emit $PM_{2.5}$ concentration above 0.3 $\mu g/m^3$ or result in an excess cancer risk greater than 10.0 per million would be considered a significant impact. The 0.3 $\mu g/m^3$ $PM_{2.5}$ concentration and the excess cancer risk of 10.0 per million persons exposed are the levels below which the BAAQMD considers new sources not to make a considerable contribution to cumulative health risks.[43] For those locations already meeting the Air Pollutant Exposure Zone criteria, a lower significance standard is required to ensure that a proposed project's contribution to existing health risks would not be significant. Since the project is not within an Air Pollutant Exposure Zone, the above thresholds apply to the proposed project.

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41 San Francisco, in partnership with BAAQMD, has modeled and assessed air pollutant impacts from mobile, stationary, and area sources within the City. This assessment identified areas with poor air quality under existing conditions—Air Pollutant Exposure Zones—which are based on health protective criteria PM2.5 and excess cancer risk. These areas warrant special attention when siting land uses that either emit toxic air contaminants (TACs) or uses that are considered sensitive to air pollution.

42 San Francisco is currently in the process of preparing a Community Risk Reduction Plan. Extensive modeling has been conducted and is documented in *The San Francisco Community Risk Reduction Plan: Technical Support Documentation.* This modeling provides the technical basis for development of the Community Risk Reduction Plan.

43 Bay Area Air Quality Management District, *California Environmental Quality Act Guidelines Update, Proposed Air Quality CEQA Thresholds of Significance*, May 3, 2010. Available online at www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Proposed_Thresholds_Report_%20May_3_2010_Final.ashx?la=en (accessed November 20, 2014).

Methodology for Analysis of Cumulative Impacts

As described in Section 5.1, Impact Overview, the following projects/programs listed below were not anticipated in the Mission Bay FSEIR and are considered in the cumulative impact analysis in this SEIR: University of California at San Francisco (UCSF), 2014 Long Range Development Plan (LRDP), Mission Bay Campus; Eastern Neighborhoods Program; Seawall Lot 337 and Pier 48 Mixed-Use Project (Mission Rock); and Pier 70 Mixed-Use Development.

While air quality analyses (both criteria air pollutants and health risk) have been conducted in the completed CEQA documentation for UCSF LRDP and the Eastern Neighborhoods Program, these analyses have not yet been completed for the other two identified projects. However, cumulative air quality analysis may be addressed by assessing whether a project's contribution is cumulatively considerable.

The contribution of a project's individual air emissions to regional air quality impacts is by its nature, a cumulative effect. Emissions from past, present and future projects in the vicinity also have or will contribute to adverse regional air quality impacts on a cumulative basis. No single project by itself would be sufficient in size to result in nonattainment of ambient air quality standards. Instead, a project's individual emissions contribute to existing cumulative air quality conditions.[44] As described above, the project-level thresholds for criteria air pollutants are based on levels by which new sources are not anticipated to contribute to an air quality violation or result in a considerable net increase in criteria air pollutants. Therefore, if a project's emissions are below the project-level thresholds, the project would not be considered to result in a considerable contribution to cumulative regional air quality impacts.

Similarly, the HRA takes into account the cumulative contribution of localized health risks to sensitive receptors from sources included in the Citywide modeling plus the proposed project's sources. Other future projects, whose emissions have not been incorporated into the existing Citywide health risk modeling, such as Pier 70 and Seawall Lot 337/Pier 48 would similarly be subject to CEQA requirements to analyze the health risk impact of their project. However, health risk impacts are localized, and health risks from sources decrease substantially with increasing distance.[45] Thus cumulative impacts from the Pier 70 and Seawall Lot 337/Pier 48 would not combine with the proposed project's emissions to substantially increase health risks within the project vicinity. Thus, because the project-level analysis includes health risks from all known existing sources, the project-level analysis is also a cumulative health risk analysis.

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[44] Bay Area Air Quality Management District, *Revised Draft Options and Justification Report, California Environmental Quality Act Thresholds of Significance*, October 2009. A copy of this document is available for review at the San Francisco Planning Department, 1650 Mission Street, Suite 400, as part of Case File No. 2014.1441E.

[45] California Air Resources Board, *Air Quality and Land Use Handbook: A Community Health Perspective*, April 2005 (hereinafter "ARB Air Quality and Land Use Handbook"). Available at http://www.arb.ca.gov/ch/handbook.pdf.

5.4.5.3 Impact Evaluation

Construction

Impact AQ-1: Construction of the proposed project would generate fugitive dust and criteria air pollutants, which would violate an air quality standard, contribute substantially to an existing or projected air quality violation, or result in a cumulatively considerable net increase in criteria air pollutants. (Significant and Unavoidable with Mitigation)

Construction activities would result in emissions of ozone precursors and particulate matter in the form of dust (fugitive dust) and exhaust (e.g., vehicle tailpipe emissions). Emissions of ozone precursors and particulate matter are primarily a result of the combustion of fuel from on-road and off-road vehicles. However, ROGs are also emitted from activities that involve painting, other types of architectural coatings, or asphalt paving. Construction phases would include demolition, excavation and site preparation, pile installation, placement of infrastructure, placement of foundations for structures, and fabrication of structures. Demolition and construction activities would require the use of drill rigs heavy trucks, excavators, material loaders, cranes, and other mobile and stationary construction equipment. During the project's approximately 26-month construction period, construction activities would result in emissions of ozone precursors and particulate matter, as discussed below.

Fugitive Dust

Project-related demolition, excavation, grading, and other construction activities may cause wind-blown dust that could contribute particulate matter into the local atmosphere. Despite the established federal standards for air pollutants and ongoing implementation of state and regional air quality control plans, air pollutants continue to have impacts on human health throughout the country. California has found that particulate matter exposure can cause health effects at lower levels than national standards. The current health burden of particulate matter demands that, where possible, public agencies take feasible available actions to reduce sources of particulate matter exposure. According to the CARB, reducing ambient particulate matter from 1998–2000 levels to natural background concentrations in San Francisco would prevent over 200 premature deaths.

Dust can be an irritant causing watering eyes or irritation to the lungs, nose, and throat. Demolition, excavation, grading, and other construction activities can cause wind-blown dust that adds particulate matter to the local atmosphere. Depending on exposure, adverse health effects can occur due to this particulate matter in general as well as due to specific contaminants such as lead or asbestos that may be constituents of dust.

In response to these concerns, the San Francisco Board of Supervisors approved a series of amendments to the San Francisco Building and Health Codes, generally referred hereto as the Construction Dust Control Ordinance (Ordinance 176-08, effective July 30, 2008), with the intent of reducing the quantity of dust generated during site preparation, demolition, and overall construction work in order to protect the health of the general public and onsite workers, to minimize public nuisance complaints, and to avoid orders to stop work by the Department of Building Inspection (DBI).

The ordinance requires that all site preparation work, demolition, or other construction activities within San Francisco that have the potential to create dust or to expose or disturb more than 10 cubic yards or 500 square feet of soil comply with specified dust control measures whether or not the activity requires a permit from DBI. The Director of DBI may waive this requirement for activities on sites less than one-half acre that are unlikely to result in any visible wind-blown dust.

To comply with the Construction Dust Control Ordinance, the project sponsor and the contractor responsible for construction activities at the project site would be required to use the following practices to control construction dust on the site or other practices that result in equivalent dust control that are acceptable to the Director of DBI. Dust suppression activities may include watering all active construction areas sufficiently to prevent dust from becoming airborne; increased watering frequency may be necessary whenever wind speeds exceed 15 miles per hour (mph). Reclaimed water must be used for dust suppression watering, as required by Article 21, Section 1100 et seq. of the San Francisco Public Works Code. Even if not required, reclaimed water should be used whenever possible. Contractors shall provide as much water as necessary to control dust (without creating run-off in any area of land clearing, and/or earth movement). During excavation and dirt-moving activities, contractors shall wet sweep or vacuum the streets, sidewalks, paths, and intersections where work is in progress at the end of the workday. Inactive stockpiles (where no disturbance occurs for more than seven days) greater than 10 cubic yards or 500 square feet of excavated material, backfill material, import material, gravel, sand, road base, and soil shall be covered with a 10 mil (0.01 inch) polyethylene plastic (or equivalent) tarp, braced down, or use other equivalent soil stabilization techniques.

For projects over one-half acre, such as the proposed project, the Dust Control Ordinance requires that the project sponsor submit a Dust Control Plan for approval by DPH. DBI will not issue a building permit without written notification from the Director of Public Health that the applicant has a site-specific Dust Control Plan, unless the Director waives the requirement. Interior-only tenant improvement projects that are over one-half acre in size that will not produce exterior visible dust are exempt from the site-specific Dust Control Plan requirement.

The site-specific Dust Control Plan would require the project sponsor to: submit a map to the Director of Public Health showing all sensitive receptors within 1,000 feet of the site; wet down areas of soil at least three times per day; provide an analysis of wind direction and install upwind and downwind particulate dust monitors; record particulate monitoring results; hire an independent, third-party to conduct inspections and keep a record of those inspections; establish shut-down conditions based on wind, soil migration, etc.; establish a hotline for surrounding community members who may be potentially affected by project-related dust; limit the area subject to construction activities at any one time; install dust curtains and windbreaks on the property lines, as necessary; limit the amount of soil in hauling trucks to the size of the truck bed and securing with a tarpaulin; enforce a 15 mph speed limit for vehicles entering and exiting construction areas; sweep affected streets with water sweepers at the end of the day; install and utilize wheel washers to clean truck tires; terminate construction activities when winds exceed 25 mph; apply soil stabilizers to inactive areas; and sweep off adjacent streets to reduce particulate emissions. The project sponsor would be required to designate an individual to monitor compliance with these dust control requirements.

Implementation of dust control measures in compliance with the regulations and procedures set forth by the San Francisco Dust Control Ordinance would ensure that potential dust-related construction air quality impacts of the proposed project would be *less than significant*.

Criteria Air Pollutants

As discussed above, construction activities would result in emissions of criteria air pollutants from the use of off- and on-road vehicles and equipment. Criteria and ozone precursor pollutant (NOx, ROG, PM_{10}, and $PM_{2.5}$) emissions from exhaust from construction equipment and truck and vehicle trips would incrementally add to the regional atmospheric loading of these pollutants during project construction. The BAAQMD *CEQA Air Quality Guidelines* recommend the quantification of project-related criteria pollutant exhaust emissions from construction, separate from operational emissions, and comparison with significance thresholds. Daily engine exhaust emissions from construction activities associated with the proposed project are compared with significance thresholds in **Table 5.4-7**. Total construction emissions were calculated using the latest emission factors available at the time of the Notice of Preparation (NOP) publication (EMFAC 2011 and OFFROAD 2011 equivalent), and total emissions were divided by the number of construction days to derive average daily emissions for comparison against applicable significance thresholds. The construction significance thresholds for criteria pollutants are established in terms of average daily emissions, which is how emissions are reported in Table 5.4-7.

TABLE 5.4-7
AVERAGE DAILY CONSTRUCTION-RELATED EMISSIONS

	Average Daily Construction Emissions (pounds/day)			
	ROG	**NOx**	**PM_{10}**	**$PM_{2.5}$**
Off-road Equipment Emissions	13	175	7.1	7.1
Truck and Vehicle emissions	7.4	51	0.84	0.77
Architectural Coating Emissions	39	0	0	0
Total[a]	59	226	8.0	7.9
Significance Threshold	54	54	82	54
Above Threshold?	**Yes**	**Yes**	No	No

NOTES:
[a] The total emissions may not sum precisely due to rounding of subtotals.
SOURCE: Ramboll Environ, 2015

The emissions presented in Table 5.4-7 would be generated by many different construction sources including the following: off-road construction equipment such as excavators, loaders, backhoes, drill rigs, and cranes; and on- road trucks. As shown in the table, the predominant source of emissions of NOx, PM_{10}, and PM $_{2.5}$ would be off-road equipment, which would generate more than three times the emissions of on-road vehicles and trucks.

Construction of the proposed project would result in emissions of PM_{10} and $PM_{2.5}$ that would be below the thresholds of significance. However, the estimated construction emissions of ROG and NOx would exceed the applicable significance threshold, which would be a *significant* air quality impact. Consequently, **Mitigation Measure M-AQ-1 (Construction Emissions Minimization)** is identified to reduce ROG and NOx emissions associated with construction.

ROG and NOx are ozone precursors, and the main health concern of exposure to ground-level ozone is effects on the respiratory system, especially on lung function. Several factors influence these health impacts, including the concentrations of ground-level ozone in the atmosphere, the duration of exposure, average volume of air breathed per minute, the length of intervals between short-term exposures, and the sensitivity of the person to the exposure.[46,47] The concentration of ground-level ozone in the atmosphere is influenced by the volume of air available for dilution, the temperature, and the intensity of ultraviolet light. In the Bay Area, the worst case conditions for ozone formation occur in the summer and early fall on warm, windless, sunny days.[48]

Given these various factors, it is difficult to predict the magnitude of health effects from the project's exceedance of significance criteria for regional ROG and NOx emissions. The increase in emissions associated with the proposed project represents a fraction of total SFBAAB regional ROG emissions (59 pounds per day compared to 265 tons per day in the SFBAAB region in 2012)[49] and NOx emissions (226 pounds per day compared to 318 tons per day in the SFBAAB region in 2012). Although Table 5.4-1 indicates that the most stringent applicable ozone standards were not exceeded at the Potrero Hill monitoring station between 2010 and 2014, the SFBAAB region experienced an average of 8.4 days of exceedance per year between 2010 and 2014.[50] The proposed project's ROG and NOx increases could contribute to new or exacerbated air quality violations in the SFBAAB region by contributing to more days of ozone exceedance or result in AQI values that are unhealthy for sensitive groups and other populations. As shown in Table 5.4-3, the SFBAAB has averaged between 8 and 19 days per year that are considered unhealthy for sensitive groups and had 2 unhealthy (red) days in the last five years. On unhealthy days, persons are recommended to avoid both prolonged and heavy exertion outdoor activities.[51]

Implementation of **Mitigation Measure M-AQ-1 (Construction Emissions Minimization)** would substantially reduce construction-related emissions of ROG and NOx. The measure would require use of off-road equipment to meet minimum emission standards, and construction-related emissions of ROG and NOx would be reduced commensurate with the degree of compliance achieved (i.e., Tier 4 or Tier 4 interim or Tier 2 with 40 percent NOx VDECS). Mitigated daily engine

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46 The World Bank Group, *Pollution Prevention and Abatement Handbook 1998: Toward Cleaner Production*, pp. 227–230, 1999. Available online at www.ifc.org/wps/wcm/connect/dd7c9800488553e0b0b4f26a6515bb18/Handbook GroundLevelOzone.pdf?MOD=AJPERES (accessed July 10, 2014).

47 U.S. Environmental Protection Agency, *Air Quality Guide for Ozone,* March 2008. www.airnow.gov/index.cfm?action=pubs.aqiguideozone (accessed July 10, 2014).

48 Bay Area Air Quality Management District, *Air Pollutants*, January 30, 2013. Available online at www.baaqmd.gov/Divisions/Communications-and-Outreach/Air-Quality-in-the-Bay-Area/Air-Pollutants.aspx (accessed July 10, 2014).

49 California Air Resources Board, The California Almanac of Emissions and Air Quality – 2013 Edition, May 21, 2014. Available online at www.arb.ca.gov/aqd/almanac/almanac13/almanac13.htm (accessed October 3, 2014).

50 Bay Area Air Quality Management District, *Annual Bay Area Air Quality Summaries*, 2014. Available online at www.baaqmd.gov/Divisions/Communications-and-Outreach/Air-Quality-in-the-Bay-Area/Air-Quality-Summaries.aspx (accessed April, 23, 2015).

51 U.S. Environmental Protection Agency, *Air Quality Index, A Guide to Air Quality and Your Health,* February 2014. Available online at www.epa.gov/airnow/aqi_brochure_02_14.pdf (accessed September 8, 2014).

exhaust emissions from construction activities associated with the proposed project are compared with emission significance thresholds in **Table 5.4-8,** assuming both the maximum level and the minimum level of compliance (Tier 4 and Tier 2 with NOx VDECS). As can be seen in Table 5.4-8, construction-related emissions would be reduced to the applicable threshold for ROG with both the maximum and minimum levels of compliance. However, while NOx emissions would be reduced by as much as 68 percent with fully compliant mitigation and 36 percent with minimally compliant mitigation, project emissions of NOx would still be significant (73 pounds per day) even with maximum compliance with Mitigation Measure M-AQ-1.

TABLE 5.4-8
MITIGATED AVERAGE DAILY CONSTRUCTION-RELATED EMISSIONS

	Average Daily Construction Emissions (pounds/day)			
	ROG	**NOx**	**PM10**	**PM2.5**
With Tier 2 + NOx VDECS Off-road Equipment (minimum compliance for NOx)				
Off-road Equipment Emissions	0.52	93	0.6	0.6
Truck and Vehicle Emissions	7	51	0.8	0.8
Architectural Coating Emissions	39	0	0	0
Total[a]	**47**	**144**	**1.4**	**1.4**
Significance Threshold	54	54	82	54
Above Threshold?	No	**Yes**	No	No
With Tier 4 Off-road Equipment (maximum compliance for NOx)				
Off-road Equipment Emissions	2.5	22	0.4	0.4
Truck and Vehicle Emissions	7	51	0.8	0.8
Architectural Coating Emissions	39	0	0	0
Total[a]	**49**	**73**	**1.2**	**1.1**
Significance Threshold	54	54	82	54
Above Threshold?	No	**Yes**	No	No

NOTES:
[a] The total emissions may not sum precisely due to rounding of subtotals.
SOURCE: Ramboll Environ, 2015

A mitigation measure was considered to reduce the contribution of on-road truck emissions by restricting contractors to utilizing haul trucks manufactured in year 2010 or later (year 2007 trucks would not result in decreased emissions over the existing truck fleet). However, recent communications with contractors indicate that there is a limited supply of available trucks for off-hauling soil. Given the high excavation volumes and short construction phase of the proposed project, it is probable that not enough qualified trucks would be available to implement such a measure. Thus, the feasibility of this mitigation is uncertain at this time. Consequently, emission offsets represent the only available additional mitigation option to address construction-related NOx emissions.

Because construction-related emissions of NOx would remain significant even with implementation of Mitigation Measure M-AQ-1, Mitigation Measure M-AQ-2b (Emissions Offsets) is also identified to reduce the residual pollutant emissions (see Impact AQ-2). Mitigation Measure M-AQ-2 (Emissions Offsets) would require the project sponsor to offset remaining emissions to below significance thresholds by funding the implementation of an offsite emissions reduction project in an amount sufficient to mitigate both residual construction pollutant emissions and operational pollutant emissions described below in Impact AQ-2. As specified in Mitigation Measure M-AQ-2b, offsetting of construction emissions would follow completion of construction activities, and the mitigation offset fee would be determined by the amount of emissions to be calculated based on reporting requirements of Mitigation Measure M-AQ-1 and the degree of compliance with off-road equipment types that are determined to be reasonably commercially available. The emissions offset fee is expressed in tons per year; therefore, under the minimum level of compliance with Mitigation Measure M-AQ-1, the remaining construction emissions offset required is 11.7 tons per year of ozone precursors and under the maximum level of compliance, the construction emissions offset required is reduced to 2.5 tons per year of ozone precursors. However, as described in Impact AQ-2 below, offset of operational emissions required would be 17.0 tons per year, which is greater than the amount estimated to be required for construction emissions offset. Therefore, emissions reduction projects funded through Mitigation Measure M-AQ-2b would offset the regional criteria pollutant emissions generated by construction of the proposed project that would remain in excess of the applicable thresholds after implementation of the project-specific emission reductions required under Mitigation Measures M-AQ-1. However, upon completion of construction, if the calculated emissions based on the reporting requirements of Mitigation Measure M-AQ-1 requires offsets are in excess of 17.0 tons per year, then the applicant shall provide the additional offset fees in an amount commensurate with the calculated ozone precursor emissions exceeding 17.0 tons per year. Because implementation of the emissions reduction project would be conducted by the BAAQMD and is not fully within the control of the project sponsor (see discussion of **Impact AQ-2**), the residual impact of construction emissions is conservatively considered *significant and unavoidable with mitigation*, acknowledging the assumption that the project sponsor would implement Mitigation Measures M-AQ-1 (Construction Emissions Minimization) and Mitigation Measure M-AQ-2b (Emission Offsets).

Summary of Impact AQ-1, Construction Emissions

Construction of the proposed project would generate emissions of fugitive dust and criteria air pollutants. The project sponsor, through its contractors, would be required to implement dust control measures in compliance with the requirements of the Construction Dust Control Ordinance, which would ensure that the construction-related impacts due to fugitive dust would be *less than significant*.

Estimated emissions of criteria air pollutants indicate that average daily construction emissions of PM_{10} and $PM_{2.5}$ would be below the applicable thresholds. Emissions of ROG and NOx, however, would exceed the applicable significance thresholds. Implementation of Mitigation Measure M-AQ-1 (Construction Emissions Minimization) would reduce ROG and NOx emissions but additional implementation of Mitigation Measure M-AQ-2b (Emission Offsets) would be further required to reduce NOx emissions to below the applicable threshold. However, because implementation of emissions offsets is dependent in part on the actions of a third party, this measure is not fully within the control of the project sponsor. As such, the residual impact related to regional emissions of criteria pollutants during construction is conservatively considered *significant and unavoidable with mitigation.*

Mitigation Measure M-AQ-1: Construction Emissions Minimization

A. *Construction Emissions Minimization Plan.* Prior to issuance of a construction permit, the project sponsor shall submit a Construction Emissions Minimization Plan (Plan) to the OCII or its designated representative for review and approval by an Air Quality Specialist. The Plan shall detail project compliance with the following requirements:

1. All off-road equipment greater than 25 horsepower (hp) and operating for more than 20 total hours over the entire duration of construction activities shall meet the following requirements:

a) Where access to alternative sources of power are available, portable diesel engines shall be prohibited. Where portable diesel engines are required because alternative sources of power are not available, the diesel engine shall meet the equipment compliance step-down schedule in **Table M-AQ-1-1**.

TABLE M-AQ-1-1
OFF-ROAD EQUIPMENT COMPLIANCE STEP-DOWN SCHEDULE

Compliance Alternative	Engine Emission Standard	Emissions Control
1	Tier 4 Interim	ARB NOx VDECS (40%)[52]
2	Tier 3	ARB NOx VDECS (40%)
3	Tier 2	ARB NOx VDECS (40%)

How to use the table: If the requirements of (A)(1)(b) cannot be met, then the project sponsor would need to meet Compliance Alternative 1. Should the project sponsor not be able to supply off-road equipment meeting Compliance Alternative 1, then Compliance Alternative 2 would need to be met. Should the project sponsor not be able to supply off-road equipment meeting Compliance Alternative 2, then Compliance Alternative 3 would need to be met.

b) All off-road equipment shall have engines that meet either U.S. Environmental Protection Agency (USEPA) or California Air Resources Board (CARB) Tier 4 off-road emission standards. If engines that comply with Tier 4 off-road emission standards are not commercially available, then the project sponsor shall provide the next cleanest piece of off-road equipment as provided by the step down schedules in Table M-AQ-1-1.

i. For purposes of this mitigation measure, "commercially available" shall mean the availability of Tier 4 equipment taking into consideration factors such as: (i) critical path timing of construction;

[52] http://www.arb.ca.gov/diesel/verdev/vt/cvt.htm, January 7, 2015.

(ii) geographic proximity to the Project site of equipment; and
(iii) geographic proximity of access to off haul deposit sites.

ii. The project sponsor shall maintain records concerning its efforts to comply with this requirement.

2. The project sponsor shall require the idling time for off-road and on-road equipment be limited to no more than two minutes, except as provided in exceptions to the applicable state regulations regarding idling for off-road and on-road equipment. Legible and visible signs shall be posted in multiple languages (English, Spanish, and Chinese) in designated queuing areas and at the construction site to remind operators of the two minute idling limit.

3. The project sponsor shall require that construction operators properly maintain and tune equipment in accordance with manufacturer specifications.

4. The Plan shall include estimates of the construction timeline by phase with a description of each piece of off-road equipment required for every construction phase. Off-road equipment descriptions and information may include, but are not limited to: equipment type, equipment manufacturer, equipment identification number, engine model year, engine certification (Tier rating), horsepower, engine serial number, and expected fuel usage and hours of operation. For VDECS installed: technology type, serial number, make, model, manufacturer, ARB verification number level, and installation date and hour meter reading on installation date. For off-road equipment using alternative fuels, reporting shall indicate the type of alternative fuel being used. The plan shall also include estimates of ROG and NOx emissions.

5. The project sponsor shall keep the Plan available for public review on site during working hours. The project sponsor shall post at the perimeter of the project site a legible and visible sign summarizing the requirements of the Plan. The sign shall also state that the public may ask to inspect the Plan at any time during working hours, and shall explain how to request inspection of the Plan. Signs shall be posted on all sides of the construction site that face a public right of way. The project sponsor shall provide copies of Plan to members of the public as requested.

B. *Reporting.* Quarterly reports shall be submitted to the OCII or its designated representative indicating the construction phase and off-road equipment information used during each phase including the information required in A(4). In addition, for off-road equipment using alternative fuels, reporting shall include the actual amount of alternative fuel used.

Within six months of the completion of construction activities, the project sponsor shall submit to the OCII or its designated representative a final report summarizing construction activities. The final report shall indicate the start and end dates and duration of each construction phase. For each phase, the report shall include detailed information required in A(4). In addition, for off-road equipment using alternative fuels, reporting shall include the actual amount of alternative fuel used.

C. *Certification Statement and On-site Requirements.* Prior to the commencement of construction activities, the project sponsor must certify (1) compliance with the Plan, and (2) all applicable requirements of the Plan have been incorporated into contract specifications.

Comparison of Impact AQ-1 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR identified construction-related air quality impact as less than significant with implementation of Mitigation Measure F.2, dust control measures. Currently, however, Mitigation Measure F.2 of the Mission Bay FSEIR to control fugitive dust would effectively be implemented through compliance with the requirements of the Construction Dust Control Ordinance, which was adopted in 2008. Therefore, Mission Bay FSEIR Mitigation Measure F.2 is not applicable to the proposed project.

Criteria air pollutants from construction were not calculated or used as an assessment tool in the Mission Bay FSEIR, as BAAQMD did not recommend quantification of criteria air pollutant emissions at that time. Consequently, the proposed project would result in a *new* significant impact that was not previously identified in the Mission Bay FSEIR due to the calculated construction emissions of ozone precursors that would exceed significance thresholds.

Operational Impacts

Impact AQ-2: During project operations, the proposed project would result in emissions of criteria air pollutants at levels that would violate an air quality standard, contribute to an existing or projected air quality violation, or result in a cumulatively considerable net increase in criteria air pollutants. (Significant and Unavoidable with Mitigation)

The proposed project would generate operational emissions from a variety of sources, including the following: new vehicle trips; maintenance operation of standby diesel generators and boilers; and area sources such as landscape equipment and use of consumer products. Some of the motor vehicle trips that would be generated by Golden State Warriors basketball games at the proposed event center would be regional trips similar to those currently generated by basketball games occurring at the Oracle Arena in Oakland, and as a result, the emissions associated with these regional trips would not represent new emissions to the air basin. While it is reasonable to assume that a percentage of non-Golden State Warriors events (i.e., concerts, family shows etc.) would be transferred to the proposed event center in San Francisco without replacement at Oracle Arena, this analysis assumes that the Oracle Arena maintains its current levels of non-Golden State Warriors events and therefore is based on a conservative (i.e., higher) estimate of net new vehicle trips to the air basin.

Consequently for the purposes of this CEQA analysis, the project operational emissions do not consider regional VMT-related emissions from basketball game events due to relocation of all Golden State Warriors basketball games from Oracle Arena in Oakland to the proposed event center in San Francisco. Marketing analysis indicates that the average trip length (25 miles) is the same for either arena location. It is unlikely that there would be another NBA franchise in the Bay Area, so all of the professional basketball games occurring in the region would likely be played at the new event center. This assumption is consistent with that of the City of Oakland in its CEQA-related analyses.[53] All other project operational vehicle trips associated with the proposed land uses are considered to be "new" vehicle trips for the purposes of this analysis.

This scenario also assumes successful implementation of the proposed Muni Special Event Transit Service Plan as part of the proposed project, or implementation of Mitigation Measure M-TR-18 (Auto Mode Share Performance Standard), if the Muni Special Event Transit Service Plan is not implemented. As described in Chapter 3, Project Description and also in more detail in Section 5.2, Transportation and Circulation, as part of the proposed project, the San Francisco Municipal Transportation Agency (SFMTA) would provide additional service over existing conditions to accommodate peak evening events for basketball games and concerts with more than 14,000 attendees. Under the Muni Special Event Transit Service Plan, light rail service on the T Third line would be increased, and three special event shuttles would be implemented, including a 16th Street BART Shuttle, Van Ness Avenue Shuttle, and Transbay Terminal/Ferry Building Shuttle. However, as also discussed in Section 5.2, Transportation and Circulation, Impact TR-18, if the Muni Special Event Transit Service Plan is not fully implemented in the future due to SFMTA fiscal constraints, Mitigation Measure M-TR-18 (Auto Mode Share Performance Standard) would require the project sponsor to implement additional transportation demand management strategies as necessary to achieve a similar arrival auto mode share as with the Muni Special Event Transit Service Plan, which is no more than 53 percent for weekday events that have 12,500 or more attendees and 59 percent for weekend events that have 12,500 or more attendees.

Criteria air pollutant emissions were calculated for all project operational emission sources, including mobile sources (vehicles), generators, natural gas boilers, and area sources. USEPA emission factors were used for generators and boilers. Vehicle trip emissions were calculated using EMFAC2011 emissions factors from the CARB[54] (the latest emissions factors available at the time of the NOP publication), based on vehicle trip generation rates developed for this project (see Section 5.2, Transportation and Circulation). The proposed project would include a number of measures that would reduce criteria air pollutant emissions. For example, the project's trip generation takes into account the project's proximity to transit service. The project would also include: bicycle and pedestrian infrastructure; provision of bicycle parking; increased energy efficiency beyond Title 24; meeting Green Building Code standards; and installation of low-water use appliances and fixtures. Calculated air pollutant emissions for the proposed project have already incorporated emission reductions associated with these measures.

The results of the project operational criteria air pollutant emissions calculations are presented in **Table 5.4-9**. Details on calculations and methodology are provided in Appendix AQ. Table 5.4-9 indicates that operational criteria air pollutant emissions of the proposed project would result in emission of criteria pollutants and precursors that would be at levels below the thresholds of significance for PM_{10} and $PM_{2.5}$. However, the estimated operational emissions of ROG and NOx would exceed the significance threshold, resulting in a *significant* air quality impact.

[53] City of Oakland, Draft Environmental Impact Report for Coliseum Area Specific Plan August 22, 2014.
[54] Although an updated versions of EMFAC (EMFAC2014) has been released by CARB, EMFAC2011 is still the currently USEPA approved version of EMFAC. (e-mail from CARB Mobile Source emissions inventory list serve, May 15,2015).

TABLE 5.4-9
AVERAGE DAILY AND MAXIMUM ANNUAL OPERATIONAL EMISSIONS

	Average Daily Emissions (pounds/day)			
	ROG	**NOx**	**PM10**	**PM2.5**
Emission Source				
Mobile Sources	42	108	77	22
Standby Diesel Generators	0.30	0.97	0.04	0.04
Boilers	2.1	14	2.9	2.9
Area Sources	35	<0.01	<0.01	<0.01
Total[a]	79	124	80	25
Significance Threshold	54	54	82	54
Above Threshold?	**Yes**	**Yes**	No	No
	Maximum Annual Emissions (short tons/year)			
	ROG	**NOx**	**PM10**	**PM2.5**
Emission Source				
Mobile Sources	7.6	20	14	4.0
Standby Diesel generators	0.06	0.18	0.01	0.01
Boilers	0.38	2.6	0.52	0.52
Area Sources	6.4	<0.01	<0.01	<0.01
Total[a]	**14**	**23**	14.6	4.5
Significance Threshold	10	10	15	10
Above Threshold?	**Yes**	**Yes**	No	No
Estimated Emissions Reduction Required	**4.4**	**12.6**	0	0

NOTES:
[a] The total emissions may not sum precisely due to rounding of subtotals.

SOURCE: Ramboll Environ, 2015

The main health concern of exposure to ground-level ozone, for which ROG and NOx are ozone precursors, is effects on the respiratory system, especially on lung function. Several factors influence these health impacts, including the concentrations of ground-level ozone in the atmosphere, the duration of exposure, average volume of air breathed per minute, the length of intervals between short-term exposures, and the sensitivity of the person to the exposure.[55,56] The concentration of ground-level ozone in the atmosphere is influenced by the volume of air

55 The World Bank Group, *Pollution Prevention and Abatement Handbook 1998: Toward Cleaner Production*, pp. 227–230, 1999. Available online at www.ifc.org/wps/wcm/connect/dd7c9800488553e0b0b4f26a6515bb18/Handbook GroundLevel Ozone.pdf?MOD=AJPERES (accessed July 10, 2014)

56 U.S. Environmental Protection Agency, *Air Quality Guide for Ozone,* March 2008. www.airnow.gov/index.cfm?action= pubs.aqiguid eozone (accessed July 10, 2014).

available for dilution, the temperature, and the intensity of ultraviolet light. In the Bay Area, the worst case conditions for ozone formation occur in the summer and early fall on warm, windless, sunny days.[57]

Given these various factors, it is difficult to predict the magnitude of health effects from the project's exceedance of significance criteria for regional ROG and NOx emissions. The increase in emissions associated with the proposed project represents a fraction of total SFBAAB regional ROG and NOx emissions (79 pounds of ROG per day compared to 265 tons per day in the SFBAAB region in 2012, and 124 pounds of NOx per day compared to 318 tons per day in the SFBAAB region in 2012).[58] Although Table 5.4-1 indicates that the most stringent applicable ozone standards were not exceeded at the Potrero Hill monitoring station between 2010 and 2014, the SFBAAB region experienced an average of 8.4 days of exceedance per year between 2010 and 2014.[59] The proposed project's ROG and NOx increases could contribute to new or exacerbated air quality violations in the SFBAAB region by contributing to more days of ozone exceedance or result in AQI values that are unhealthy for sensitive groups and other populations. As shown in Table 5.4-3, the SFBAAB has averaged between 8 and 19 days per year that are considered unhealthy for sensitive groups and had 2 unhealthy (red) days in the last five years. On unhealthy days, persons are recommended to avoid both prolonged and heavy exertion outdoor activities.[60]

Mitigation Measure M-AQ-2a (Reduce Operational Emissions) and **Mitigation Measure M-AQ-2b (Emission Offsets)** are identified to reduce ROG and NOx emissions associated with project operations.

Mitigation Measure M-AQ-2a would reduce operational emissions of ROG and NOx primarily through reduction in mobile sources through implementation of additional transportation demand measures (TDM) beyond those already included as part of the proposed project. Section 5.2, Transportation and Circulation, provides a detailed analysis regarding strategies to reduce transportation impacts, which form the basis for Mitigation Measure M-AQ-2a. However, as described in Section 5.2, Transportation and Circulation, the feasibility of the additional TDM measures listed in Mitigation Measures M-AQ-2a is currently unknown. Even though the California Air Pollution Control Officers Administration estimates that "commute trip reduction" strategies can result in a commuter trip reduction of 1.0 to 6.2 percent,[61] the specific TDM strategies identified for this project address more than just commute trips, and it is unknown if a higher percentage reduction of overall vehicle trips is attainable. Notwithstanding these estimated reductions, it is assumed that specific quantitative reduction of vehicle trips associated with the additional TDM would be difficult to quantify and the success of any one measure variable; therefore, no emissions

57 Bay Area Air Quality Management District, *Air Pollutants*, January 30, 2013. Available online at www.baaqmd.gov/Divisions/ Communications -and -Outreach/ Air-Quality-in-the-Bay-Area/Air-Pollutants.aspx (accessed July 10, 2014).

58 California Air Resources Board, The California Almanac of Emissions and Air Quality – 2013 Edition, May 21, 2014. Available online at www.arb.ca.gov/aqd/almanac/almanac13/almanac13.htm (accessed April 23, 2015).

59 Bay Area Air Quality Management District, *Annual Bay Area Air Quality Summaries*, 2014. Available online at www.baaqmd.gov/Divisions/Communications-and-Outreach/Air-Quality-in-the-Bay-Area/Air-Quality-Summaries.aspx (accessed October 3, 2014).

60 U.S. Environmental Protection Agency, *Air Quality Index, A Guide to Air Quality and Your Health,* February 2014. Available online at www.epa.gov/airnow/aqi_brochure_02_14.pdf (accessed September 8, 2014.

61 CAPCOA, Quantifying Greenhouse Gas Mitigation Measures, August 2010. p.218

reduction are attributed to Mitigation Measure M-AQ-2a. The analysis in Section 5.2, Transportation and Circulation, also addresses Mission Bay FSEIR Mitigation Measure F.1, which essentially reiterated the transportation-related mitigation measures related to transportation demand management that, if implemented, would reduce vehicular air pollutant emissions; as described above in Section 5.4.2.2, these Mission Bay FSEIR mitigation measures are either completed, incorporated as part of the project, or not applicable to this project.

To address operational emission levels of ROG and NOx exceeding the SEIR's significance thresholds, **Mitigation Measure M-AQ-2b, Emission Offsets,** is identified to offset project operational emissions by funding the implementation of one or more emission reduction projects within the air basin. As discussed above under "Regulatory Setting," the BAAQMD administers the Carl Moyer program within the SFBAAB, which establishes the cost-effectiveness criteria for funding emissions reduction projects at $18,030 per weighted ton of ROG, NOx and PM emissions.[62] The Carl Moyer guidelines can be used to evaluate other emissions reduction projects within the SFBAAB that are administered by the Strategic Incentive Division of BAAQMD. Based on the current Carl Moyer cost effectiveness criteria and a 5 percent administrative fee, payment of $321,646 to the Strategic Incentives Division of the BAAQMD to implement emission reduction projects within the SFBAAB would be sufficient to offset the regional criteria pollutant emissions generated by operation of the proposed project that would remain in excess of the applicable thresholds, based on 4.4 tons per year of ROG and 12.6 tons per year of NOx, as shown in Table 5.4-9, or a total of 17.0 tons per year of ozone precursors; as indicated in Impact AQ-1 above, estimated emissions offsets for construction emissions is less than 17.0 tons per year, so this payment would also mitigate for the project's construction emissions.

Mitigation Measure M-AQ-2b would require the project sponsor to pay an offset mitigation fee to the BAAQMD to fund emissions reduction projects that would reduce emissions of ozone precursors to below the applicable thresholds. Mitigation Measure M-AQ-2b also assumes that the BAAQMD would report to the lead agency the final emissions reductions funded by the mitigation fee and that the BAAQMD would refund the project sponsor for any unspent mitigation fees upon meeting the required emissions reductions indicated in Table 5.4-9 above.

The project sponsor has agreed to fund Mitigation Measure M-AQ-2b as part of its overall commitment to implement all mitigation measures identified in this SEIR. However, because implementation of an emissions offset project would be conducted by the BAAQMD and is dependent in part on the actions of a third party, this measure is not fully within the control of the project sponsor. As such, the impact related to regional emissions of criteria pollutants associated with project operations is conservatively considered *significant and unavoidable with mitigation*, acknowledging the assumption that the project sponsor would implement Mitigation Measures M-AQ-2a (Reduce Operational Emissions) and Mitigation Measure M-AQ-2b (Emission Offsets).

62 The following equation is used to calculated the Weighted Emissions Reductions: Weighted Emissions Reductions= NOx reductions (tons/year)+ROG Reductions (tons/year) +(20 x (PM Reductions (tons/year))).

Summary of Impact AQ-2, Operational Emissions

Operation of the proposed project would include a variety of sources that would contribute to long term emissions of criteria air pollutants (ROG, NOx, PM_{10}, and $PM_{2.5}$). These sources would include new vehicle trips, maintenance and operation of standby diesel generators, boilers, and area sources such as landscape equipment and use of consumer products. Calculations of average daily and maximum annual emissions indicate that under the proposed project without mitigation, levels of ROG and NOx would exceed significance thresholds; this would be a significant impact. With implementation of Mitigation Measures M-AQ-2a (Reduce Operational Emissions), operational emissions of ROG and NOx would still be significant due to the as yet unknown feasibility of the mitigation strategies. Consequently, emission offsets, Mitigation Measure M-AQ-2b, represent the only available mitigation option to address operations-related emissions. However, this impact is conservatively considered *significant and unavoidable with mitigation* because implementation of an emissions offset project is dependent in part on the actions of a third party, beyond the control of the project sponsor.

Mitigation Measure M-AQ-2a: Reduce Operational Emissions

The project sponsor shall implement the following measures as feasible:

- Provision of outlets for electrically powered landscape equipment
- **Mitigation Measure M-TR-2c: Additional Strategies to Reduce Transportation Impacts** (see Section 5.2, Transportation and Circulation, Impact TR-2)
- **Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events** (see Section 5.2, Transportation and Circulation, Impact TR-11)

Mitigation Measure M-AQ-2b: Emission Offsets

Upon completion of construction, and prior to issuance of certificate of occupancy, the project sponsor shall pay a mitigation offset fee to the Bay Area Air Quality Management District's (BAAQMD) Strategic Incentives Division in an amount not to exceed $18,030 per weighted ton per year of ozone precursors plus a 5 percent administrative fee to fund one or more emissions reduction projects within the San Francisco Bay Area Air Basin (SFBAAB). This fee is intended to fund emissions reduction projects to achieve reductions of 17.0 tons per year of ozone precursors. Documentation of payment shall be provided to OCII or its designated representative.

The project sponsor shall calculate the amount of emissions offset required from construction based on the reporting requirements of Mitigation Measure M-AQ-1 and the degree of compliance with off-road equipment types that were determined to be commercially available. If the calculated construction emissions of ozone precursors requires offsets in excess of 17.0 tons per year, then the applicant shall provide the additional offset amount commensurate with the calculated ozone precursor emissions exceeding 17.0 tons per year.

Acceptance of this fee by the BAAQMD shall serve as an acknowledgment and commitment by the BAAQMD to: (1) implement an emissions reduction project(s) within one year of receipt of the mitigation fee to achieve the emission reduction objectives specified above; and (2) provide documentation to OCII or its designated representative and to the project sponsor describing the project(s) funded by the mitigation fee, including the amount of emissions of ROG and NOx reduced (tons per year) within the SFBAAB from the emissions reduction project(s). If there is any remaining unspent portion of the mitigation offset fee following implementation of the emission reduction project(s), the project sponsor shall be entitled to a refund in that amount from the BAAQMD. To qualify under this mitigation measure, the specific emissions retrofit project must result in emission reductions within the SFBAAB that would not otherwise be achieved through compliance with existing regulatory requirements.

Comparison of Impact AQ-2 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR identified the operational air quality impact with respect to criteria air pollutants as significant and unavoidable due to NOx emissions in excess of 16 times greater than the 1998 threshold, ROG emissions in excess of 10 times the 1998 threshold and PM_{10} emissions in excess of 24 times the 1998 threshold. Thus, the impact conclusion for the proposed project is essentially the same as that in the Mission Bay FSEIR for the entire Mission Bay plan area for ROG and NOx, though unlike the conclusions of the FSEIR, the proposed project's operational emissions would not exceed the PM_{10} threshold. Therefore, the project would not result in a new or substantially more severe significant impact than was previously identified. As described above in Section 5.4.2.2, Mission Bay FSEIR Mitigation Measure F.1 (which is the same as Mission Bay FSEIR Transportation Measures E.46 through E.50), has either already been implemented, is incorporated as part of the proposed project, or is not applicable to the proposed project.

Toxic Air Contaminants, Construction and Operation

Impact AQ-3: Construction and operation of the proposed project would generate toxic air contaminants, including diesel particulate matter, and could expose sensitive receptors to substantial air pollutant concentrations. (Less than Significant with Mitigation)

As discussed above, San Francisco, in partnership with BAAQMD, has modeled and assessed air pollutant impacts from mobile, stationary, and area sources within the City. As described above in Section 5.4.2.3, this assessment identified areas with poor air quality under existing conditions—Air Pollutant Exposure Zones—which are based on significance thresholds for $PM_{2.5}$ and excess cancer risk, or areas within the City that warrant special attention when siting land uses that either emit TACs or uses that are considered sensitive to air pollution. The project site is not located within an Air Pollutant Exposure Zone. Under existing conditions, sensitive land uses exist in the project vicinity, as indicated in Table 5.4-5; in addition, there is the potential that planned future development in the project vicinity could include sensitive uses, such as the planned Uber/ARE development at Blocks 26-27, north of the project site (see Section 5.1, Impact Overview, for description of planned and proposed project in the vicinity). Thus, because construction and operation of the proposed project would result in emissions of TACs and $PM_{2.5}$, this analysis evaluates the potential to expose sensitive receptors in the project vicinity to substantial air pollutant concentrations.

Construction TAC Emissions

Regarding construction emissions, off-road equipment (which includes construction-related equipment) is a large contributor to diesel particulate matter (DPM) emissions in California, although since 2007, the CARB has found the emissions to be substantially lower than previously expected.[63] Newer and more refined emission inventories have lowered the estimates of DPM emissions from off-road equipment such that off-road equipment is now considered the sixth largest source of DPM emissions in California.[64] For example, CARB's revised estimates of particulate matter (PM) emissions (of which DPM is a major component) for the SFBAAB for the year 2010 have decreased by 83 percent from previous 2010 emissions estimates.[65] Approximately half of the reduction in emissions can be attributed to the economic recession and half to updated methodologies used to better assess construction emissions.[66]

Additionally, a number of federal and state regulations are requiring cleaner off-road equipment. Specifically, both the USEPA and California have set emissions standards for new off-road equipment engines, ranging from Tier 1 to Tier 4. Tier 1 emission standards were phased in from 1996 to 2000, and Tier 4 interim and final emission standards for all new engines will be phased in between 2008 and 2015. To meet the Tier 4 emission standards, engine manufacturers will be required to produce new engines with advanced emission-control technologies. Although the full benefits of these regulations will not be realized for several years, the USEPA estimates that by implementing the federal Tier 4 standards, NO_x and PM emissions will be reduced by more than 90 percent.[67] Furthermore, California regulations limit maximum idling times to five minutes, which further reduces public exposure to NO_x and PM emissions.[68]

Furthermore, construction activities do not lend themselves to analysis of long-term health risks because of their temporary and variable nature. As explained in the BAAQMD's *CEQA Air Quality Guidelines*:

> "Due to the variable nature of construction activity, the generation of TAC emissions in most cases would be temporary, especially considering the short amount of time such equipment is typically within an influential distance that would result in the exposure of sensitive receptors to substantial concentrations. Concentrations of mobile-source diesel PM emissions are typically reduced by 70 percent at a distance of approximately 500 feet (CARB 2005). In addition, current models and methodologies for conducting health risk

63 ARB, *Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Proposed Amendments to the Regulation for In-Use Off-Road Diesel-Fueled Fleets and the Off-Road Large Spark-Ignition Fleet Requirements*, p.1 and p. 13 (Figure 4), October 2010.

64 ARB, *Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Proposed Amendments to the Regulation for In-Use Off-Road Diesel-Fueled Fleets and the Off-Road Large Spark-Ignition Fleet Requirements*, October 2010.

65 ARB, "In-Use Off-Road Equipment, 2011 Inventory Model," Query accessed online, April 2, 2012, http://www.arb.ca.gov/msei/categories.htm#inuse_or_category.

66 ARB, *Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Proposed Amendments to the Regulation for In-Use Off-Road Diesel-Fueled Fleets and the Off-Road Large Spark-Ignition Fleet Requirements*, October 2010.

67 USEPA, "Clean Air Nonroad Diesel Rule: Fact Sheet," May 2004.

68 California Code of Regulations, Title 13, Division 3, § 2485.

> assessments are associated with longer-term exposure periods of 9, 40, and 70 years, which do not correlate well with the temporary and highly variable nature of construction activities. This results in difficulties with producing accurate estimates of health risk."[69]

Therefore, project-level analyses of construction activities have a tendency to overestimate assessments of long-term health risks. However, a health risk assessment (HRA) was conducted for the proposed project's 26-month construction period. The primary construction TAC emissions of concern, DPM and $PM_{2.5}$, would be emitted by diesel-powered construction equipment and truck trips hauling excavated materials. Equipment used would include cranes, excavators, loaders and backhoes. The project-specific HRA was based on the use of these and other high-powered non-standardized diesel equipment, as provided by the project sponsor.

Operational TAC Emissions

The sources of TAC emissions that would occur during the operational phase of the project include emissions from mobile sources (passenger vehicles and delivery vehicles) and five stationary sources (diesel generators). Mobile source air toxics are compounds emitted from highway vehicles, which are known or suspected to cause cancer or other serious health and environmental effects. Examples of mobile source air toxics include benzene, 1,3-butadiene, formaldehyde, acetaldehyde, acrolein, polycyclic organic matter (POM), naphthalene, and diesel particulate matter.

Under the project, the five proposed diesel back-up generators would all be located within the parking structure on Lower Parking Level 1. Diesel generators, if larger than 50 horsepower, must obtain a permit from the BAAQMD and comply with the Air Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines. As a practical matter, the BAAQMD will not issue a permit for a new generator that results in an operational cancer risk greater than 10 in one million.

Health Risk Assessment

A heath risk assessment was conducted to asses both increased cancer risk and localized $PM_{2.5}$ concentrations from both construction and operational sources. Localized $PM_{2.5}$ concentrations are assessed based on annual average concentrations, and hence, separate evaluations are performed for construction and operations. Conversely, cancer risk is assessed based on the probability of contracting cancer over a person's lifetime, evaluated as 70 years. Therefore the probability of an increased cancer risk is determined by evaluating a sensitive receptor's exposure to both construction and operational emissions. Both the $PM_{2.5}$ and cancer risk assessments account for background (existing) concentrations and risk levels. The cumulative (project plus background) $PM_{2.5}$ and cancer risk results are compared to significance thresholds of 10 $\mu g/m^3$ and 100 per one million, respectively.

Sources considered in the HRA include un-mitigated and mitigated emissions from construction equipment and trucks, operational traffic generated by the full build out of the proposed development, and maintenance operations of the proposed diesel generators. Under California

[69] BAAQMD, *CEQA Air Quality Guidelines,* May 2011, page 8-6.

regulatory guidelines, DPM is used as a surrogate measure of carcinogen exposure for the mixture of chemicals that make up diesel exhaust as a whole.

To evaluate TAC and $PM_{2.5}$ impacts from the proposed project, near-field air dispersion modeling of DPM and $PM_{2.5}$ from project construction emission sources was conducted using the USEPA's American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD), version 14134,[70] as recommended by the BAAQMD *CEQA Air Quality Guidelines*. Air dispersion modeling applications used meteorological data from the Mission Bay meteorological site operated by the BAAQMD to provide the most representative data set for this analysis.

The ambient concentrations obtained through dispersion modeling were subsequently used in the risk assessment to quantify cancer health risk impacts and to evaluate $PM_{2.5}$ impacts. Air dispersion models such as AERMOD require a variety of inputs such as source parameters, meteorological parameters, topography information, and receptor parameters, which are discussed below.

To evaluate TAC and $PM_{2.5}$ impacts from operational sources, a screening level assessment was conducted. Emissions from the proposed emergency generators were assumed to comply with BAAQMD permitting requirements. The permitting process under BAAQMD Regulation 2, Rule 5 requires a Health Risk Screening Analysis, the results of which are posted on the District's website. Per its Policy and Procedure Manual, the BAAQMD requires implementation of Best Available Control Technology for Toxics and would deny an *Authority to Construct* or a *Permit to Operate* for any new or modified source of TACs that exceeds a cancer risk of 10 in one million. As a worst case analysis, it was conservatively assumed the two generators each associated with the retail and office buildings, respectively, could potentially be permitted by a separate entity than the permit held by the arena operator and that therefore three separate permits could be required, each allowing an increased cancer risk of up to 10 in one million. Therefore, it was conservatively assumed that increased cancer risk associated with the five proposed generators could be up to 30 in one million and no refined health risk modeling was conducted for the emergency generators.

Meteorological Data. Air dispersion modeling applications require the use of meteorological data that ideally are spatially and temporally representative of conditions in the immediate vicinity of the site under consideration. For the HRA, meteorological data collected and processed by BAAQMD[71] at the Mission Bay station were used.[72] The Mission Bay station is less than 1 mile west of the project site.

Source Configurations – Construction. Emitting activities were modeled between 7 a.m. and 1 a.m., seven days a week to reflect the duration of construction activities.

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70 U.S. Environmental Protection Agency, *User's Guide for the AMS/EPA Regulatory Model (AERMOD)*, Office of Air Quality Planning and Standards, Emissions Monitoring and Analysis Division, Research Triangle Park, North Carolina, EPA-454/B-03-001, September 2004.
71 BAAQMD processed the data using AERMET 12345.
72 The ESA Air Quality Technical Report Scope of Work approved by the San Francisco EP suggested using this meteorological station.

Source Configurations – Operation. Emissions from project-generated traffic were modeled 24 hours a day, with an hour-of-day temporal profile reflecting the fluctuation of traffic volume in San Francisco County, extracted from EMFAC 2011. Actual emission factors were generated by EMFAC2011 for the project-generated traffic increment.

Source Parameters – Construction. At any given time there would be multiple emissions sources associated with construction equipment within the construction zone. Each construction phase was modeled as a series of adjacent area sources, the dimensions of which varied depending on the sources considered. Off-site vehicles (trucks and worker trips going to and from construction zones) were included in the area sources.

Source Parameters – Operation. The proposed project would include new natural gas-fired boilers to provide heating to the proposed arena. According to the BAAQMD,[73] non-diesel boilers are regarded as minor, low-impact sources that can be excluded from the CEQA process. The project would also include five stationary emergency diesel engines which would require stationary source permits. These generators would require stationary source permits from the BAAQMD. BAAQMD Rule 2-5-302 limits project risks to 10 in one million, so for screening purposes incremental risk from the generators is assumed to be 10 in one million. In the worst case, the generators might have up to three different owners, resulting in three separate permits with risks of up to 10 in one million each, for a total potential risk of 30 in one million associated with project generators.

$PM_{2.5}$ impacts were modeled using the USEPA SCREEN3 model. SCREEN3 is a Gaussian air dispersion model that uses a worst-case, not site-specific, meteorological dataset to estimate maximum impacts. Using the concentration estimates from SCREEN3, a human health risk analysis was conducted at distances from the project site representing the residential and hospital receptors.

More specific details on the health risk and $PM_{2.5}$ calculations and methodology are provided in Appendix AQ.

Exposure to $PM_{2.5}$

Table 5.4-10 shows the results of the risk assessment for exposure to $PM_{2.5}$ during construction at the maximally impacted receptor. The Air Pollutant Exposure Zone standard for $PM_{2.5}$ is an annual average standard, and because construction and operational activities would not overlap, only the construction $PM_{2.5}$ concentrations are added to the background $PM_{2.5}$ concentrations to determine whether construction of the project would result in the project vicinity meeting the Air Pollutant Exposure Zone criteria. As shown in Table 5.4-10, cumulative $PM_{2.5}$ levels at the maximally impacted sensitive receptor would be 8.9 $\mu g/m^3$, and would not exceed the 10 $\mu g/m^3$ significance threshold. Thus, localized $PM_{2.5}$ impacts from construction activities at sensitive receptor locations would be *less than significant*.

73 BAAQMD. 2012. Recommended Methods for Screening and Modeling Local Risks and Hazards. Available online at : http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Risk%20Modeling%20Approach%20May%202012.ashx?la=en

TABLE 5.4-10
ANNUAL AVERAGE $PM_{2.5}$ CONCENTRATIONS AT OFF-SITE RECEPTORS

Source	$PM_{2.5}$ Concentration ($\mu g/m^3$, Annual Average)	
	UCSF Hearst Tower Receptor	**UCSF Hospital Receptor**
Construction		
Background at the maximally impacted receptor	8.5	8.6
Unmitigated Construction Contribution	0.31	0.31
Mitigated (Tier 2 + NOx VDECS) Construction Contribution	0.053	0.053
Cumulative Total (Unmitigated/with Mitigation)[a]	8.8 / 8.5	8.9 / 8.7
Significance Threshold	10	10
Above Threshold?	No	No
Operation		
Background at the maximally impacted receptor	8.5	8.6
Project Operations – Generators	0.055	0.055
Project Operations – Mobile Sources	0.32	0.32
Cumulative Total (Project, Unmitigated)[a]	8.9	9.0
Significance Threshold	10	10
Above Threshold?	No	No

NOTES:
[a] The total concentrations may not sum precisely due to rounding of subtotals.

SOURCE: Ramboll Environ, 2015

Following completion of construction activities, the proposed project's operational sources would also generate $PM_{2.5}$ emissions, which are quantified in Table 5.4-10. As shown in this table, maximum cumulative (background plus project) $PM_{2.5}$ concentrations during project operations would be 9.0 $\mu g/m^3$ for the proposed project. Furthermore, at no off-site location, during construction or operations, would cumulative $PM_{2.5}$ concentrations exceed 10 $\mu g/m^3$. Therefore, the proposed project would not result in sensitive receptor locations meeting the Air Pollutant Exposure Zone criteria for $PM_{2.5}$, and construction and operational $PM_{2.5}$ emissions would be *less than significant*.

Cancer Risk

The results of the risk assessment are presented in **Table 5.4-11** below for both the unmitigated and mitigated scenarios, the latter of which assumes the minimum level of compliance (Tier 2 engines with NOx VDECS) with implementation of **Mitigation Measure M-AQ-1 (Construction Emissions Minimization)** described above under Impact AQ-1. Table 5.4-11 shows that under unmitigated conditions, the excess cancer risk for a child resident at the UCSF Hearst Tower and Hospital would exceed the significance threshold of 100 per one million persons exposed. More specifically, a resident child at the UCSF Hearst Tower could be exposed to an excess cancer risk of up to 117 per one million under unmitigated project conditions, a significant impact. The proposed project's unmitigated construction emissions would account for an excess cancer risk of 54 in one million,

TABLE 5.4-11
LIFETIME EXCESS CANCER RISK AT OFF-SITE RECEPTORS

Source	Excess Cancer Risk (in one million)		
	UCSF Hearst Tower Receptor		UCSF Hospital Receptor
	Child Resident	Adult Resident	(Child Resident)
Background at the maximally impacted receptor	26	26	44
Unmitigated Construction Contribution	54	2.8	28
Mitigated (Tier 2 + NOx VDECS) Construction Contribution	9.2	0.48	4.8
Project Operations – Generators	30	30	30
Project Operations – Mobile Sources	7.2	7.2	7.2
Cumulative Total (Unmitigated/with Mitigation)[a]	117 / 72	66 / 64	109 / 86
Significance Threshold	100	100	100
Above Threshold? (Unmitigated/with Mitigation)	**Yes** / No	No / No	**Yes** / No

NOTES:
[a] The total risks may not sum precisely due to rounding of subtotals.

SOURCE: Ramboll Environ, 2015

and unmitigated operational emissions would account for an excess cancer risk of 37 in one million at this receptor location. Implementation of Mitigation Measure M-AQ-1 (Construction Emissions Minimization) would reduce the impacts from standardized construction equipment for which "tiered" equipment is available, as shown in Table 5.4-11. With the minimum level of compliance with this mitigation measure (Tier 2 plus NOX VDECS), increased cancer risk as a result of project construction activities at the maximally impacted receptor would be approximately 9.2 in one million and cumulative excess cancer risk at all receptor locations would be reduced to below the significance threshold of 100 per one million.

While unmitigated increased cancer risk at the maximally impacted receptors would exceed the threshold of 100 in one million, with implementation of Mitigation Measure M-AQ-1 (Construction Emissions Minimization), increased cancer risk at the maximally impacted receptors would be below the threshold of 100 in one million. Furthermore, at no off-site location would cumulative excess cancer risk exceed 100 per one million persons exposed with implementation of Mitigation Measure M-AQ-1. Therefore, the proposed project would not result in sensitive receptor locations meeting the Air Pollutant Exposure Zone criteria for excess cancer risk, and construction and operational cancer risk would be *less than significant with mitigation*.

Summary of Impact AQ-3, Exposure to Toxic Air Contaminants

Both construction and operation of the proposed project would generate emissions of $PM_{2.5}$ and toxic air contaminants, including DPM. The project-specific HRA conducted indicated that without mitigation, the project—including both construction and operational impacts added to the existing background levels— would exceed significance thresholds for increased cancer risk for off-site receptors; concentrations of $PM_{2.5}$ emissions would not exceed significance thresholds. With implementation of Mitigation Measure M-AQ-1 (Construction Emissions Minimization) described above for Impact AQ-1, impacts related to increased cancer risk would be reduced to less than significant. Therefore, this impact is *less than significant with mitigation*.

> **Mitigation Measure M-AQ-1: Construction Emissions Minimization** (see Impact AQ-1, above)

Comparison of Impact AQ-3 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR qualitatively assessed operational health risk impacts and identified this impact as potentially significant. The FSEIR identified four mitigation measures (Mitigation Measures F.3, F.4, F.5, and F.6) to reduce impacts due to emissions of toxic air contaminants, but in the absence of specific development proposals at that time, this impact was determined to be significant and unavoidable with mitigation.

Only one of the four FSEIR mitigation measures are applicable to the proposed project. Mission Bay FSEIR Mitigation Measure F.3 requires the applicant to demonstrate receipt of BAAQMD permit for stationary TAC sources. As a permit will be required for the five proposed backup diesel generators, the applicant would be required to comply with FSEIR Mitigation Measure F.3.

Mission Bay FSEIR Mitigation Measure F.4 requires establishing a meteorological station in Mission Bay; this measure has already been implemented and information from this meteorological station was used in to conduct the HRA prepared for this SEIR. Mission Bay FSEIR Mitigation Measure F.5 requires reducing exposure to dry cleaning facilities in the area that use perchloroethylene and other toxic contaminants. Dry cleaning operations primarily emit evaporative emissions of perchloroethylene. However, BAAQMD Regulation 11, Rule 16 required that all co-residential (sharing a wall, floor, ceiling or is in the same building as a residential unit) dry cleaners cease use of perchloroethylene on July 1, 2010. Additionally, all other dry cleaners must phase out use of perchloroethylene by January 1, 2023. Therefore, due to current regulations, dry cleaning facilities are not anticipated to result in substantial, long term health risks to sensitive populations in San Francisco, and this measure is no longer applicable.

Mission Bay FSEIR Mitigation Measure F.6 requires the creation of buffer zones for pre-school and child care centers from TAC sources; this measure does not apply to the proposed project because although only TAC sources (diesel generators) would be located in the garage, the nearest child care facility (UCSF Child Care Center) is located over 1,300 feet to the west and the nearest school (Daniel Webster Elementary) is located over 2,000 feet to the southwest of the proposed project. Additionally a potential San Francisco Unified School District school site is located at Block 14, approximately 1,500 feet west of the project site. BAAQMD generally recognizes a buffer distance of 1,000 feet from standard TAC sources as sufficient to avoid health impacts relative to CEQA. At this time, there is a planned development at Blocks 26/27, directly north of Blocks 29-32 (see Section 5.1, Impact Overview, for description) which could include sensitive receptors such as a day care facility. Since this facility could be located within 1,000 feet of the project during a portion of the construction period (8 months) and during operations, the potential impacts are analyzed in Impact C-AQ-2, below.

Therefore, because the project's impacts would be less than significant with mitigation, the project would not result in new or substantially more severe significant impacts than was previously identified in the Mission Bay FSEIR.

Consistency with Clean Air Plan

Impact AQ-4: The proposed project could conflict with, or obstruct implementation of, the *2010 Clean Air Plan*. (Less than Significant with Mitigation)

The most recently adopted air quality plan in the San Francisco Bay Area Air Basin is the BAAQMD's 2010 Clean Air Plan (2010 CAP) (BAAQMD, 2010). The 2010 CAP is a roadmap showing how the San Francisco Bay Area will achieve compliance with the State one-hour ozone standard as expeditiously as practicable, and how the region will reduce transport of ozone and ozone precursors to neighboring air basins. The control strategy includes stationary source control measures to be implemented through BAAQMD regulations; mobile source control measures to be implemented through incentive programs and other activities; and transportation control measures to be implemented through transportation programs in cooperation with the Metropolitan Transportation Commission (MTC), local governments, transit agencies, and others. The 2010 CAP also represents the Bay Area's most recent triennial assessment of the region's strategy to attain the State one-hour ozone standard.

BAAQMD guidance states that lead agencies should consider three questions in assessing consistency with the 2010 CAP: (1) Would the project support the primary goals of the Clean Air Plan? (2) Does the project include applicable control measures from the Clean Air Plan? and (3) Does the project disrupt or hinder implementation of control measures identified in the Clean Air Plan?

Support the Primary Goals of the CAP. The first of these questions is whether a project would support the primary goals of the 2010 CAP, which include:

- Attainment of air quality standards;
- Reducing population exposure and protecting public health in the Bay Area; and
- Reducing greenhouse gases and protecting the climate.

With respect attainment of air quality standards, several mitigation measures are identified to reduce criteria air pollutants from both construction and operations. These include Mitigation Measure M-AQ-1, Construction Emissions Minimization, which would reduce construction-related ozone precursor NOx emissions by 62 percent. Mitigation Measure M-AQ-2a (Reduce Operational Emissions) would promote additional transportation demand strategies beyond those included in the proposed project, while Mitigation Measure M-AQ-2b (Emission Offsets) would offset both construction-related and operational ROG and NOx emissions to below significance thresholds. Additionally, as addressed in Impact AQ-3, Mitigation Measure M-AQ-1 (Construction Emissions Minimization) would reduce increased cancer risks from construction such that these risks would be below significance thresholds, thereby reducing population exposure and protecting public health in the Bay Area.

The proposed project's impact with respect to GHGs is discussed in Section 5.5, Greenhouse Gas Emissions. As stated in that discussion, the proposed project would be compliant with the City's Greenhouse Gas Reduction Strategy and as part of the project's status as an environmental leadership development project under AB 900, the project would result in no net increase in GHGs. Thus, the project would not result in any significant impacts associated with an increase in GHGs or conflict with measures adopted for the purpose of reducing such emissions.

The other two questions to be considered are:

- Does the project include applicable control measures from the air quality plan?
- Does the project disrupt or hinder implementation of any air quality plan control measures?

Applicable Control Measures from the CAP. To meet the primary goals, the Clean Air Plan recommends specific control measures and actions. These control measures are grouped into various categories and include stationary- and area-source measures, mobile-source measures, transportation control measures, land-use measures, and energy and climate measures. The Clean Air Plan recognizes that, to a great extent, community design dictates individual travel mode and that a key long-term control strategy to reduce emissions of criteria pollutants, air toxics, and greenhouse gases from motor vehicles is to channel future Bay Area growth into communities where goods and services are located nearby and people have a range of viable transportation options. To this end, the Clean Air Plan includes 55 control measures aimed at reducing air pollutants in the SFBAAB.

The measures most applicable to the proposed project are transportation control measures and energy and climate control measures.

The compact urban development of the proposed project and high availability of viable transportation options would ensure that event center attendees and employees could bicycle, walk, and ride transit to and from the project site instead of taking trips via private automobile. These features ensure that the project would avoid substantial growth in automobile trips and vehicle miles traveled. The proposed project's 13,691 net new daily vehicle trips (weekday with concert event) during the operational phase would result in an increase in air pollutant emissions.

Transportation control measures that are identified in the Clean Air Plan are implemented by the *San Francisco General Plan* and the Planning Code,[74] for example, through the City's Transit First Policy, the bicycle parking requirements, and transit impact development fees.

Additionally, as described in Chapter 3, Project Description, the project would incorporate a TDM program. Compliance with these requirements would ensure the project includes relevant transportation control measures specified in the Clean Air Plan. Therefore, the proposed project would include applicable control measures identified in the Clean Air Plan and supports the Clean Air Plan's primary goals. Furthermore, Mitigation Measure M-AQ-2a, Reduce Operational Emissions, and Mission Bay FSEIR Mitigation Measure F.1 would promote additional strategies to reduce vehicle trips beyond those incorporated in the project, further supporting the Clean Air Plan's goals.

The proposed project includes sustainability measures that would serve to implement control measures of the 2010 CAP, including the land use/local impact measures and energy/climate measures of the 2010 CAP. The proposed development would be subject to a number of sustainability requirements, including the California CalGreen Code, City of San Francisco Green Building Code, Design for Development for the Mission Bay South Area, and the 2012 NBA Arena Design Standards – Sustainability Requirements. The project would be designed to Leadership in Energy and Environmental Design (LEED®) Gold standards. This would be achieved through incorporation of a variety of design features and implementation of practices during construction and operation to provide energy and water conservation and efficiency, encourage alternative transportation, promote a healthy indoor environment, minimize waste, and maximize recycling opportunities.

Disruption or Hindrance of CAP Control Measures. Examples of a project that could cause the disruption or delay of Clean Air Plan control measures are projects that would preclude the extension of a transit line or bike path or projects that propose excessive parking beyond City parking requirements. The proposed project would maintain the existing character of the project site, which is a dense, walkable urban area near a concentration of local transit service. It would not preclude the extension of a transit line or a bike path or any other transit improvement. The realigned Terry A. Francois Boulevard would contain — on the east side of the roadway — a two-way cycletrack (bike path). Thus, the project would not disrupt or hinder implementation of control measures identified in the Clean Air Plan.

Therefore, the proposed project would not conflict with, or obstruct implementation of the *2010 Clean Air Plan*, particularly with implementation of Mitigation Measure M-AQ-1 (Construction Emissions Minimization), Mitigation Measure M-AQ-2a (Reduce Operational Emissions), and Mitigation Measure M-AQ-2b (Emission Offsets), and this impact would be *less than significant with mitigation*.

[74] Although the Planning Code is not applicable within the Mission Bay Area, similar requirements are implemented pursuant to the Mission Bay South Design for Development.

Summary of Impact AQ-4

The project would be consistent with the 2010 CAP, assuming implementation of mitigation measures, which include offsetting emissions to below significance thresholds in addition to project-specific measures to reduce pollutant emissions. Additionally, the project would be consistent with the 2010 CAP by virtue of incorporation of control measures of the CAP, including land use/local impact measures and energy/climate measures as well as the transportation demand management measures incorporated in the proposed project. The proposed project would also not hinder implementation of the 2010 CAP. Therefore, the proposed project would not conflict with, or obstruct implementation of the *2010 Clean Air Plan*, and this impact would be *less than significant with mitigation*.

> **Mitigation Measure M-AQ-1: Construction Emissions Minimization** (see Impact AQ-1, above)
>
> **Mitigation Measure M-AQ-2a: Reduce Operational Emissions** (see Impact AQ-2, above)
>
> **Mitigation Measure M-AQ-2b: Emissions Offsets** (see Impact AQ-2, above)

Comparison of Impact AQ-4 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR identified Clean Air Plan consistency as a significant and unavoidable impact. This conclusion was based on: (1) the increase in population (819,500) would exceed that assumed in the Clean Air Plan at the time (795,800 in 2015); and (2) the increase in VMT was greater than the increase in population. No mitigation measures were identified with respect to this impact but presumably these would be the same as the operational air pollutant measures.

Based on the updated approach to analysis for the proposed project, the impact conclusion for the proposed project would have a less severe impact than what was identified in the FSEIR (i.e., less than significant with mitigation), and the project would not result in a new or substantially more severe significant impact than was previously identified.

Cumulative Impacts

Impact C-AQ-1: The project, in combination with other past, present, and reasonably foreseeable future projects, would contribute to cumulative regional air quality impacts. (Significant and Unavoidable with Mitigation)

As discussed above, regional air pollution is by its very nature a cumulative impact. Emissions from past, present, and future projects contribute to the region's adverse air quality on a cumulative basis. No single project by itself would be sufficient in size to result in regional nonattainment of ambient air quality standards. Instead, a project's individual emissions contribute to existing cumulative adverse air quality impacts.[75] The project-level thresholds for

[75] BAAQMD, *CEQA Air Quality Guidelines*, May 2011, page 2-1.

criteria air pollutants are based on levels by which new sources are not anticipated to contribute to an air quality violation or result in a considerable net increase in criteria air pollutants.

With implementation of Mitigation Measures M-AQ-1, M-AQ-2a, and M-AQ-2b, the proposed project's construction and operational emissions (Impacts AQ-1 and AQ-2) could be mitigated to below the project-level thresholds for criteria air pollutants (ROG and NOx). Mitigation Measure M-AQ-2b represents the lead agency's efforts to use offsets as air quality mitigation, and although offsets would be implemented through a known verifiable program well established by the BAAQMD, implementation of the mitigation measure is beyond the control of the project sponsor. Thus, the impact is conservatively considered *significant and unavoidable with mitigation*, and therefore, the proposed project would also be considered to result in a cumulatively considerable contribution to regional air quality impacts even with implementation of mitigation measures identified for Impacts AQ-1 and AQ-2, and the cumulative impact is also considered *significant and unavoidable with mitigation*.

Summary of Impact C-AQ-1

The analysis of construction-related and operational criteria pollutant impacts (Impact AQ-1 and Impact AQ-2, respectively) assess whether the proposed project would be considered to result in a cumulatively considerable contribution to regional and localized air quality impacts. The proposed project would result in significant and unavoidable air quality impacts after implementation of feasible mitigation measures identified in Impacts AQ-1 and AQ-2, and consequently, would result in a cumulatively considerable contribution to regional or local air quality impacts. Therefore, this impact would be *significant and unavoidable with mitigation*.

> **Mitigation Measure M-AQ-1: Construction Emissions Minimization** (see Impact AQ-1)
>
> **Mitigation Measure M-AQ-2a: Reduce Operational Emissions** (see Impact AQ-2)
>
> **Mitigation Measure M-AQ-2b: Emission Offsets** (see Impacts AQ-1 and AQ-2)

Comparison of Impact C-AQ-1 to Mission Bay FSEIR Impact Analysis

Cumulative criteria air pollutant emissions were identified as significant and unavoidable in the Mission Bay FSEIR. This was based on the significant and unavoidable finding at a project level.

Since the impact conclusion for the proposed project is the same, the project would not result in a new or substantially more severe significant impact than was previously identified in the Mission Bay FSEIR.

Impact C-AQ-2: The project, in combination with other past, present, and reasonably foreseeable future projects, could generate toxic air contaminants, including diesel particulate matter, and could expose sensitive receptors to substantial air pollutant concentrations. (Less than Significant with Mitigation)

As discussed above, the project site is not located in an Air Pollutant Exposure Zone. Impact AQ-3 addresses health risk exposures from TACs resulting from both construction and operation of the proposed project and adds them to the cumulative existing contributions of risks from TACs and $PM_{2.5}$ concentrations. The analysis then compares these cumulative totals to thresholds developed for the purposes of a cumulative impacts analysis. The HRA takes into account the cumulative contribution of localized health risks to sensitive receptors from sources included in the Citywide modeling plus the proposed project's sources.

The geographic scope of analysis for cumulative localized air pollutant exposure impacts encompasses potential new sensitive land uses or emissions sources that could be developed within approximately 1,000 feet of the proposed project site. Beyond 1,000 feet, CARB has found that ground-level TAC emissions to return to background levels.[76] This is because the contribution of project emissions would be greatly dispersed through both distance and intervening structures and their contribution would be expected to be minimal.

Section 5.1, Impact Overview, presents the list of reasonably foreseeable future projects in the vicinity, which in particular would include implementation of the University of California, San Francisco (UCSF) Long Range Development Plan (LRDP) for the Mission Bay campus and other nearby Mission Bay development projects. The UCSF LRDP EIR proposes new housing at Block 15 which is over 1,000 feet from the project site and would have impacts substantially less than those identified in Impact AQ-3 for both the UCSF Hospital Receptors and UCSF Hearst Tower receptor, both of which were identified as less than significant with mitigation.

Other future projects, whose emissions have not been incorporated into the existing Citywide health risk modeling, such as the proposed Pier 70 and Seawall Lot 337/Pier 48 mixed use developments would similarly be subject to CEQA requirements to analyze the health risk impact of their project. However, health risk impacts are localized and health risks from sources decrease substantially with increasing distance. Thus, cumulative impacts from the proposed Pier 70 and Seawall Lot 337/Pier 48 developments would not combine with the proposed project's emissions to substantially increase health risks within the project vicinity.

The Uber/ARE project on Blocks 26/27 is estimated to start construction by the end of 2015, and construction could be concurrent with the proposed project. This project is immediately north of the project site, across South Street, and immediately across Third Street from the nearest sensitive receptor to the project site, the UCSF Mission Bay housing at Hearst Tower. Although primarily designated as office use this development and any development in Mission Bay could include child care facilities and therefore have the potential to represent a future sensitive

76 California Air Resources Board, *Air Quality and Land Use Handbook: A Community Health Perspective, Page C-3,* April 2005 (hereinafter "ARB Air Quality and Land Use Handbook"). Available at http://www.arb.ca.gov/ch/handbook.pdf.

receptor. Occupancy of this cumulative, offsite project would likely not occur until 2017 at which time the construction of the proposed project would be in its third and final year. Consequently, sensitive receptors at this site would be exposed to at most eight months of the construction emissions, resulting in an excess cancer risk of about 12 in one million assuming minimum compliance with **Mitigation Measure M-AQ-1, Construction Emissions Minimization**. Adding this exposure to existing levels modeled by the City and the project contributions from generators and vehicles results in a cumulative exposure of 70 in a million, which would be below the cumulative threshold of 100 in one million. In addition the Uber/ARE project would be subject to Mission Bay FSEIR Mitigation Measure J.2: Child Care Development, which sets forth the Mission Bay Risk Management Plan requirements for child care facilities to ensure that human health and environmental risks are within acceptable limits. Consequently, the project's contribution to cumulative TAC exposure to receptors potentially proposed by future cumulative projects would be *less than significant with mitigation*.

Mitigation Measure M-AQ-1: Construction Emissions Minimization (see Impact AQ-1)

Comparison of Impact C-AQ-2 to Mission Bay FSEIR Impact Analysis

Cumulative impacts regarding TACs were identified as less than significant with mitigation in the Mission Bay FSEIR. This was based on the less than significant with mitigation finding at a project level. Since the impact conclusion for the proposed project is the same, the project would not result in a new or substantially more severe significant impact than was previously identified in the Mission Bay FSEIR.

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5.5 Greenhouse Gas Emissions

5.5.1 Introduction

This section describes greenhouse gas (GHG) emissions and global climate change, the existing regulatory framework governing GHG emissions, and the potential impacts related to GHGs associated with implementation of the proposed project. The proposed project is evaluated for compliance with San Francisco's *Strategies to Address Greenhouse Gas Emissions*, recognized by the Bay Area Air Quality Management District (BAAQMD) as meeting the criteria of a qualified GHG Reduction Strategy.

5.5.2 Summary of Mission Bay FSEIR Greenhouse Gas Emissions Section

The Mission Bay FSEIR did not address GHG emissions as a distinct environmental topic. However, the Air Quality section of the Mission Bay FSEIR did acknowledge the effects of GHG emissions under the Setting section as well as the potential for the Mission Bay Redevelopment Plan to contribute to GHG emissions. The discussion indicated that the nature and extent of GHG emissions could not be quantified at that time, but because their effects on climate change occur on a global level, the Plan would not be expected to significantly alter the global atmospheric concentrations of GHG.

5.5.3 Setting

5.5.3.1 Greenhouse Gas Emissions and Climate Change

Gases that trap heat in the atmosphere are referred to as greenhouse gases (GHGs) because they capture heat radiated from the sun as it is reflected back into the atmosphere, much like a greenhouse does. The accumulation of GHGs contributes to global climate change. The primary GHGs, or climate pollutants, are carbon dioxide (CO_2), black carbon, methane (CH_4), nitrous oxide (N_2O), ozone, and water vapor.

Individual development projects contribute to the cumulative effects of climate change by emitting GHGs during demolition, construction, and operational phases. While the presence of the primary GHGs in the atmosphere is naturally occurring, CO_2, CH_4, and N_2O are also emitted from human activities, accelerating the rate at which these compounds occur within the earth's atmosphere. Emissions of CO_2 are largely by-products of fossil fuel combustion, whereas CH_4 results from off-gassing associated with agricultural practices and landfills. Black carbon has emerged as a major contributor to global climate change, possibly second only to CO_2. Black carbon is produced naturally and by human activities as a result of the incomplete combustion of fossil fuels, biofuels, and biomass.[1] N_2O is a byproduct of various industrial processes. Other

[1] Center for Climate and Energy Solutions. *What is Black Carbon?,* April 2010. Available online at: http://www.c2es.org/docUploads/what-is-black-carbon.pdf. Accessed January 24, 2015.

GHGs include hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, and are generated in certain industrial processes. GHGs are typically reported in "carbon dioxide-equivalent" measures (CO_2E).[2]

There is international scientific consensus that human-caused increases in GHGs contribute to climate change. Many impacts resulting from climate change, including sea level rise, increased fires, floods, severe storms, and heat waves, already occur and will only become more severe and costly in the future. Secondary effects of climate change likely include impacts to agriculture, the state's electricity system, and native freshwater fish ecosystems; an increase in the vulnerability of levees such as in the Sacramento-San Joaquin Delta; changes in disease vectors; and changes in habitat and biodiversity.[3]

5.5.3.2 Greenhouse Gas Emission Estimates and Energy Providers in California

The California Air Resources Board (CARB) estimated that in 2010 California produced about 451.60 million gross metric tons of CO_2E (million $MTCO_2E$).[4] The CARB found that transportation is the source of 38 percent of the state's GHG emissions, followed by electricity generation (both in-state generation and imported electricity) at 21 percent, and industrial sources at 19 percent. Commercial and residential fuel use (primarily for heating) accounted for 10 percent of GHG emissions.[5] In San Francisco, motorized transportation and natural gas sectors were the two largest sources of GHG emissions, accounting for approximately 40 percent (2.1 million $MTCO_2E$) and 29 percent (1.5 million $MTCO_2E$) respectively, of San Francisco's 5.3 million $MTCO_2E$ emitted in 2010.[6] Electricity consumption (building operations and transit) accounts for approximately 25 percent (1.3 million $MTCO_2E$) of San Francisco's GHG emissions.[7]

Electricity in San Francisco is primarily provided by the Pacific Gas and Electricity Company (PG&E) and the San Francisco Public Utilities Commission (SFPUC). In 2010, electricity consumption in San Francisco was approximately 6.1 million megawatt-hours (MWh). Of this total, PG&E produces approximately 73 percent of the electricity distributed (4.5 million MWh; about 79 percent of San Francisco's electricity-driven GHG emissions), and the SFPUC produces approximately 14 percent of the electricity distributed (0.9 million MWh; about 0.01 percent of San Francisco's electricity-driven GHG emissions).[8]

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2 Because of the differential heat absorption potential of various GHGs, GHG emissions are frequently measured in "carbon dioxide-equivalents," which present a weighted average based on each gas's heat absorption (or "global warming") potential.

3 California Energy Commission. California Climate Change Center. *Our Changing Climate 2012*. Available online at: http://www.energy.ca.gov/2012publications/CEC-500-2012-007/CEC-500-2012-007.pdf. Accessed January 24, 2015.

4 California Air Resources Board. *California Greenhouse Gas Inventory for 2000-2010— by Category as Defined in the Scoping Plan.* Available online at: http://arbis.arb.ca.gov/cc/inventory/pubs/reports/2000_2010/ghg_inventory_scopingplan_00-10_2013-02-19.pdf. Accessed January 24, 2015.

5 *Ibid*.

6 San Francisco Department of Environment (DOE), *San Francisco Climate Action Strategy, 2013 Update*.

7 *Ibid*.

8 *Ibid*. Note: the remainder of the electricity consumption is derived from third party generators or other suppliers.

The majority of land use projects in San Francisco are provided power by PG&E, whose 2010 power mix was as follows: 20 percent natural gas, 24 percent nuclear, 16 percent eligible renewables (described below), 16 percent large hydroelectric, 23 percent unspecified power, one percent coal, and one percent other fossil fuels.[9,10]

Muni, city buildings, and a limited number of other commercial accounts in San Francisco are provided energy by the SFPUC, which operates three hydroelectric power plants that are part of San Francisco's Hetch Hetchy water supply and distribution system. This system has the lowest GHG emissions of any large electric utility in California.[11]

5.5.4 Regulatory Framework

5.5.4.1 State Regulations

Executive Orders S-3-05 and B-30-15

In 2005, Executive Order (EO) S-3-05, set forth a series of target dates by which statewide emissions of GHGs need to be progressively reduced, as follows: by 2010, reduce GHG emissions to 2000 levels (approximately 457 million $MTCO_2E$); by 2020, reduce emissions to 1990 levels (estimated at 427 million $MTCO_2E$); and by 2050 reduce emissions to 80 percent below 1990 levels (approximately 85 million $MTCO_2E$). As discussed in the Setting section above, California produced about 452 million $MTCO_2E$ in 2010, thereby meeting the 2010 target date to reduce GHG emissions to 2000 levels. In April 2015, Governor Jerry Brown issued EO B-30-15, which set an additional statewide GHG reduction target of 40 percent below 1990 levels to be achieved by 2030.

Assembly Bill 32 and California Climate Change Scoping Plan

In 2006, the California legislature passed Assembly Bill No. 32 (California Health and Safety Code Division 25.5, Sections 38500, et seq., or AB 32), also known as the California Global Warming Solutions Act. AB 32 requires ARB to design and implement emission limits, regulations, and other measures, such that feasible and cost-effective statewide GHG emissions are reduced to 1990 levels by 2020.

Pursuant to AB 32, the ARB adopted a Scoping Plan in December 2008, outlining measures to meet the 2020 GHG reduction limits. In order to meet the goals of AB 32, California must reduce its GHG emissions by 30 percent below projected 2020 business-as-usual emissions levels, about

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9 Pacific Gas & Electric (PG&E). *PG&E's 2010 Electric Power Mix Delivered to Retail Customers.* Available online at: http://www.pge-corp.com/corp_responsibility/reports/2010/index.html/en02_clean_energy.jsp Accessed January 24, 2015.

10 Pending California Public Utilities Commission approval, PG&E would include a "Green Option" program that would allow customers an opportunity to pay into a program that may lead to the development of up to 250 MW of new clean energy projects in the PG&E service area. See PG&E's, *New Green Option (Community Solar) FAQ*. Available online at: http://www.pge.com/about/environment/pge/greenoption/faq/. Accessed January 24, 2015.

11 San Francisco Public Utilities Commission (SFPUC), *Agenda Item No 20, Adopt an Enforcement Program as required under the California Renewable Energy Resources Act*, December 13, 2011. Available online at: http://www.energy.ca.gov/portfolio/rps_pou_reports.html. Accessed January 24, 2015.

15 percent below 2008 levels.[12] The Scoping Plan estimates a reduction of 174 million $MTCO_2E$ from transportation, energy, agriculture, forestry, and other high global warming sectors, as shown in **Table 5.5-1**.[13]

TABLE 5.5-1
GHG REDUCTIONS FROM THE AB 32 SCOPING PLAN SECTORS[14,15]

	GHG Reductions (million MT CO_2E)
GHG Reduction Measures By Sector	
Transportation Sector	62.3
Electricity and Natural Gas	49.7
Industry	1.4
Landfill Methane Control Measure (Discrete Early Action)	1
Forestry	5
High Global Warming Potential GHGs	20.2
Additional Reductions Needed to Achieve the GHG Cap	34.4
Total	**174**
Other Recommended Measures	
Government Operations	1-2
Methane Capture at Large Dairies	1
Additional GHG Reduction Measures:	
Water	4.8
Green Buildings	26
High Recycling/ Zero Waste • Commercial Recycling • Composting • Anaerobic Digestion • Extended Producer Responsibility • Environmentally Preferable Purchasing	9
Total	**41.8-42.8**

$MTCO_2E$ = metrics tons of carbon dioxide equivalent

The AB 32 Scoping Plan also anticipates that local government actions will result in reduced GHG emissions because local governments have the primary authority to plan, zone, approve, and permit development to accommodate population growth and the changing needs of their

12 California Air Resources Board. *California's Climate Plan: Fact Sheet*. Available online at: http://www.arb.ca.gov/cc/facts/scoping_plan_fs.pdf. Accessed January 24, 2015.
13 *Ibid*.
14 California Air Resources Board. *Climate Change Scoping Plan*, December 2008. Available online at: http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf. Accessed January 24, 2015.
15 California Air Resources Board. *California's Climate Plan: Fact Sheet.* Available online at: http://www.arb.ca.gov/cc/facts/scoping_plan_fs.pdf. Accessed January 24, 2015.

jurisdictions.[16] The Scoping Plan also relies on the requirements of Senate Bill (SB) 375 (discussed below) to align local land use and transportation planning for achieving GHG reductions.

The Scoping Plan must be updated every five years to evaluate AB 32 policies and ensure that California is on track to achieve the 2020 GHG reduction goal. In 2014, CARB released the First Update to the Scoping Plan, which builds upon the Initial Scoping Plan with new strategies and recommendations. The First Update identifies opportunities to leverage existing and new funds to further drive GHG emission reductions through strategic planning and targeted low carbon investments. This update defines CARB's climate change priorities for the next five years and sets the groundwork to reach long-term goals set forth in EO S-3-05. The update highlights California's progress toward meeting the "near-term" 2020 GHG emission reduction goals in the original 2008 Scoping Plan. It also evaluates how to align the State's "longer-term" GHG reduction strategies with other State policy priorities for water, waste, natural resources, clean energy, transportation, and land use.[17]

Senate Bill 375

The Scoping Plan also relies on the requirements of Senate Bill 375 (SB 375), known as the Sustainable Communities and Climate Protection Act of 2008, to reduce carbon emissions from land use decisions. SB 375 requires regional transportation plans developed by each of the State's 18 Metropolitan Planning Organizations (MPOs) to incorporate a "sustainable communities strategy" (SCS) in each regional transportation plan that will then achieve GHG emission reduction targets set by CARB. For the Bay Area, the per-capita GHG emission reduction target is a 7 percent reduction by 2020 and a 15 percent reduction by 2035 from 2005 levels. The Metropolitan Transportation Commission's 2013 Regional Transportation Plan, Plan Bay Area, adopted in July 2013, is the region's first plan subject to SB 375 requirements.

Senate Bill 1078, 107, and X1-2 and Executive Order S-14-08 and S-21-09

California established aggressive Renewable Portfolio Standards under SB 1078 (Chapter 516, Statutes of 2002) and SB 107 (Chapter 464, Statutes of 2006), which require retail sellers of electricity to provide at least 20 percent of their electricity supply from renewable sources by 2010. EO S-14-08 (November 2008) expanded the State's Renewable Portfolio Standard from 20 percent to 33 percent of electricity from renewable sources by 2020. In September 2009, then-Governor Schwarzenegger continued California's commitment to the Renewable Portfolio Standard by signing EO S-21-09, which directed CARB to enact regulations to help California meet the Reviewable Portfolio Standard goal of 33 percent renewable energy by 2020.[18]

To codify the GHG reduction goal of 33 percent by 2020 for energy suppliers, SB X1-2 (Chapter 1, Statutes of 2011) was signed by Governor Edmund G. Brown, Jr., in April 2011. This Renewable

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[16] California Air Resources Board. *Climate Change Scoping Plan*, December 2008. Available online at: http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf. Accessed January 24, 2015.

[17] ARB, "First Update to the AB 32 Scoping Plan," May 27, 2014. Available online at: http://www.arb.ca.gov/cc/scopingplan/document/updatedscopingplan2013.htm. Accessed January 23, 2015.

[18] California Energy Commission, *Renewables Portfolio Standard (RPS).* Available online at: http://www.energy.ca.gov/portfolio/. Accessed January 24, 2015.

Portfolio Standard preempts CARB's 33 percent renewable sources electricity standard and applies to all electricity suppliers (not just retail sellers) in the state, including publicly owned utilities, investor-owned utilities, electricity service providers, and community choice aggregators. All of these entities must adopt the new Renewable Portfolio Standard goals of 20 percent of retail sales from renewable sources by the end of 2013, 25 percent by the end of 2016, and 33 percent by the end of 2020.[19] Eligible renewable sources include geothermal, ocean wave, solar photovoltaic, and wind, but exclude large hydroelectric (30 MW or more). Therefore, any non-hydroelectric sources of electricity provided by the SFPUC are required to be 100 percent renewable.[20]

Assembly Bill 900

The Jobs and Economic Improvement Through Environmental Leadership Act [Assembly Bill 900 (AB 900)], signed by the Governor in September 2011 and effective on January 1, 2012, provides streamlined environmental review for "environmental leadership development projects" (leadership projects). Leadership projects include all of the following:

1. The project is residential, retail, commercial, sports, cultural, entertainment, or recreational in nature;
2. The project, upon completion, will qualify for LEED silver certification or better.
3. The project will achieve at least 10 percent greater transportation efficiency than comparable projects.
4. The project is located on an infill site and in an urbanized area.
5. The project is within a metropolitan planning organization for which a sustainable communities strategy or alternative planning strategy is in effect, and the California Air Resources Board has accepted that the strategy meets the adopted greenhouse gas reduction targets.

The Governor may certify a leadership project for streamlining under AB 900 if a number of conditions are met. One of the conditions is that the project will not result in any net additional greenhouse gas emissions, as determined by CARB. The procedures for this determination require an applicant to submit a proposed methodology and documentation to CARB that no net additional greenhouse gas emissions would result from the project; this includes quantification of direct and indirect greenhouse gas emissions associated with the project's construction and operation, including the project's energy use and transportation related emissions; and quantification of net emissions of the project after accounting for any mitigation measures. As described in Chapter 2, Introduction, the project sponsor applied for certification of the proposed project under AB 900, and on April 20, 2015, the CARB determined that the proposed event center and mixed-use development would not result in any net additional GHG emissions for

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19 *Ibid*.

20 San Francisco Public Utilities Commission (SFPUC), *Agenda Item No 20, Adopt an Enforcement Program as required under the California Renewable Energy Resources Act,* December 13, 2011. Available online at: http://www.energy.ca.gov/portfolio/rps_pou_reports.html. Accessed January 24, 2015.

purposes of certification under AB 900.[21] On April 30, 2015, Governor Jerry Brown certified the proposed project as a leadership project under AB 900.[22]

5.5.4.2 Regional and Local Regulations and Plans

Regional

The BAAQMD is responsible for attaining and maintaining federal and state air quality standards in the San Francisco Bay Area Air Basin (SFBAAB), as established by the federal Clean Air Act (CAA) and the California Clean Air Act (CCAA), respectively. The CAA and the CCAA require plans to be developed for areas that do not meet air quality standards, generally. The most recent air quality plan, the 2010 Clean Air Plan, includes a goal of reducing GHG emission to 1990 levels by 2020 and to 40 percent below 1990 levels by 2035.

In addition, the BAAQMD established a climate protection program to reduce pollutants that contribute to global climate change and affect air quality in the SFBAAB; the program includes GHG-reduction measures that promote energy efficiency, reduce vehicle miles traveled, and develop alternative energy sources.[23]

The BAAQMD also assists lead agencies in complying with the requirements of CEQA regarding potentially adverse impacts to air quality with respect to their CEQA Air Quality Guidelines. The BAAQMD advises lead agencies to consider adopting a Greenhouse Gas Reduction Strategy capable of meeting AB 32 goals and then reviewing projects for compliance with the Greenhouse Gas Reduction Strategy.[24] This is consistent with the approach to analyzing GHG emissions in the CEQA Guidelines, Section 15183.5.

Local

San Francisco Greenhouse Gas Reduction Ordinance

In May 2008, the City and County of San Francisco (CCSF) adopted Ordinance No. 81-08 amending the San Francisco Environment Code to establish GHG emissions targets and departmental action plans and to authorize the San Francisco Department of the Environment to coordinate efforts to meet these targets. The City ordinance establishes the following GHG emissions reduction limits and target dates by which to achieve them: determine 1990 Citywide GHG emissions by 2008, the baseline level, with reference to which target reductions are set; reduce GHG emissions by

[21] Corey, Richard W., Executive Director, Air Resources Board, 2015. Air Resources Board Executive Order G-15-022, Relating to Determination of No Net Additional Greenhouse Gas Emissions Under Public Resources Code section 21183, subdivision (c) for Golden State Warriors Event Center and Mixed-Use Development at Mission Bay Blocks 29-32, dated April 20, 2015.

[22] Alex, Ken, Director, Governor's Office of Planning and Research, 2015. Governor's Certification Granting Streamlining for the Golden State Warriors Event Center and Mixed Use Development at Mission Bay, dated April 30, 2015.

[23] Bay Area Air Quality Management District (BAAQMD), *Climate Protection Program.* Available online at: http://www.baaqmd.gov/?sc_itemid=83004271-3753-4519-8B09-D85F3FC7AE70. Accessed January 24, 2015.

[24] Bay Area Air Quality Management District (BAAQMD), *California Environmental Quality Act Air Quality Guidelines*, May 2012. Available online at:http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/BAAQMD%20CEQA%20Guidelines_Final_May%202012.ashx?la=en. Accessed January 24, 2015.

25 percent below 1990 levels by 2017; reduce GHG emissions by 40 percent below 1990 levels by 2025; and reduce GHG emissions by 80 percent below 1990 levels by 2050. The City's GHG reduction targets are consistent with—in fact, more ambitious than—those set forth in Governor Brown's recent Executive Order B-30-15 by targeting a 40 percent reduction by 2025 rather than a 40 percent reduction by 2030.

San Francisco Greenhouse Gas Reduction Strategy

San Francisco has developed a number of plans and programs to reduce the City's contribution to global climate change and to meet the goals of the City's Greenhouse Gas Reduction Ordinance. San Francisco's Greenhouse Gas Reduction Strategy documents its actions to pursue cleaner energy, energy conservation, and alternative transportation and solid waste policies. For instance, the City has implemented mandatory requirements and incentives that have measurably reduced GHG emissions including, but not limited to, increasing the energy efficiency of new and existing buildings, installation of solar panels on building roofs, implementation of a green building strategy, adoption of a zero waste strategy, a construction and demolition debris recovery ordinance, a solar energy generation subsidy, incorporation of alternative fuel vehicles in the City's transportation fleet (including buses), and a mandatory recycling and composting ordinance. The strategy also identifies 42 specific regulations for new development that would reduce a project's GHG emissions.

San Francisco's policies and programs have resulted in a reduction in GHG emissions to below 1990 levels, exceeding statewide AB 32 GHG reduction goals. San Francisco's GHG emissions in 2010 were 5.3 million $MTCO_2E$, which represents a 14.5 percent reduction in GHG emissions compared to 1990 levels (6.2 million $MTCO_2E$). The reduction is largely a result of reduced GHG emissions from the electricity sector, from 2.0 million $MTCO_2E$ (1990) to 1.3 million $MTCO_2E$ (2010), and waste sector, from 0.5 million $MTCO_2E$ (1990) to 0.2 million $MTCO_2E$ (2010).[25]

5.5.5 Impacts and Mitigation Measures

5.5.5.1 Significance Thresholds

The project would have a potentially significant impact related to GHG emissions if the project were to:

- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or

- Conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

[25] San Francisco Department of Environment (DOE), *San Francisco Climate Action Strategy, 2013 Update*.

5.5.5.2 Approach to Analysis

GHG emissions and global climate change represent cumulative impacts of human activities and development projects locally, regionally, statewide, nationally, and worldwide. GHG emissions from all of these sources cumulatively contribute to the significant adverse environmental impacts of global climate change. No single project could generate enough GHG emissions to noticeably change the global average temperature; instead, the combination of GHG emissions from past, present, and future projects around the world have contributed and will continue to contribute to global climate change and its associated environmental impacts.

The BAAQMD has prepared guidelines and methodologies for analyzing the impacts associated with GHG emissions. These guidelines are consistent with CEQA Guidelines Sections 15064.4 and 15183.5, which address the analysis and determination of significant impacts from a proposed project's GHG emissions. CEQA Guidelines Section 15064.4 allows lead agencies to rely on a qualitative analysis to describe GHG emissions resulting from a project. CEQA Guidelines Section 15183.5 allows for public agencies to analyze and mitigate GHG emissions as part of a larger plan for the reduction of greenhouse gases and describes the required contents of such a plan. Accordingly, San Francisco has prepared its own Greenhouse Gas Reduction Strategy (described above), which the BAAQMD has reviewed and concluded that "Aggressive GHG reduction targets and comprehensive strategies like San Francisco's help the Bay Area move toward reaching the State's AB 32 goals, and also serve as a model from which other communities can learn."[26]

Given that the City's local greenhouse gas reduction targets are more aggressive than the State and region's 2020 and 2030 GHG reduction targets and consistent with the long-term 2050 reduction targets, the City's Greenhouse Gas Reduction Strategy is consistent with the goals of EO S-3-05, EO B-30-15, AB 32, and the Bay Area 2010 Clean Air Plan. Therefore, proposed projects that are consistent with the City's Greenhouse Gas Reduction Strategy would be consistent with the goals of EO S-3-05, EO B-30-15, AB 32, and the Bay Area 2010 Clean Air Plan, would not conflict with these plans, and would therefore not exceed the GHG significance threshold.

The following analysis of the proposed project's impact on climate change focuses on the project's contribution to cumulatively significant GHG emissions. Given the analysis is in a cumulative context, this section does not include an individual project-specific impact assessment.

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26 BAAQMD. Letter from J. Roggenkamp, BAAQMD, to B. Wycko, San Francisco Planning Department, October 28, 2010. Available online at: http://www.sf-planning.org/ftp/files/MEA/GHG-Reduction_Letter.pdf. Accessed January 24, 2015.

5.5.5.3 Impact Evaluation

Impact C-GG-1: The proposed project would generate greenhouse gas emissions, but not at levels that would result in a significant impact on the environment or conflict with any policy, plan, or regulation adopted for the purpose of reducing greenhouse gas emissions. (Less than Significant)

Individual projects contribute to the cumulative effects of climate change by directly or indirectly emitting GHGs during construction and operational phases. Direct operational emissions include GHG emissions from new vehicle trips and area sources (natural gas combustion). Indirect emissions include emissions from electricity providers, energy required to pump, treat, and convey water, and emissions associated with waste removal, disposal, and landfill operations.

The proposed project would increase the activity onsite primarily by introducing occupants of the new office buildings and commercial businesses as well as event attendees. Therefore, the proposed project would contribute to annual long-term increases in GHGs as a result of increased vehicle trips (mobile sources) as well as event-related, commercial, and office operations that would result in an increase in energy use, water use, wastewater treatment, and solid waste disposal. Construction activities would also result in temporary increases in GHG emissions. However, as described above under Regulatory Framework, the proposed project is a certified environmental leadership project under AB 900 and CARB has determined that the project would not result in any net additional GHG emissions due in part to the voluntary purchase of carbon credits by the project sponsor (see Improvement Measure I-C-GG-1, below).

Moreover, the proposed project would be subject to and required to comply with several regulations adopted to reduce GHG emissions as identified in the GHG Reduction Strategy. The proposed project would comply with the following regulations or their equivalent: Commuter Benefits Ordinance; Emergency Ride Home Program; Transportation Management Programs (see Project Description and Appendix TMP); Transit Impact Development Fee to the extent applicable under the Mission Bay Redevelopment Plan; Jobs-Housing Linkage Program (residential uses less than ¼ -mile north of the project site); Bicycle Parking requirements (the project would exceed these requirements and provide a total of 586 bicycle parking spaces); Fuel Efficient Vehicle and Carpool Parking (providing 51 carpool spaces and 51 fuel efficient and vehicle charging stations); San Francisco Green Building Requirements (increased energy efficiency, purchase of renewable energy credits, reduction of potable water consumption by about 35 percent, enhanced energy commissioning); San Francisco Stormwater Management Ordinance (low impact development practices including filtration basins, rain gardens, and approximately 50,000 square feet of self-treating green roofs); San Francisco Water Efficient Irrigation Ordinance (the project's landscaped areas include low-water use planting selections, use of sedum and allium-based green roof materials, and soil mix design for a high available water holding capacity); Mandatory Recycling and Composting Ordinance (paper, glass, corrugated cardboard, plastic, and metals would be collected on site for recycling, and recycling bins and composting containers would be located throughout the buildings); San Francisco Construction and Demolition Debris Recovery Ordinance (to be included as part of the construction specifications); Street Tree Planting Requirements for New Construction (the project includes 79 new street trees); Light Pollution Reduction (exterior lighting fixture selections will have minimum backlight/uplight/glare ratings as allowed by required illuminance levels); Construction Site Runoff Control (site is served by a separate storm sewer system and construction contractors would implement best management practices to comply with conditions of a site-specific stormwater pollution prevention plan); Enhanced Refrigerant Management; Finished Material Pollutant Control; and Regulation of Diesel Backup Generators.

These regulations, as outlined in San Francisco's *Strategies to Address Greenhouse Gas Emissions*, have proven effective as San Francisco's GHG emissions have measurably reduced when compared to 1990 emissions levels, demonstrating that the City has met and exceeded the GHG reduction goals specified in EO S-3-05, EO B-30-15, AB 32, and the Bay Area 2010 Clean Air Plan for the year 2020. The proposed project was determined to be consistent with San Francisco's GHG Reduction Strategy.[27] Other existing regulations, such as those implemented through AB 32, will continue to reduce a proposed project's contribution to climate change.

In addition to compliance with the applicable provisions of the San Francisco's GHG Reduction Strategy or their equivalents, the project has been certified by Governor Brown as a leadership project under the Jobs and Economic Improvement Through Environmental Leadership Act of 2011 (AB 900). As discussed under Regulatory Framework above, on April 20, 2015, CARB determined that based on the documentation submitted by the project sponsor, the proposed project would not result in any net additional GHG emissions for purposes of certification under AB 900.[28]

As part of the AB 900 application, the project sponsor has committed to purchase carbon credits from a qualified GHG emissions broker in an amount sufficient to offset all GHG emissions from project construction and operations, as reiterated in **Improvement Measure I-C-GG-1, Purchase Voluntary Carbon Credits**. Net additional GHG emissions would be calculated in accordance with the methodology agreed upon by CARB in connection with the AB 900 certification of the project.[29] Thus, the Governor's certification of the proposed project as a leadership project further supports the determination that the proposed project would not have a significant impact on global climate change due to GHG emissions.

Therefore, the proposed project's GHG emissions would not conflict with state, regional, and local GHG reduction plans and regulations, and because the proposed project would not result in any net additional GHG emissions, the project would not contribute to cumulative GHG

27 Greenhouse Gas Analysis: Compliance Checklist, May 22, 2015. This document is on file and available for public review at the San Francisco Planning Department as part of Case File No. 2014.1441E.

28 Corey, Richard W., Executive Director, Air Resources Board, 2015. Air Resources Board Executive Order G-15-022, Relating to Determination of No Net Additional Greenhouse Gas Emissions Under Public Resources Code section 21183, subdivision (c) for Golden State Warriors Event Center and Mixed-Use Development at Mission Bay Blocks 29-32, dated April 20, 2015.

29 Golden State Warriors, 2015. *Application for Environmental Leadership Development Project, Golden State Warriors Event Center and Mixed-Use Development at Mission Bay Blocks 29-32*, February 2015, and Addenda dated March 6, 2015 and March 16, 2015.

emissions impacts. As such, the proposed project would result in a *less-than-significant* impact with respect to GHG emissions.

Mitigation: Not required.

Improvement Measure I-C-GG-1: Purchase Voluntary Carbon Credits

***Construction Emissions*:** No later than six (6) months after the issuance of a Temporary Certificate of Occupancy for the project, the project sponsor shall provide to the Office of Community Investment and Infrastructure (OCII), a calculation of the net additional emissions resulting from the construction of the project, to be calculated in accordance with the methodology agreed upon by the California Air Resources Board (CARB) in connection with the AB 900 certification of the project. The project sponsor shall provide courtesy copies of the calculations to CARB and the Governor's office promptly following transmittal of the calculations to OCII. The project sponsor shall enter into one or more contracts to purchase voluntary carbon credits from a qualified greenhouse gas emissions broker in an amount sufficient to offset the construction emissions. The project sponsor shall provide courtesy copies of any such contracts to the ARB and the Governor's office promptly following the execution of such contracts.

***Operational Emissions*:** No later than six (6) months after project stabilization, to be defined as the date following project completion when the project is 90 percent leased and occupied (and with respect to the arena component, 90 percent of the available booking dates are utilized), the project sponsor shall submit to OCII a projection of operational emissions arising from the project, based on data accumulated to that date and reasonable projections of operational emissions for the useful life of the project (30 years), to be calculated in accordance with the methodology agreed upon by CARB in connection with the AB 900 certification of the project. The project sponsor shall provide courtesy copies of the calculations to CARB and the Governor's office promptly following transmittal of the calculations to OCII. The project sponsor shall enter into one or more contracts to purchase voluntary carbon credits from a qualified greenhouse gas emissions broker in an amount sufficient to offset the operational emissions, on a net present value basis in light of the fact that the project sponsor is proposing to acquire such credits in advance of any creation of the emissions subject to the offset. The project sponsor shall provide courtesy copies of any such contracts to CARB and the Governor's office promptly following the execution of such contracts.

Comparison of Impact C-GG-1 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR did not specifically address impacts associated with GHG emissions. However, because the proposed project would have a less-than-significant impact on GHG emissions, the project would result in no new or substantially more severe significant impacts than those previously identified in the FSEIR.

5.6 Wind and Shadow

5.6.1 Introduction

This section of the SEIR analyzes potential wind and shadow impacts that could occur as a result of the proposed project, and assesses the potential for project implementation to adversely affect existing wind and shadow patterns. The analyses in this section are based in part on a wind study prepared by Rowan Williams Davies & Irwin Inc. (RWDI)[1], and a shadow analysis conducted by ESA (see Appendix WS).

5.6.2 Summary of Wind and Shadow Impacts in Mission Bay FSEIR

5.6.2.1 Summary of Wind Impacts in Mission Bay FSEIR Initial Study Air Quality/Climate Section

The Mission Bay FSEIR Initial Study Air Quality/Climate section discussed wind significance criteria and impacts. The Mission Bay FSEIR Initial Study Air Quality/Climate section reported that while the City Planning Code contained specific wind hazard and comfort criteria for evaluating wind effects of new buildings in the Downtown Commercial (C-3) District and the Rincon Hill, Van Ness Avenue and South of Market areas, there were no wind criteria in the City Planning Code that specifically applied to the Mission Bay Plan area.

The Mission Bay FSEIR Initial Study summarized the wind analysis from the Mission Bay FEIR, and reported that proposed buildings 100 feet or higher could generate pedestrian-level wind effects, including increased wind speeds and turbulence (i.e., variability in wind speed). The Mission Bay FSEIR Initial Study also reported that buildings up to 100 feet in height would not be expected to generate hazardous winds. Hazardous winds are defined in the City Planning Code Section 148 as an hourly average of 26 miles per hour (mph), for more than any single hour of the year. The Mission Bay FSEIR Initial Study reported that the extent and magnitude of wind effects attributable to new buildings developed within the Mission Bay Plan area would depend on the actual design, height, bulk and placement of each specific structure in relationship to adjacent buildings, streets and open space areas.

The Mission Bay FSEIR Initial Study indicated that while the standards of City Planning Code Section 148 do not apply to the Mission Bay plan area, Section 148's wind standards nonetheless provide an appropriate methodology and criteria for the analysis of wind effects in the Plan area. The Mission Bay FSEIR Initial Study included Mitigation Measure D.7, adapted from the Mission Bay FEIR, that required wind review, including wind tunnel testing, of proposed structures within the Mission Bay Plan area over 100 feet in height, which would have the potential to create wind hazards. The mitigation measure also provided for design-specific analysis of wind hazards of

[1] Rowan Williams Davies & Irwin Inc., *Warriors Arena, San Francisco California, Pedestrian Wind Study*, April 23, 2015.

individual projects and a basis to incorporate design modifications to reduce significant wind hazards. With implementation of this mitigation measure, the Mission Bay FSEIR concluded that Mission Bay plan wind impacts would be less than significant.

5.6.2.2 Summary of Shadow Impacts in Mission Bay FSEIR Initial Study Air Quality/Air Climate Section

The Mission Bay FSEIR Initial Study Air Quality/Climate section discussed shadow significance criteria and impacts. The Mission Bay FSEIR Initial Study Air Quality/Climate section reported that City Planning Code Section 295 (Sunlight Ordinance), which provides for the protection of public open spaces under the jurisdiction of the City Recreation and Parks Department from shadowing from new structures, did not apply to proposed development within the Mission Bay plan area.

The Mission Bay FSEIR Initial Study included a shadow analysis to assess potential shading effects of full development under the Mission Bay plan by using generalized buildings masses for the land uses and maximum height zones proposed by the Mission Bay plan. The shadow analysis revealed that proposed development under the Mission Bay plan would not shade any nearby City Recreation and Parks Department open space area at any time, and consequently, would have a less-than-significant effect on these facilities.

The shadow analysis also indicated that development under the Mission Bay plan would shade open space areas within the Mission Bay plan area, including proposed open space area near the waterfront of the Bay along the eastern plan area boundary, proposed open space along the China Basin Channel, and the proposed open space areas along Mission Bay Boulevard. The Mission Bay FSEIR Initial Study included Mitigation Measure D.8, adapted from the Mission Bay FEIR, which required analysis of potential shadows on existing and proposed open spaces during the building design and review process for any development that would exceed the design height and/or bulk criteria of the plan. With implementation of this mitigation measure, the Mission Bay FSEIR concluded that Mission Bay plan shadow impacts on open space within the Mission Bay plan area would be less than significant.

The Mission Bay FSEIR Initial Study also determined that Mission Bay plan shading effects on vegetation or wildlife within or near the Plan area, including along the Bay shore and at China Basin Channel, would be less than significant.

5.6.3 Setting

5.6.3.1 Wind

San Francisco's Existing Wind Environment

In San Francisco, average winds speeds are the highest in the summer and lowest in winter. However, the strongest peak wind speeds occur in winter. The highest average wind speeds occur in mid-afternoon and the lowest in the early morning. Based on over 40 years of recordkeeping, the highest mean hourly wind speeds (approximately 20 mph) occur mid-afternoon in July, while the lowest mean hourly wind speeds (in the range of 6 to 9 mph) occur throughout the day in November.

Meteorological data collected at the old San Francisco Federal Building at 50 United Nations Plaza over a 6-year period[2] show that westerly[3] through northwesterly winds are the most frequent and strongest winds during all seasons. Of the 16 primary wind directions, four have the greatest frequency of occurrence: these are northwest, west-northwest, west, and southwest. Analysis of the Federal Building wind data shows that during the hours from 6:00 a.m. to 8:00 p.m., about 70 percent of the winds blow from five adjacent directions of the 16 directions, as follows: northwest (10 percent of all winds), west-northwest (14 percent of all winds), west (35 percent of all winds), west-southwest (accounting for 2 percent of all winds), and southwest (9 percent of all winds). Over 90 percent of all measured winds with speeds over 13 mph blow from these five directions. The other 10 percent of winds over 13 mph are from storms and can come from any other direction.

Wind Effects on People

The comfort of pedestrians varies under different conditions of sun exposure, temperature, clothing, and wind speed.[4] Winds up to about 4 mph have no noticeable effect on pedestrian comfort. With speeds from 4 to 8 mph, wind is felt on the face. Winds from 8 mph to 13 mph will disturb hair, cause clothing to flap, and extend a light flag mounted on a pole. Winds from 13 to 19 mph will raise loose paper, dust, and dry soil, and will disarrange hair. For winds from 19 to 26 mph, the force of the wind will be felt on the body. With 26 to 34 mph winds, umbrellas are used with difficulty, hair is blown straight, there is difficulty in walking steadily, and wind noise is unpleasant. Winds over 34 mph and gusts can blow people over.

Wind Effects from Buildings

Tall buildings and exposed structures can strongly affect the wind environment for pedestrians. A building that stands alone or is much taller than the surrounding buildings can intercept and redirect winds that might otherwise flow overhead and bring them down the vertical face of the building to ground level, where they create ground-level wind and turbulence. These redirected winds can be relatively strong and turbulent, and may in some instances be incompatible with the intended uses of nearby ground-level spaces. Moreover, structure designs that present tall flat surfaces square to strong winds can create ground-level winds that can prove to be hazardous to pedestrians in the vicinity. Conversely, a building with a height that is similar to the heights of surrounding buildings typically would cause little or no additional ground-level wind acceleration and turbulence.

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[2] Arens, E. *et al.*, "Developing the San Francisco Wind Ordinance and its Guidelines for Compliance," Building and Environment, Vol. 24, No. 4, p. 297-303, 1989.

[3] Wind directions are reported as directions from which the winds blow.

[4] Lawson, T.V. and A.D. Penwarden, "The Effects of Wind on People in the Vicinity of Buildings," Proceedings of the Fourth International Conference on Wind Effects on Buildings and Structures, London, 1975, Cambridge University Press, Cambridge, U.K., 605-622 1976.

Thus, wind impacts are generally caused by large building masses extending substantially above their surroundings, and by buildings oriented so that a large wall catches a prevailing wind, particularly if such a wall includes little or no articulation. In general, new buildings less than approximately 80 feet in height are unlikely to result in substantial adverse effects on ground-level winds such that pedestrians would be uncomfortable. Such winds may occur under existing conditions, but shorter buildings typically do not cause substantial changes in ground-level winds.

Wind Patterns in the Mission Bay Plan Area Vicinity

As discussed above, in San Francisco, including Mission Bay, over 90 percent of all measured winds with speeds greater than 13 mph blow from the northwest, west-northwest, west, and west-southwest. These are the directions of primary concern for potential wind effects of the proposed project.

The wind conditions for pedestrians in the Mission Bay Plan area are determined by the interactions between the higher-speed northwest, west-northwest, west and southwest winds, and the combined effects of the Mission Bay Plan street grid and the large footplate buildings within the Plan area. The west and the west-northwest winds, which in combination make up nearly half of all winds, align closely with the street grid and contribute to the strong winds that flow along the east-west-oriented streets within the Plan area. Although the northwest and southwest winds are misaligned with the street grid, both also contribute to winds flowing eastward along the east-west-oriented streets. Located on the eastern waterfront of San Francisco, the project site is fully exposed to storm winds that approach from over the Bay from the southeast through the east and northeast.

The existing pedestrian wind conditions on large vacant parcels of land in the Mission Bay South Plan area can be characterized as windy. However, prior wind tunnel testing conducted within Mission Bay South Plan area has demonstrated that existing wind conditions within the Plan area have improved over time as planned buildings have been constructed in accordance with the *Mission Bay South Design for Development* (see *Regulatory Framework,* below). Groups of buildings built according to these guidelines substantially slow winds in their vicinity.

5.6.3.2 Shadow

Background

In an urban environment, shadow is a function of the height, size, and massing of buildings and other elements of the built environment, and the angle of the sun. The angle of the sun varies due to the time of day (from rotation of the earth) and the change in seasons (due to the earth's elliptical orbit around the sun and the earth's tilted axis). The longer mid-day shadows are cast during the winter (when the mid-day sun is lowest in the sky) and the shorter mid-day shadows are cast during the summer (when the mid-day sun is higher in the sky). At the time of the summer solstice (which falls approximately on June 21 of every year), the mid-day sun is highest in the sky, and the longest day and shortest night occur on this date. Conversely, the shortest day and longest night occur on the winter solstice (which falls on approximately December 21 of every year). The vernal and fall equinoxes (when day and night are equal in length) represent the halfway point between solstices.

Existing/Planned Open Spaces Under Public Jurisdiction in the Vicinity of the Project Site

Bayfront Park is a planned linear park comprising Mission Bay plan parcels P21 through P24, and when completed, will extend from Mission Bay Boulevard south to Mariposa Street. The north portion of the park (P21, located east of Terry A. Francois Boulevard, between Mission Bay Boulevard South and just south of Pierpoint Lane) is complete, and includes a landscaped parking lot and boat launch. Construction is underway in 2015 for the south portion of Bayfront Park (P23 and P24, located west of Terry A. Francois Boulevard, between 16th Street and Mariposa Street), and construction of this portion of the park will be complete by the end of 2016. Following realignment of Terry A. Francois Boulevard, the central portion (P22) of Bayfront Park located east of the project site and consisting of approximately 5.5 acres will be developed. Potential park uses for this portion of Bayfront Park being considered at this time include, but are not limited to, pathways, outdoor performance area, kiosks, outdoor dining areas, and informal playing field(s). Both the realignment of Terry A. Francois Boulevard and Bayfront Park public access improvements on P22 are triggered by development on Block 29-32 and would be implemented by the master developer, FOCIL-MB, LLC, prior to occupancy of buildings at the project site.

Agua Vista Park is an existing shoreline landscaped area and fishing pier located east of the project site across from the existing alignment of Terry A. Francois Boulevard. Agua Vista Park is on Port of San Francisco property and is outside of the Mission Bay plan area. The Port is currently renovating Agua Vista Park, include new pathways, seating areas, interpretation and/or fishing facility improvements; these improvements are planned to be completed in August 2015.

5.6.4 Regulatory Framework

Development within the Mission Bay South Redevelopment Plan Area, including Blocks 29-32, is subject to the development controls of the South Plan, the *Mission Bay South Design for Development* (South Design for Development), as amended, and other related documents. The South Plan and South Design for Development supersede the City's *Planning Code*, except as otherwise specifically provided in those documents and associated documents for implementing the Plans. The regulatory framework discussion presented below focuses on the guidelines and design standards contained in the Mission Bay South Design for Development that are applicable to the proposed project.

5.6.4.1 Wind

Mission Bay South Design for Development

The Mission Bay South Design for Development includes *Wind Analysis* standards for new development in Mission Bay South. These standards were prepared with the objective to use all feasible means to eliminate wind hazards and to reduce adverse wind impacts, including potentially uncomfortable wind conditions. The Mission Bay South Design for Development states that wind review, including potential wind tunnel testing, is required for all projects that include buildings over 100 feet in height. The Mission Bay South Design for Development specifies that the wind analysis shall be conducted to assess wind conditions for the project in conjunction with the anticipated pattern of development on surrounding blocks.

The Mission Bay South Design for Development also provides design guidelines for new development within Mission Bay South on blocks that would be exposed to winds from the west or north-west, particularly if they front open space. Examples include modulation of western facades through the use of architectural devices (e.g., surface articulation, variation of planes, wall surfaces, and heights; and placement of stepbacks, courtyards, plazas, and other features); landscaping in appropriate locations and use of porous materials (vegetation, hedges, screens, latticework, perforated or expanded metal); avoidance of use of "breezeways" or notches at the upwind corners of the building, and use of building setbacks to reduce ground level wind accelerations.

5.6.4.2 Shadow

Mission Bay South Design for Development

The Mission Bay South Design for Development includes *Sunlight Access to Open Space* design standards. These standards were prepared with the objective of encouraging new developments to ensure sunlight access to public open spaces and limit the extent and duration of shadows on these public open spaces. The South Design for Development notes that shadow studies have determined that development complying with the design standards will reasonably limit areas of shadow on public open spaces during the active months of the year (March to September) and during the most active times of the day (10:00 a.m. to 4:00 p.m.). The South Design for Development requires that additional shadow analysis be conducted for a project that would need a variance from South Design for Development's design standards for height, bulk and coverage and streetwall.

5.6.5 Impacts and Mitigation Measures

5.6.5.1 Significance Thresholds

Wind

The proposed project would have a significant impact related to wind if it were to:

- Alter wind in a manner that substantially affects public areas.

As discussed above, while City Planning Code Section 148 does not apply to the Mission Bay Plan area, Section 148's wind standards nonetheless provide an appropriate methodology and criteria for the analysis of wind effects in the Plan area. Consequently, for the purposes of CEQA review, an exceedance of the Planning Code's wind hazard criterion is used in this SEIR as the standard for determining whether the project would alter pedestrian winds in a manner that would substantially alter public areas.

Shadow

The proposed project would have a significant shadow impact if it were to create new shadow in a manner that would:

- Substantially affect the use of publicly accessible open space or outdoor recreation facilities or other public areas.

5.6.5.2 Approach to Analysis

Wind

The methodology and the criteria for analyzing potential project wind impacts in this SEIR are derived from Section 148 of the Planning Code. Section 148 establishes a wind hazard criterion, whereby project buildings may not cause wind speeds that meet or exceed 26 mph, averaged for a full hour for any hour of the year.[5] Potential project exceedance of this hazard criterion in off-site public areas would be a significant environmental impact. Wind effects on on-site publically accessible areas are not considered a significance threshold.

Section 148 also establishes wind comfort criterion, whereby a project shall not cause ground-level wind currents to exceed, more than 10 percent of the time, 11 mph in areas of substantial pedestrian use, and 7 mph in public seating areas.[6] The Section 148 wind comfort criterion is not used to judge significance of project wind impacts in the Mission Bay Plan area and in this SEIR. Accordingly, exceedance of wind speeds[7] that exceed wind comfort criteria but do not reach hazard levels would not be a significant impact, and accordingly, would not require mitigation. Nevertheless, project effects on wind comfort are presented in this SEIR for informational purposes.

A wind tunnel test was conducted by RWDI in April, 2015 to characterize the pedestrian wind environment that currently exists and to determine future wind conditions on sidewalks and open spaces around the project site should the project be constructed. A one-inch-to-25-foot scale model of the project site and vicinity was constructed in order to simulate existing and existing-plus-project wind conditions. The wind model included all relevant surrounding buildings within a 1,200 foot radius of the center of the project site, including both existing and cumulative conditions.

The wind tunnel test measured wind speeds for the existing setting and the existing-plus-project scenarios, as well as a project-plus-cumulative scenario. Pedestrian-level wind speeds were measured at up to 142 on- and off-site locations (depending on the test scenario), that were selected for the study area to quantify resulting pedestrian-level winds on sidewalks and in other publically accessible spaces where the project would be expected to have the most effect on winds. Locations for wind speed sensors, or study test points, were selected to indicate how the general flow of winds would be directed around the new buildings. Consistent with Section 148, the locations of interest are public sidewalks and public parks, including areas of substantial pedestrian use and/or public seating areas. As a result, test points were included along sidewalks,

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5 The wind hazard criterion is derived from the wind condition that would generate a 3-second gust of wind at 20 meters per second, a commonly used guideline for wind safety. This wind speed, on an hourly basis, is a 26 mph average for a full hour. Because the original Federal Building wind data were collected at one-minute averages, the 26 mph hourly average is converted to a one-minute average of 36 mph, which is used to determine compliance with the 26 mph one-hour hazard criterion in the *Planning Code*. (Arens, E. *et al.*, "Developing the San Francisco Wind Ordinance and its Guidelines for Compliance," Building and Environment, Vol. 24, No. 4, p. 297-303, 1989.)

6 The wind comfort criteria are defined in terms of *equivalent wind speed*, which is an average wind speed (mean velocity), adjusted to include the level of gustiness and turbulence. *Equivalent wind speed* is defined as the mean wind velocity, multiplied by the quantity (one plus three times the turbulence intensity) divided by 1.45. This calculation magnifies the reported wind speed when turbulence intensity is greater than 15 percent.

7 Throughout this document, unless otherwise stated, use of the term "wind speeds" in connection with the wind-tunnel tests refers to equivalent wind speeds that are exceeded 10 percent of the time.

near existing/planned open space and other areas of substantial pedestrian use. Consistent with City guidance, the wind analysis results presented for the various scenarios in this SEIR do not consider existing or planned landscaping.

In accordance with the protocol for wind tunnel testing under Section 148, the three scenarios were tested for each of four prevailing wind directions: northwest, west-northwest, west, and west-southwest. These winds are the most common in San Francisco, including within Mission Bay, and are therefore most representative for evaluation of the proposed project.

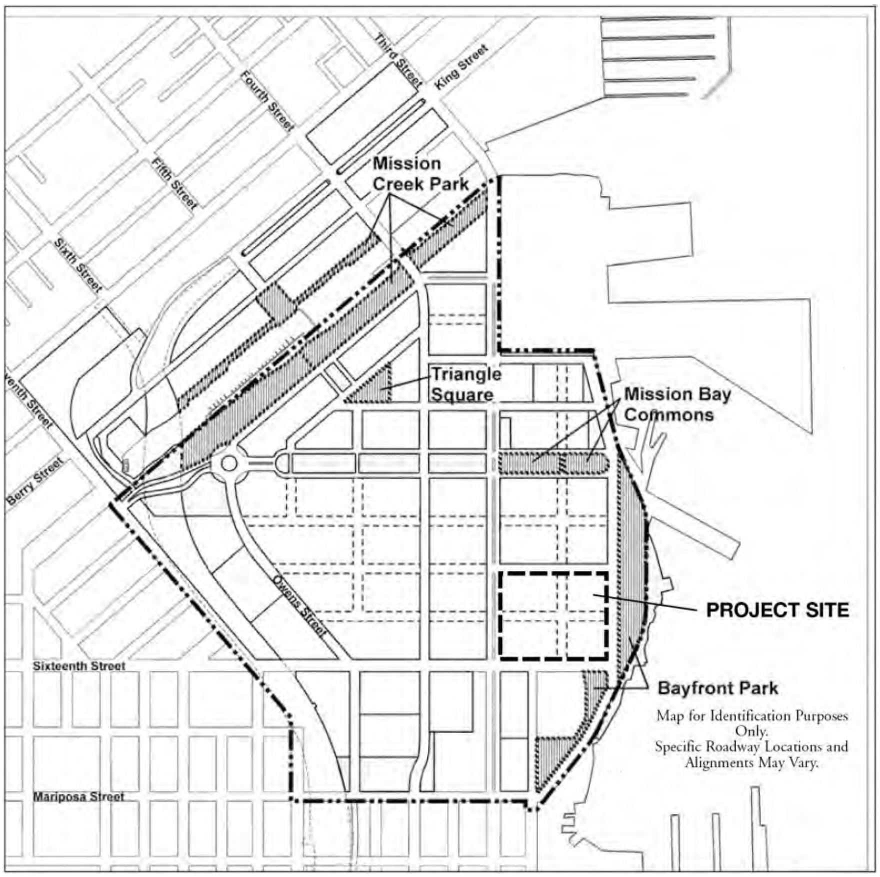
Shadow

For projects subject to a shadow analysis per the South Design for Development, the amount of area shadowed, the duration of the shadow, and the importance of sunlight to the use patterns of open spaces are taken into account when determining the impact of shadows from development. The South Design for Development provides the following methodology:

- For the purposes of assessing the impact of shadows on Mission Bay open spaces, open spaces have been divided into four areas: Mission Creek Park (which includes both North and South), Bayfront Park, Triangle Square, and the section of Mission Bay Commons, between Third Street and Terry Francois Boulevard. (See **Figure 5.6-1,** below, for project location in relation to the existing/planned Mission Bay South open spaces.)
- Shadow analysis should study the area of public open space in continuous shadow for periods of one hour, during the most active months of the year (March to September) and during the most active times of the day (10:00 a.m. to 4:00 p.m.).
- Analysis for a specific development proposal should take into account aggregate shadow impacts from all buildings over 40 feet in height adjacent to the public open space. For the purpose of shadow analysis, undeveloped parcels should be analyzed using either approved plans for future development or a plan that resembles the maximum allowable building envelope for that parcel.
- The total area of each of the described public open spaces should be the basis for shadow calculation. To reasonably limit areas of open space in continuous shadow for extended periods of time, the area of public open space in continuous shadow for a period of one hour from March to September between 10:00 a.m. and 4:00 p.m. should not exceed the following percentages:

Mission Creek Park:	13 percent
Bayfront Park:	20 percent
Triangle Square	17 percent
Mission Bay Commons	11 percent

As shown in **Figure 5.6-1**, given the proposed project's location, the purpose of this shadow analysis within the Mission Bay South plan area is to evaluate the potential shadow impacts on the planned Bayfront Park, a linear park that will extend from Mission Bay Boulevard south to Mariposa Street. No other existing or planned open space in the Mission Bay South plan area, including Mission Bay Commons, Mission Creek Park, Triangle Square, or Mariposa Park would be shadowed by the proposed project.



SOURCE: South Design for Development, 2004

Figure 5.6-1
Existing/Planned Public Open Space in Mission Bay South

To evaluate the shadow impact of the proposed project, ESA prepared an up-to-date three-dimensional (3-D) model of the Mission Bay South plan area, which included the following:

- Current ground and roadway elevations for the study area in the 3-D model using the maps provided by the Office of Community Investment and Infrastructure (OCII).
- The digital 3-D model of the proposed event center and mixed-use development as provided by the sponsor.
- Cumulative development in the study area consistent with the maximum dimensions and bulks provided for in the South Design for Development.

ESA conducted a shadow screening study for the proposed project by casting shadows on the hour starting at noon and 4:00 p.m. continuing through the 21st of each month of concern – March, April, May, June, July, August, and September. (As discussed in the Setting, the equinoxes and solstices occur on approximately the 21st of the month, and consequently, are representative of the entire month). Given the project site's location relative to Bayfront Park, there is no potential for project shadows to be cast on Bayfront Park between 10:00 a.m. and noon, and consequently, no shadow screening images were needed for times before noon.

Images of the resulting shadows cast for the study months/times are presented in **Appendix WS**.

Given that this shadow analysis follows the methodology from the South Design for Development, which requires the analysis "take into account shadow impacts from all building development over 40 feet in height adjacent to public open space," the shadow analysis for this SEIR is essentially a cumulative analysis and project-specific impacts are addressed within the cumulative context.

5.6.5.3 Impact Evaluation

Wind

Wind Hazards at Off-site Public Areas

Impact WS-1: The project would alter wind in a manner that would substantially affect off-site public areas. (Significant and Unavoidable with Mitigation)

The proposed project would include development of an event center, office and retail buildings, and other structures that would have the potential to alter winds off-site, including at pedestrian use areas such as public walkways and public open space in the project vicinity.

As discussed in the Setting, prior wind tunnel tests conducted within the Mission Bay South Plan area have demonstrated that historical wind conditions within the Plan area have improved over time as planned buildings have been constructed in accordance with the *Mission Bay South Design for Development.* This general trend is expected to continue as more buildings are constructed in the Plan area. Accordingly, as more buildings are built and fill in vacant sites in the Plan area, wind speeds in pedestrian areas around the buildings will generally continue to decrease.

As discussed under Section 5.6.5.2, Approach to Analysis, a wind tunnel test was conducted to define the pedestrian wind environment that currently exists, and to determine future wind conditions on public use areas around the project site with implementation of the project. **Table 5.6-1** presents the wind analysis results, namely the 10-percent exceeded equivalent wind speeds and the number of hours per year the wind hazard criterion would be exceeded at 46 off-site study test points located on public walkways along the site perimeter and vicinity for the existing and existing-plus-project wind scenarios. **Figure 5.6-2** presents a map showing the location of the off-site wind test points, including the location of wind hazards for the existing-plus-project scenario.

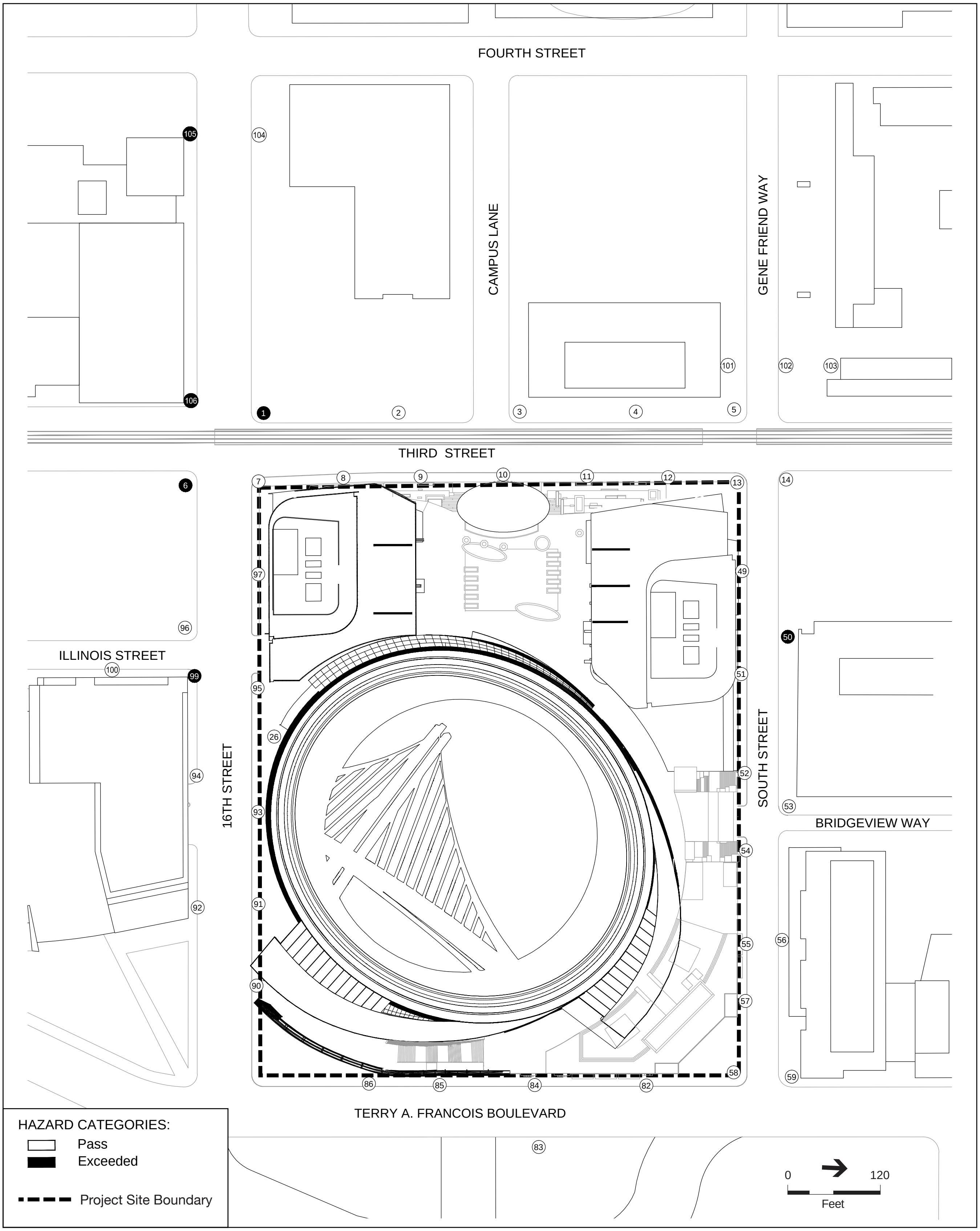
Existing Wind Hazard Conditions. Under existing conditions, the wind hazard criterion is exceeded at seven test locations on public walkways in the project vicinity. Currently, five test locations with wind hazards occur along 16th Street at test points adjacent to, across the street from, or upwind of the project site, one wind hazard location occurs along Gene Friend Way upwind of the project site, and one wind hazard location occurs on South Street adjacent to the project site. The total duration of the existing wind hazards at the seven locations on public walkways in the project vicinity is 106 hours per year, with 101 of those hours occurring at the five test points along 16th Street.

INSERT TABLE 5.6-1
EXISTING PLUS PROJECT WIND HAZARD CONDITIONS

WIND HAZARD ANALYSIS - OFF-SITE STUDY POINTS

References		Existing			Project			
Wind Test Location Number	Wind Hazard Criterion Speed miles/hour	1-hr./yr. Equivalent Wind Speed miles/hour	Wind Hazard Criterion Exceeded, hours/year	Source	1-hr./yr. Equivalent Wind Speed miles/hour	Wind Hazard Criterion Exceeded, hours/year	Hazard Hours Relative to Existing	Source
1	36	41	13	e	42	12	-1	e
2	36	28			23			
3	36	22			17			
4	36	14			21			
5	36	36			29			
6	36	36			44	39	39	p
7	36	39	6	e	34		-6	-
8	36	35			24			
9	36	29			28			
10	36	24			24			
11	36	15			28			
12	36	24			23			
13	36	33			27			
14	36	30			28			
49	36	31			19			
50	36	35			40	5	5	p
51	36	34			33			
52	36	31			28			
53	36	23			27			
54	36	38	3	e	26		-3	-
55	36	29			25			
56	36	22			28			
57	36	30			23			
58	36	19			23			
59	36	21			19			
82	36	31			24			
83	36	31			28			
84	36	34			20			
85	36	31			26			
86	36	32			22			
90	36	29			24			
91	36	34			25			
92	36	32			20			
93	36	31			30			
94	36	29			20			
95	36	35			29			
96	36	29			32			
97	36	34			23			
99	36	40	8	e	41	14	6	p
100	36	22			21			
101	36	32			29			
102	36	35			33			
103	36	37	1	e	35		-1	-
104	36	33			35			
105	36	45	70	e	43	57	-13	e
106	36	39	5	e	42	12	7	p
Ave 1-hr. Equivalent Wind Speed		30.7			27.9			
Total Hours Winds Exceeds Criterion			106			139	33	

Total Exceedances:	Total:	7		Total:	6	
Subtotals by type:	*Existing*	7	e	*Existing*	2	e
				New, or increased time	4	p
				New, at new location	0	n
				Eliminated by Project	3	-



SOURCE: RWDI, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.6-2
Existing Plus Project Wind Hazard Conditions

Existing-Plus-Project Wind Hazard Conditions at Off-site Public Use Areas. Development of the proposed project would alter wind speeds among individual study test points at off-site public walkways. Under existing-plus-project conditions, the total net number of off-site study test points at which wind speed would exceed the wind hazard criterion would be reduced from 7 to 6. However, there would also be a net increase in the total duration of wind hazards on the off-site public walkways in the project vicinity, increasing from 106 hours per year under existing conditions to 139 hours per year under existing-plus-project conditions (an increase of 33 hours).

When considering individual wind test points, the proposed project would result in the following changes to the wind environment in the project vicinity compared to existing conditions (see Figure 5.6-2 for test point locations):

- Create new exceedances of the wind hazard criterion at two test points: at the southeast corner of Third Street and 16th Street (Test Point No. 6: 39 hours per year); and on the north side of South Street between Third Street and Bridgeview Way across from the project site (Test Point No. 50: 5 hours per year);
- Increase the duration of two existing wind hazard exceedances: at the southeast corner of 16th Street and Illinois Street (Test Point No. 99: 6 hour increase per year); and at the southwest corner of Third Street and 16th Street (Test Point No. 106: 7 hour increase per year);
- Decrease the duration of two existing wind hazards: at the northwest corner of Third Street and 16th Street (Test Point No. 1: 1 hour decrease per year); and on 16th Street between Third and Fourth Streets (Test Point No. 105: 13 hour decrease per year) and
- Eliminate three existing exceedances of the wind hazard criterion: at the northeast corner of Third Street and 16th Street (Test Point No. 7: 6 hours eliminated per year); on South Street adjacent to the site (Test Point No. 54: 3 hours eliminated per year); and on Gene Friend Way adjacent to UCSF Hearst Tower (Test Point No. 103: 1 hour eliminated per year).

It should be noted that the wind test results indicate that under existing-plus-project conditions, no wind hazard exceedances would occur on public walkways located on the east side of the project site. Given that the planned Bayfront Park is located even further east, it can also be inferred from the wind test data that the project would not cause a new wind hazard within the planned Bayfront Park.

In summary, the project would result in a net increase in the total duration of the wind hazard exceedance at off-site public walkways in the project vicinity. Consequently, the project would alter wind in a manner that would substantially affect off-site public areas, and accordingly, the impact would be significant. **Mitigation Measure M-WS-1**, identified below, describes potential design measures that would serve to reduce or avoid related project wind hazards. Preliminary evaluation by the project sponsor of certain potential on-site design modifications indicate such modifications would be effective in reducing the project wind hazard impact to a less than significant level. However, given that the project design is not yet finalized, the impact is conservatively identified as *significant and unavoidable with mitigation*. It should be noted that the project impact discussed above is identified only for the interim conditions prior to implementation of planned cumulative development in the project vicinity. As described in

Impact C-WS-1, below, under cumulative-plus-project conditions, wind hazard impacts would be less than significant.

Mitigation Measure M-WS-1: Develop and Implement Design Measures to Reduce Project Off-site Wind Hazards

The project sponsor shall develop and implement design measures to reduce the identified project off-site wind hazards to the extent feasible. This may include on-site project design modifications or additions, additional on-site landscaping; and the implementation of potential additional off-site streetscape landscaping or other off-site wind-reducing features. Potential on- and/or off-site project site wind-reduction design measures developed by the sponsor would be coordinated with, and subject to review and approval, by OCII.

Comparison of Impact WS-1 to Mission Bay FSEIR Impact Analysis

As discussed under Summary of Impacts in the Mission Bay FSEIR, the Mission Bay FSEIR reported that proposed buildings 100 feet or higher could generate pedestrian-level wind effects, including increased wind speeds and turbulence. The Mission Bay FSEIR determined that with implementation of Mitigation Measure D.7, which required wind review, including wind tunnel testing, of proposed structures over 100 feet in height, and provided for design-specific analysis of wind hazards and a basis to incorporate design modifications to reduce significant wind hazards, that Mission Bay plan wind impacts would be less than significant.

Consistent with Mission Bay FSEIR Mitigation Measure D.7 (and the South Design for Development *Wind Analysis* standards), wind tunnel testing and analysis was conducted for the proposed project. As discussed above, project wind hazard impacts at off-site public areas are conservatively determined to be significant. If implementation of Mitigation Measure M-WS-1 does not effectively mitigate the project off-site wind hazard to a less than significant level, then the project would result in a substantially more severe significant wind impact than was previously identified in the Mission Bay FSEIR. As discussed above, this would be an interim significant wind impact, and under cumulative-plus-project conditions, wind hazard impacts would be less than significant.

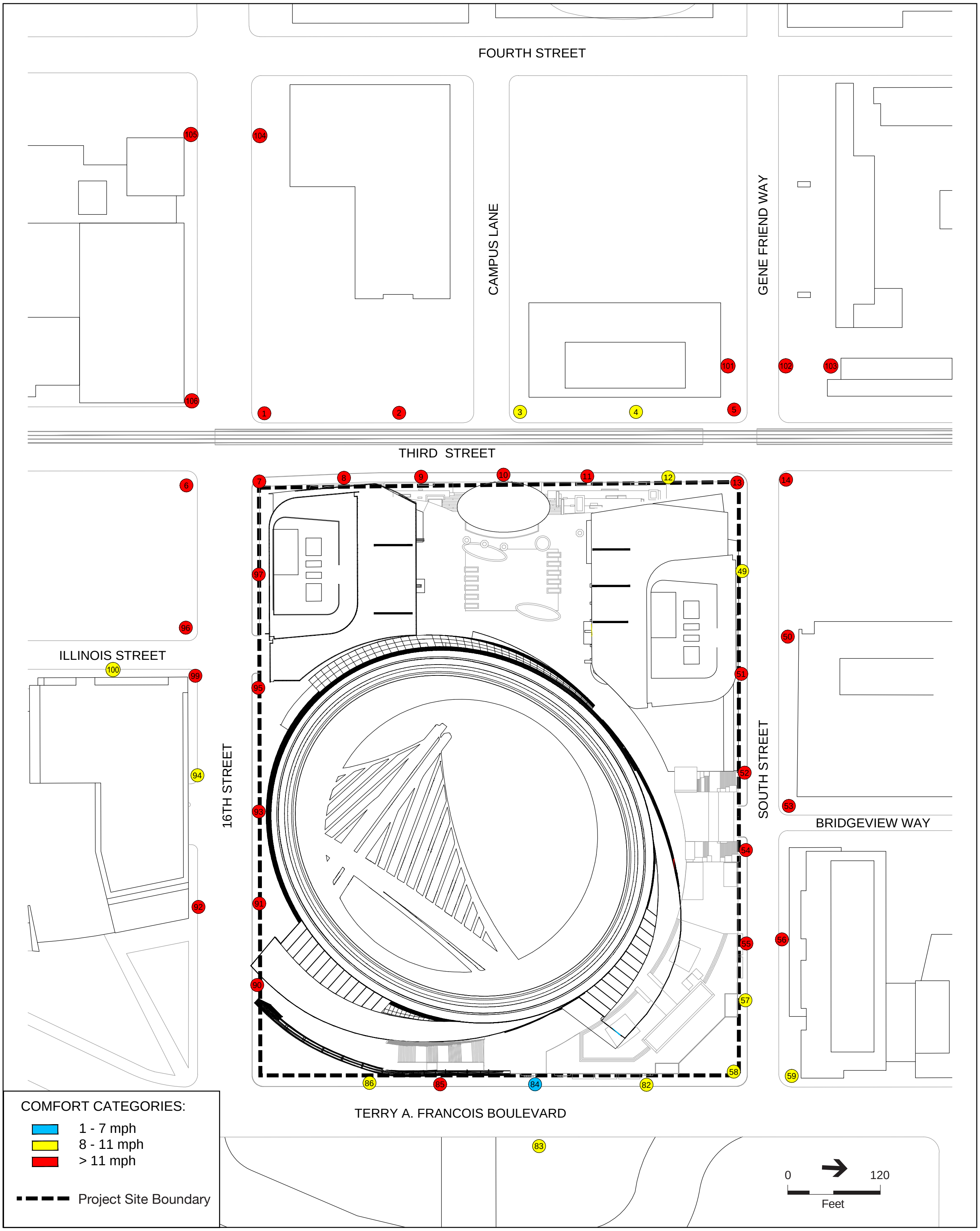
Supplemental Information – Project Wind Comfort Effects at Off-site Public Areas

As discussed under Section 5.6.5.2, above, the wind comfort criterion is not used to judge significance of project wind impacts in the Mission Bay Plan area and in this SEIR. Nonetheless, project effects on wind comfort at off-site public areas may be of interest to members of the public and to decision-makers, and are therefore presented herein for informational purposes.
Table 5.6-2 presents the pedestrian comfort analysis results, namely the average wind speeds that are exceeded 10 percent of the time, and the percentage of time that the 11-mph comfort criterion is exceeded for each off-site study test location, including the test points located on public walkways along the site perimeter and vicinity, for the existing and existing-plus-project wind scenarios. **Figure 5.6-3** presents a map showing the location of the off-site wind test points, and summarizes wind comfort speed results for the existing-plus-project scenario.

INSERT TABLE 5.6-2
EXISTING PLUS PROJECT WIND COMFORT CONDITIONS

WIND COMFORT ANALYSIS - OFF-SITE STUDY POINTS

References		Existing			Project			
Wind Test Location Number	Wind Comfort Criterion Speed miles/hour	Wind Speed Exceeded 10% of Time, miles/hour	Percent of Time Wind Wind Speed Exceeds Criterion	Source	Wind Speed Exceeded 10% of Time, miles/hour	Percent of Time Wind Wind Speed Exceeds Criterion	Speed Change Relative to Existing miles/hour	Source
1	11	20	46	e	19	38	-1	e
2	11	16	30	e	14	22	-2	e
3	11	13	16	e	10	5	-3	-
4	11	6	0		10	7	4	
5	11	19	45	e	15	25	-4	e
6	11	17	32	e	22	52	5	e
7	11	19	41	e	20	48	1	e
8	11	17	34	e	13	21	-4	e
9	11	15	26	e	16	30	1	e
10	11	14	19	e	13	18	-1	e
11	11	8	1		13	19	5	p
12	11	11	10		11	10	0	
13	11	18	37	e	15	25	-3	e
14	11	17	35	e	16	31	-1	e
49	11	16	33	e	10	7	-6	-
50	11	16	32	e	22	52	6	e
51	11	18	39	e	16	30	-2	e
52	11	14	25	e	13	15	-1	e
53	11	12	14	e	13	15	1	e
54	11	18	36	e	12	13	-6	e
55	11	15	24	e	12	13	-3	e
56	11	12	16	e	14	19	2	e
57	11	16	31	e	11	10	-5	-
58	11	10	6		11	10	1	
59	11	12	12	e	11	10	-1	-
82	11	17	35	e	9	6	-8	-
83	11	16	33	e	11	10	-5	-
84	11	18	38	e	7	2	-11	-
85	11	17	35	e	14	22	-3	e
86	11	17	37	e	9	4	-8	-
90	11	15	25	e	14	19	-1	e
91	11	17	34	e	15	23	-2	e
92	11	16	30	e	12	12	-4	e
93	11	16	28	e	17	33	1	e
94	11	14	23	e	11	10	-3	-
95	11	17	36	e	16	30	-1	e
96	11	16	31	e	16	30	0	e
97	11	17	31	e	13	19	-4	e
99	11	21	48	e	23	52	2	e
100	11	11	10		11	10	0	
101	11	15	26	e	14	23	-1	e
102	11	18	40	e	17	33	-1	e
103	11	19	44	e	18	40	-1	e
104	11	18	41	e	20	47	2	e
105	11	25	51	e	26	50	1	e
106	11	18	36	e	19	41	1	e
Ave of Wind Speeds Exceeding 10%		15.8			14.4			
Ave % of Time Winds Exceeds Criterion			29%			23%		
Total Exceedances:		Total:	41			Total:	33	
Subtotals by type:		*Existing*	41	e		*Existing*	32	e
						New, due to Project	1	p
						New, at new location	0	n
						Eliminated by Project	9	-



SOURCE: RWDI, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.6-3
Existing Plus Project Wind Comfort Conditions

Existing Wind Comfort Conditions. Under existing conditions, the average wind speed exceeded 10 percent of the time at the off-site study test points on public walkways is 15.8 mph. 41 of the 46 study test points currently experience existing wind speeds that exceed the 11-mph pedestrian comfort criterion. The windiest public areas in the study area are along the 16th Street and Gene Friend Way corridors.

A review of additional study test points located within the vacant project site revealed similarly windy conditions, where the average wind speed exceeded 10 percent of the time across the site was 15.3 mph (i.e., similar to, but slightly less than the average of the off-site study test points).

Existing-Plus-Project Wind Comfort Conditions at Off-site Public Use Areas. Development of the proposed project would alter wind speeds at individual study test points, but would not result in an overall substantial change in wind comfort conditions at off-site public walkways and open space. Under existing-plus-project conditions, the average wind speed exceeded 10 percent of the time on public walkways in the project site vicinity would decrease by 1.4 mph, from 15.8 to 14.4 mph, and the average percentage of time the wind speed would exceed the wind comfort criterion would be reduced from 29 to 23 percent.

Furthermore, the project would result in a net reduction in the total number of off-site exceedances of the 11-mph pedestrian comfort criterion, from 41 to 33 test points. When considering individual wind test points, the proposed project would:

- Create one new exceedance of the 11-mph pedestrian comfort criterion: on Third Street adjacent to site at southwest corner of proposed South Street office and retail building (Test Point No. 11);
- Create a new exceedance of the 7-mph seating comfort criterion on Third Street across from site (Test Point No. 4);
- Further increase wind speeds at eight existing exceedances of the 11-mph pedestrian comfort criterion on Third, 16th and South Streets adjacent to, across or upwind from site (Test Point Nos. 6, 7, 9, 50, 53, 56, 93, 99 and 104-106);
- Reduce wind speeds, but not eliminate existing exceedances of the 11-mph pedestrian comfort criterion, at 18 locations on Third Street, 16th Street, South Street, and Terry A. Francois Boulevard adjacent to and/or across from site (Test Point Nos. 1, 2, 5, 8, 10, 13, 14,51, 52, 54, 55, 85, 90-92, 95, 97, and 101-103);
- Eliminate nine existing exceedances of the 11-mph pedestrian comfort criterion on Third Street, 16th Street, South Street, and Terry A Francois Boulevard adjacent to and/or across from site (Test Point Nos. 3, 49, 57, 59, 82-84, 86, and 94); and
- Result in minor or no change in wind speeds at four test points (Test Point Nos. 12, 58, 96 and 100).

The majority of locations that would experience project-associated increases or decreases in off-site wind speeds exceeded 10 percent of the time would be in the ±1 to 5 mph range. However, larger reductions in off-site wind speeds exceeded 10 percent of the time would occur on Terry A. Francois Boulevard between the project site and the planned Bayfront Park (-1 to -11 mph).

Accordingly, the project would not be anticipated to result in substantial changes in wind comfort within the planned Bayfront Park

In conclusion, with respect to off-site wind comfort, the project would result in a net reduction in the average of wind speeds exceeded 10 percent of the time, a net reduction in the average percentage of time the wind speed would exceed the pedestrian comfort criterion, and a net reduction in the number of exceedances of the 11-mph pedestrian comfort criterion at off-site public areas. Consequently, the project would meet the wind comfort criterion at off-site public areas.

Supplemental Information – Project Wind Effects at On-site Publically Accessible Areas of Substantial Pedestrian Use

The project would include a variety of privately-owned, publically accessible on-site plazas and exterior walkways that would be located throughout and at varying elevations on the project site. These proposed publically accessible areas on the project site would experience wind effects resulting from proposed on-site development and surrounding off-site development in the project vicinity. On-site publically accessible areas that may be subject to periods of high pedestrian use, particularly prior to and following games/events at the event center, include the following:

- *Third Street Plaza (10 feet el.) and Approaches (0 to 10 feet el.):* This area includes the elevated Third Street Plaza and adjacent on-site pedestrian approaches from Third Street. The primary entrance to the event center is accessed via this plaza.
- *Event Center North Side Pedestrian Path (10 to 26 feet el.):* This proposed walkway would serve as the primary pedestrian pathway around the north side of the event center, and would connect the Third Street Plaza with the bayfront overlook and Southeast Plaza. This proposed walkway would provide access to the secondary entrance to the event center for large events.
- *Event Center Southwest Side Pedestrian Path (0 to 10 feet el.):* This proposed walkway would provide pedestrian access around the southwest side of the event center, and provide access between 16th Street and the Third Street Plaza.
- *Southeast Plaza (0 feet el.)*: This proposed ground-level plaza would be located in the southeast corner of the project site. The primary entrance to the event center for smaller "theater" events, and the secondary entrance for large events, would be via this plaza.
- *Bayfront Overlook (26 feet el.):* This elevated area is located on the east side of the site adjacent to the event center and would overlook the Bay.

As discussed above, wind effects on on-site publically accessible areas are not considered a significance threshold. Nonetheless, project wind effects at on-site publically accessible areas that would be subject to substantial pedestrian use may be of interest to members of the public and to decision-makers, and are therefore presented herein for informational purposes. A discussion of potential wind effects at the on-site areas of substantial pedestrian use identified above is presented herein for informational purposes.

Other outdoor areas within the project site that may offer private and/or public pedestrian access, include the office and retail building podium roofs (90 foot el.), the food hall roof (41-foot el.), and the event center bayfront terrace (pedestrian deck at approximate 100-foot el.). However, since the event center and/or office and retail building operators would have greater access control over these site areas so as to be able to restrict pedestrian access in the event of hazardous windy conditions, potential project wind effects at these specific areas are not discussed further.

Pedestrian-level winds were measured at numerous locations on-site for each of four prevailing wind directions for existing and existing-plus-project conditions. Since the existing project site form would be completely altered by the proposed development, many wind test points used for analysis of existing conditions were not applicable for the existing-plus-project conditions, and a number of additional wind test study points were used solely for existing-plus-project conditions. Consequently, while a broad comparison of existing and proposed on-site wind conditions can be discussed, direct comparisons of individual on-site test points for these conditions are neither applicable nor useful for the discussion of on-site wind comfort and wind hazard effects.

Project Wind Hazard Effects at On-Site Publically Accessible Areas of Substantial Pedestrian Use. Under existing-plus-project conditions, three on-site study test points at the proposed event center on the north side pedestrian path would exceed the wind hazard criterion, for a total of 31 hours per year. No exceedances of the wind hazard criterion would occur at any of the other areas of substantial pedestrian use at the project site.

Project Wind Comfort Effects at On-Site Publically Accessible Areas of Substantial Pedestrian Use. Under existing-plus-project conditions, the average wind speed exceeded 10 percent of the time across the site would be 8.3 mph, lower than the average wind speed exceeded 10 percent of the time across the site under existing conditions (15.3 mph).

Under existing-plus-project conditions, 15 on-site study test points in the areas of substantial pedestrian use would exceed the 11-mph pedestrian comfort criterion, including 8 of 16 wind study test points on the Third Street Plaza and approaches, the 5 wind study test points on the event center north-side pedestrian path, and 2 of the 3 wind test study points on the event center southwest side pedestrian path. No exceedances of the 11-mph pedestrian comfort criterion would occur at any of the other areas of substantial pedestrian use at the project site. The project sponsor would consider a range of feasible design refinements to effectively reduce on-site wind effects. Design refinements that could be incorporated into the project might include the proposed addition of landscaping within the plazas; and the potential installation of vertical porous screens, overhead protection such as tilted foils and archways, and/or other screening features on the event center perimeter walkway and other publicly accessible areas.

Cumulative Impact— Wind

Wind Hazards at Off-site Public Areas

Impact C-WS-1: The project, in combination with cumulative development, would not alter wind in a manner that would substantially affect off-site public areas. (Less than Significant)

Under cumulative conditions, past, present, and reasonably foreseeable future buildings 100 feet and taller within the project vicinity would have the potential to result in localized wind effects that could be adverse. As part of the wind tunnel testing, one test was conducted to evaluate the pedestrian wind environment that would exist with the project, in combination with reasonably foreseeable cumulative development, on public use areas around the project site. In the immediate project vicinity, this included assumed cumulative development on currently undeveloped portions of Blocks 27, 25, X3 and 33, located north, west, southwest and south of the project site, respectively (see Section 5.1 for discussion of cumulative projects).

Cumulative development would alter wind speeds among individual off-site study test points. The off-site wind hazards that would occur under cumulative-plus-project conditions would be fewer than would occur under both existing conditions (reduced from 7 to 3) and existing-plus-project conditions (reduced from 6 to 3). Furthermore, the duration of the wind hazards that would occur under cumulative-plus-project conditions -54 hours – would be less than would occur under existing conditions (106 hours) and existing-plus-project conditions (139 hours). Consequently, cumulative wind hazard impacts would be *less than significant*.

Mitigation: Not required.

Comparison of Impact WS-1 to Mission Bay FSEIR Impact Analysis. Consistent with Mission Bay FSEIR Mitigation Measure D.7 (and the South Design for Development *Wind Analysis* standards), wind tunnel testing and analysis was conducted for both project and cumulative conditions. As discussed above, cumulative impacts of wind hazards at off-site public areas would be less than significant. Therefore, the project would not result in any new or substantially more severe significant cumulative wind hazard impacts than those previously identified in the Mission Bay FSEIR.

Supplemental Information – Cumulative Wind Comfort Effects at Off-site Public Areas

As discussed above, the wind comfort criterion is not used to judge significance of project wind impacts in this SEIR; however, a discussion of potential cumulative effects on wind comfort is presented herein for informational purposes. Under cumulative-plus-project conditions, the average wind speed exceeded 10 percent of the time on public walkways in the project site vicinity – 12.2 mph - would be less than that which would occur under both existing conditions (15.8 mph) and existing-plus-project conditions (14.4 mph). In addition, the average percentage of time the wind speed would exceed the wind comfort criterion on public walkways – 16 percent - would be less than that which would occur under both existing conditions (29 percent) and existing-plus-project conditions (23 percent). Furthermore, the estimated 22 off-site exceedances of the 11-mph pedestrian comfort criterion that would occur under cumulative-plus-project conditions would be less than that which would occur under both existing conditions (41) and existing-plus-project conditions (33). Given these factors, cumulative wind comfort effects would not be substantial.

Supplemental Information – Cumulative Wind Effects at On-site Publically Accessible Areas of Substantial Pedestrian Use

For reasons discussed above, wind effects on on-site publically accessible areas are not considered a significance threshold; however, a discussion of potential cumulative wind effects at on-site areas of substantial pedestrian use is presented herein for informational purposes.

Cumulative Wind Hazard Effects at On-Site Publically Accessible Areas of Substantial Pedestrian Use. Under cumulative-plus-project conditions, one on-site study test point on the event center north side pedestrian path would exceed the wind hazard criterion, for a total of 20 hours; however, this would be less than the total duration of the exceedance that would occur on this pedestrian path under existing-plus-project conditions (31 hours). No exceedances of the wind hazard criterion would occur at any of the other areas of substantial pedestrian use at the project site.

Cumulative Wind Comfort Effects at On-Site Publically Accessible Areas of Substantial Pedestrian Use. Under cumulative-plus-project conditions, the average wind speed exceeded 10 percent of the time across the site would be 7.9 mph, lower than that which would occur under both existing conditions (15.3 mph) and existing-plus-project conditions (8.3 mph).

Under cumulative-plus-project conditions, 14 on-site study test points in the areas of substantial pedestrian use would exceed the 11-mph pedestrian comfort criterion, including 8 of 16 wind study test points on the Third Street Plaza and approaches, the 5 wind study test points on the event center north-side perimeter walkway, and 1 of the 3 wind test study points on the event center southwest side pedestrian path. This would be less than the 15 exceedances experienced at the areas of substantial pedestrian use within the project site under existing-plus-project conditions. No exceedances of the 11-mph pedestrian comfort criterion would occur in any of the other areas of substantial pedestrian use of the project site. The design refinements discussed under existing-plus-project conditions, above, that the project sponsor would consider would also be applicable for reducing on-site wind effects on cumulative-plus-project conditions.

Shadow

Impact C-WS-2: The project, in combination with cumulative development, would create new shadow but not in a manner that would substantially affect the use of publicly accessible open space or outdoor recreational facilities or other public areas within the Mission Bay South plan area. (Less than Significant)

The proposed project would include development of an event center, office and retail buildings, and other structures that would have the potential to cast shadows off-site, including on nearby public open space within the Mission Bay South plan area. The project also includes on-site public plazas, walkways and other open space that would be shadowed by proposed on-site development and existing and/or future off-site cumulative development in the project vicinity.

As discussed under Regulatory Framework above, the South Design for Development indicates that the prior shadow studies have determined that development within the Mission Bay South plan area complying with the design standards will reasonably limit areas of shadow on public open spaces during the active months of the year and during the most active times of the day. However, consistent with Mission Bay FSEIR Mitigation Measure D.8, the South Design for Development requires that additional shadow analysis be conducted for projects that would need a variance from the South Design for Development's design standards that establish the shape and location of buildings. Accordingly, the proposed project is subject to a shadow analysis per the South Design for Development *Sunlight Access to Open Space* methodology.

As described above under Approach to Analysis, the shadow analysis evaluated the potential shadow impacts on the planned Bayfront Park. Given the project site's location relative to the planned Bayfront Park, the project could not cast any shadows on Bayfront Park between 10:00 a.m. and noon during any of the seven-month study interval, given that the sun rises in the east and all morning shadows would be cast towards the west. Furthermore, review of the shadow screening study images (Appendix WS) shows that shadow coverage (either project or cumulative) of Bayfront Park would be well under 20 percent at any time between noon and 4:00 p.m. during the seven-month study interval. Therefore, the area of public open space in Bayfront Park that would be in continuous shadow for a period of one hour from March to September between 10:00 a.m. and 4:00 p.m. would be less than 20 percent, and consequently, the project design satisfies the South Design for Development criterion for sunlight access to open space. Accordingly, the project's shadow impact and its contribution to cumulative shadow impacts, on publicly accessible open space or outdoor recreation facilities or other public areas within the Mission Bay plan area would be less significant.

Mitigation: Not required.

Comparison of Impact C-WS-2 to Mission Bay FSEIR Impact Analysis

As discussed under Summary of Impacts in the Mission Bay FSEIR, the Mission Bay FSEIR included a shadow analysis that indicated that the Mission Bay plan would shade open space areas within the Mission Bay plan area, including proposed open space area near the waterfront of the Bay along the eastern plan area boundary. The Mission Bay FSEIR determined that with implementation of Mitigation Measure D.8, which required analysis of potential shadows on existing and proposed open spaces during the building design and review process for any development that would exceed the design height and/or bulk criteria of the plan, Mission Bay plan shadow impacts on open space within the Mission Bay plan area would be less than significant.

Consistent with Mission Bay FSEIR Mitigation Measure D.8, a shadow analysis was conducted for the proposed project per the South Design for Development *Sunlight Access to Open Space* methodology. As discussed above, the project's shadow impact and its contribution to cumulative shadow impacts, on publicly accessible open space or outdoor recreation facilities or other public areas within the Mission Bay plan area would be less significant. Therefore, the project would result in no new or substantially more severe significant impacts than those previously identified in the Mission Bay FSEIR.

Impact C-WS-3: The project, in combination with cumulative development, would create new shadow but not in a manner that would substantially affect the use of publicly accessible open space or outdoor recreational facilities or other public areas outside the Mission Bay South plan area. (Less than Significant)

As discussed in the Setting, Agua Vista Park, an existing public open space is located on Port of San Francisco land adjacent to, and outside of, the Mission Bay plan area boundary. (Agua Vista Park is not under the jurisdiction of the City Recreation and Parks Department, and consequently, not subject to Planning Code 295.)

The shadow analysis conducted for the project in support of this SEIR reveals that the project would not cast a shadow on any of Agua Vista Park during the study timeframe analyzed (March through September, 10:00 a.m. to 4:00 p.m.). The shadow analysis also determined the proposed project, and other existing and/or cumulative Mission Bay South plan development in the vicinity of Agua Vista Park would create shadows that would extend onto Agua Vista Park in late afternoons (after 4:00 p.m.) at or near the summer solstice. However, the design standards established for the Mission Bay South plan area ensure that development within Mission Bay South limit areas of shadow on public open spaces – including the adjacent Agua Vista Park - during the most active times of the day during the most active months. Accordingly, any project shadow effects, including project contribution to cumulative effects on publicly accessible open space or outdoor recreational facilities or other public areas outside the Mission Bay South plan area, would be less than significant.

Mitigation: Not required.

Comparison of Impact C-WS-3 to Mission Bay FSEIR Impact Analysis

As discussed under Summary of Impacts in the Mission Bay FSEIR, the Mission Bay FSEIR determined that development that would occur under the Mission Bay plan would not shade any City Recreation and Parks Department open space area located outside the Mission Bay plan area at any time, and consequently, would have a less-than-significant effect on these facilities. The Mission Bay FSEIR also determined that Mission Bay plan shading effects on vegetation or wildlife near the Mission Bay plan area, including along the Bay shore, would be less than significant. As discussed above, any project shadow effects, including project contribution to cumulative effects on publicly accessible open space or outdoor recreational facilities or other public areas outside the Mission Bay South plan area, would be less than significant. Therefore, the project would result in no new or substantially more severe significant impacts than those previously identified in the Mission Bay FSEIR.

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5.7 Utilities and Service Systems

5.7.1 Introduction

This section addresses potential effects of the project on existing wastewater and stormwater systems. The existing wastewater and stormwater infrastructure at the time the Mission Bay FSEIR was published is described along with changes to the infrastructure constructed by the master developer in accordance with mitigation required by the Mission Bay FSEIR. The impact analysis considers whether project-generated wastewater and stormwater flows would result in the need to construct new or expanded facilities, the construction of which could cause significant environmental effects.

Utilities impacts related to water supply and solid waste are described in the Initial Study (see Appendix NOP-IS). The project's impacts related to exceeding the wastewater treatment requirements of the San Francisco Bay Regional Water Quality Control Board and on combined sewer discharges, are addressed in Section 5.9, Hydrology and Water Quality.

5.7.2 Summary of Mission Bay FSEIR Utilities Analysis

5.7.2.1 Mission Bay FSEIR Setting

Wastewater/Stormwater Collection and Treatment

The Mission Bay FSEIR described the City's combined wastewater and stormwater collection and treatment systems in two different sections of the document, the Community Services and Utilities section and the Hydrology and Water Quality section. The Mission Bay Plan area is located in the City's Bayside drainage basin, in which combined stormwater and sanitary sewage (wastewater) are collected, then conveyed to and treated at the Southeast Water Pollution Control Plant (SEWPCP) near Islais Creek. At the time the Mission Bay FSEIR was published, the entire Mission Bay Redevelopment Plan area was located in four sub-basins, with the project site at Blocks 29-32 draining to two of the sub-basins (see Mission Bay FSEIR, Figure V.K.1). The north and east portions of the Blocks 29-32 site drained to the Bay sub-basin, and stormwater from the Bay sub-basin drained directly to the Bay, not the combined sewer system. The balance of Blocks 29-32 drained to the Mariposa sub-basin. Wastewater flows from both basins were collected in the combined sewer system and conveyed to the SEWPCP for treatment. Wastewater flows from the Mariposa sub-basin were transported from the Mariposa dry-weather pump station to the SEWPCP via a 10-inch force main. This drainage system has since been completely reconfigured, as described in Section 5.7.2.2, Mission Bay FSEIR Impacts and Mitigation Measures, below.

Stormwater in the Mariposa sub-basin was directed to the Mariposa wet weather pump station via the Mariposa storage/transport sewer under Mariposa Street, and ultimately to the SEWPCP. During wet weather, the wet-weather pump station system transported combined storm runoff and sewage south to gravity sewers at 21st Street and Illinois Street via a 20-inch force main under Third Street. At the time the Mission Bay FSEIR was published, the existing Third Street sewer was inadequate to handle wet-weather flows and the City planned to construct the Illinois Street Auxiliary Sewer to accommodate the flows and transport them from the Mariposa Pump Station to the SEWPCP. As planned, this auxiliary sewer would be a 60-inch gravity sewer extending beneath Illinois Street, between 24th Street and the Islais Creek Transport Storage Structure located at the intersection of Third Street and Caesar Chavez Street. The auxiliary sewer was constructed in 1999.

North of Blocks 29-32, wastewater and stormwater generated in the Plan area drained to the Central sub-basin, which directed flows to the Channel and North-of-Channel storage sewers and ultimately to the Channel Pump Station. From there, flows were pumped to the SEWPCP through a 66-inch-diameter force main. Excess wet weather flows from this sub-basin were discharged to China Basin Channel (Mission Creek) via six combined sewer discharge structures.

The Mission Bay FSEIR reported the existing wastewater generation from the Mission Bay Plan area (based on the 1990 FEIR) was approximately 0.072 million gallons per day (mgd), and the existing wastewater volume treated at the SEWPCP was an average of 67 mgd.

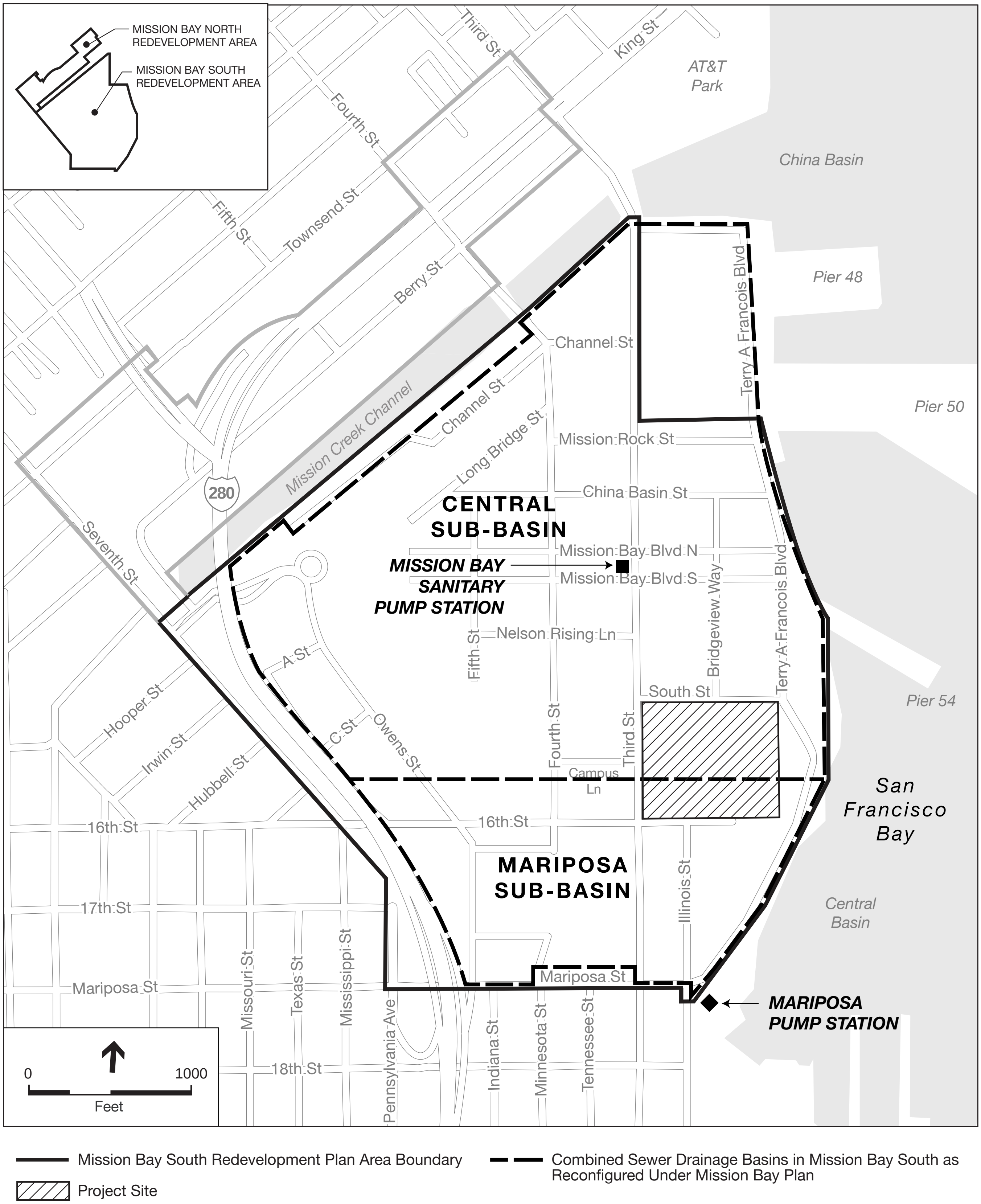
5.7.2.2 Mission Bay FSEIR Impacts and Mitigation Measures

The Mission Bay FSEIR described major sewer upgrades within the Mission Bay Plan area that were proposed as part of the Mission Bay Plan. The proposed improvements included changes to both the Central/Bay and Mariposa sub-basins of the City's combined sewer system. As indicated in the Mission Bay FSEIR, the Central and Bay sub-basins would be reconfigured into one basin as shown on **Figure 5.7-1**. The reconfigured Central sub-basin would direct wastewater and stormwater flows into distinct, separate sanitary-sewer-only and storm-drainage–only lines, respectively. This sub-basin would extend from about 300 feet north of 16th Street to China Basin Channel (Mission Creek), and would include the northern portions of Blocks 29-32. Wastewater flows from the reconfigured Central sub-basin would drain to the Channel Street storage sewer.

The Mariposa sub-basin of the combined sewer system would also be reconfigured as shown on Figure 5.7-1. The planned reconfigured Mariposa sub-basin would extend from about 300 feet north of 16th Street south to Mariposa Street.[1] The Mission Bay FSEIR determined that the projected increases in wastewater generation and stormwater flows could be accommodated by the planned infrastructure, and the Mission Bay Plan's effects on wastewater and stormwater collection and treatment facilities would be less than significant.[2]

1 The original approach presented in the Draft Mission Bay SEIR was based on using the Mariposa sub-basin of the combined sewer system to collect both wastewater and stormwater. However, the Final SEIR revised this approach to include construction of a separate stormwater system in this area.

2 The original approach presented in the Draft Mission Bay SEIR was based on the assumption that the stormwater pump stations would direct the initial 80 percent of stormwater flows to the combined sewer system for ultimate treatment at the SEWPCP. The remainder of the stormwater flows, approximately 20 percent of the annual stormwater flows, would be discharged to China Basin Channel (Mission Creek) or the Bay through one of the four new stormwater outfalls adjacent to the new pump stations. This approach was revised in the Final SEIR and resulted in implementation of Mitigation Scenario B described in the text that follows, which does not include diverting any stormwater to the combined sewer system.



SOURCE: ESA, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.7-1
Combined Sewer Drainage Basins in Mission Bay South as Reconfigured Under Mission Bay Plan

However, the Mission Bay FSEIR determined that the Plan would result in a cumulatively considerable and significant contribution to combined sewer discharges during wet weather. Mitigation Measure K.3 of the Mission Bay FSEIR requires design and construction of sewer improvements to ensure that wastewater and stormwater flows from the Plan area to the City's combined sewer system do not contribute to combined sewer discharges. The master developer adopted Mitigation Scenario B described in the Summary of Comments and Responses of the Mission Bay FSEIR (in Volume III, beginning on p. XII.253). This scenario meets the requirements of Mitigation Measure K.3 by constructing a separate stormwater system throughout Mission Bay South, in both the reconfigured Mariposa and Central/Bay sub-basins. This system is included in the approved Mission Bay South Infrastructure Plan.[3]

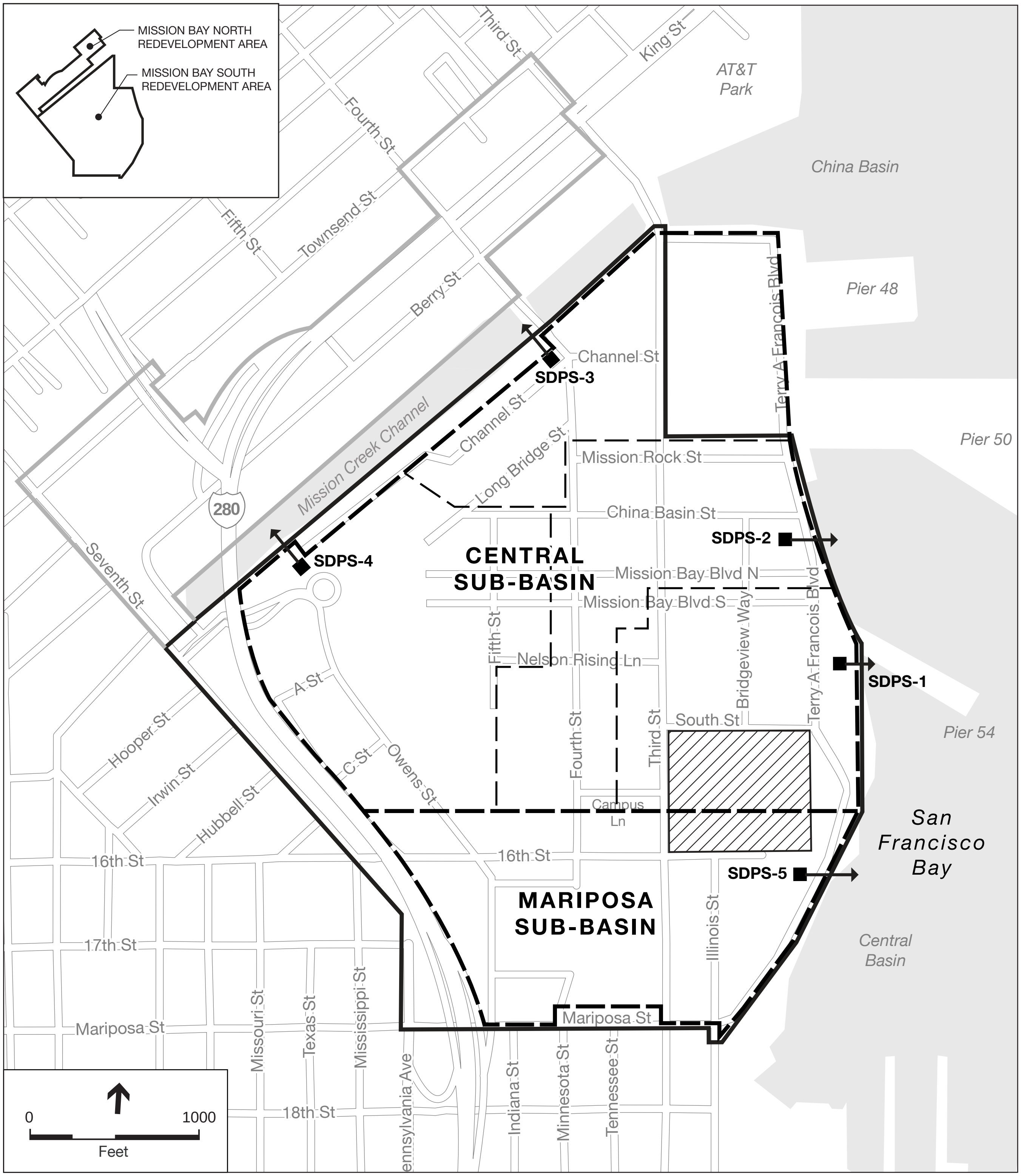
The separate stormwater system for the Mission Bay South Plan area is currently being implemented by the master developer and includes four drainage zones within the geographic boundaries of the reconfigured Central sub-basin that have already been constructed and one drainage zone within the geographic boundaries of the reconfigured Mariposa sub-basin which is currently under construction. Stormwater in each of the drainage zones flows by gravity to one of five stormwater pump stations in the locations shown on **Figure 5.7-2**, including Pump Station SDPS-5 near the east end of 16th Street. When construction of the fifth drainage basin is completed (anticipated in 2015, prior to construction and operation of the proposed project), all stormwater runoff from Mission Bay South will be conveyed through the separate stormwater system and discharged to the Bay and China Basin Channel (Mission Creek).

The Mission Bay FSEIR identified Mitigation Measure M.5 requiring conveyance of all stormwater runoff from newly developed areas in the former Bay sub-basin to the combined sewer system as an interim measure to address potential sewer capacity and associated water quality impacts until the appropriate infrastructure would be completed. However, this mitigation measure is not applicable to the proposed project because stormwater from the project site would discharge to the separate stormwater system being constructed in accordance with the approved Mission Bay South Infrastructure Plan as described above.

Mission Bay FSEIR Estimates of Wastewater Flows

The Mission Bay FSEIR Community Services and Utilities impacts section estimated that the Mission Bay Plan would generate approximately 2.5 mgd of wastewater at build-out (average dry weather flow), or 3.7 percent of the volume of wastewater treated at the SEWPCP at the time of Mission Bay FSEIR publication. For Blocks 29-32, equal amounts of wastewater were expected to be routed to the Mariposa sub-basin via the City’s Mariposa Pump Station and to the reconfigured Central sub-basin via the City’s Mission Bay Sanitary Pump Station located at Park P15. The estimated peak wastewater flow to each sub-basin from the project site was 0.29 mgd, and the estimated average flow was 0.096 mgd.

3 San Francisco Redevelopment Agency and Catellus Development Corporation, Mission Bay South Infrastructure Plan.



Mission Bay South Redevelopment Plan Area Boundary

Approximate Stromwater Drainage Basin Boundaries in Mission Bay South

Project Site

Stormwater System Pump Station

Stormwater Outfall

SOURCE: ESA, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E: Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.7-2

Separate Stormwater Drainage Basins in Mission Bay South Constructed as Part of Mission Bay Plan

The Mission Bay FSEIR concluded that the effects on wastewater collection and treatment facilities would be less than significant because the proposed sewer system improvements under the Mission Bay Plan, including reconfiguration of the Central/Bay and Mariposa sub-basins, would accommodate the projected increases in wastewater generation. Similarly, the Mission Bay FSEIR concluded that the effects related to construction of new storm drainage facilities would be less than significant because the proposed sewer system improvements under the Mission Bay Plan, including reconfiguration of the Central/Bay and Mariposa sub-basins, would accommodate the projected changes in stormwater flows.

5.7.3 Setting

5.7.3.1 Combined Sewer System

Currently, the SEWPCP treats both dry and wet-weather flows from the eastside of the City—specifically the Bayside drainage basin of the City's combined sewer system (shown on Figure 5.9-1 in Section 5.9, Hydrology and Water Quality) — similar to what was described in the Mission Bay FSEIR (see Section 5.9, Hydrology and Water Quality, for a more detailed description). The plant has a dry-weather capacity of 84.5 mgd. During dry weather, wastewater flows consist mainly of municipal and industrial sanitary sewage and wastewater, and the annual average wastewater flow during dry weather is 60 mgd[4] (a reduction of 7 mgd from the 67 mgd reported by the Mission Bay FSEIR in 1998). The wet-weather facilities in the Bayside drainage basin have a combined capacity of 400 mgd, plus the 125-million gallon volume of storage and transport boxes that retain the combined stormwater and wastewater flows during wet weather. Flows in excess of the wet-weather capacity of the Bayside treatment facilities receive flow-through treatment in the storage and transport boxes that is the equivalent of primary treatment. The treated flows are discharged to the Bay through 29 combined sewer discharge structures located along the shoreline.

As discussed above, the Mission Bay Plan included reconfiguration of the combined sewer system drainage sub-basins in the Mission Bay South portion of the Bayside drainage basin. As reconfigured, the northern portion of the project site is located in the Central sub-basin, and wastewater flows to this sub-basin are conveyed to the SEWPCP via the Mission Bay Sanitary Pump Station. The southern portion of the project site is located in the Mariposa sub-basin, and wastewater flows to this sub-basin are conveyed to the SEWPCP via the Mariposa Pump Station. However, since the project site is currently undeveloped, except for a parking lot, there are no wastewater flows contributing to either sub-basin.

[4] San Francisco Water Power Sewer, *San Francisco's Wastewater Treatment Facilities*. June, 2014.

Mariposa Pump Station

The 240-acre reconfigured Mariposa sub-basin of the combined sewer system is divided into two tributary areas that direct flow to the Mariposa Pump Station. Tributary B includes Potrero Hill to the south of Mariposa Street and is outside of the Mission Bay Plan area; this tributary area directs both rainwater and wastewater to the pump station. Tributary A includes areas to the north of Mariposa Street that are located within the Plan area; in this area, stormwater flows are directed to the separate stormwater system constructed for the Mission Bay South development, and only wastewater flows are directed to the Mariposa Pump Station.

The Mariposa Pump Station consists of a dry-weather and wet-weather pump station. The dry-weather pump station was built in 1954 and has a capacity of 1.2 mgd. With the addition of peak wastewater flows from the planned and approved University of California, San Francisco (UCSF) developments in the Plan area, the SFPUC anticipates that peak flows would exceed the capacity of the dry-weather pump station. To address this need for additional capacity, the SFPUC is connecting the 10-inch dry weather force main to the 20-inch wet weather force main and upsizing the influent sewer, which will increase the capacity of the dry-weather pump station to 3.5 mgd in dry weather conditions on an interim basis until long term improvements can be constructed to permanently increase the capacity of the pump station.[5] Completion of this connection is expected by fall of 2015.

The 10 mgd wet-weather pump station and associated 0.7 million gallon transport/storage structure were built in 1993, and new chopper pumps were installed in 2014 to manage debris that accumulates at the pump station. In the event that wet weather flows in the Mariposa sub-basin exceed the combined capacity of the Mariposa pump station and transport/storage structure (11.2 mgd), the excess flows are discharged to the Bay as a combined sewer discharge after receiving flow-through treatment in the transport and storage structure. This system is designed to achieve an annual average of 10 combined sewer discharges per year, but has historically exceeded this average.[6]

Mission Bay Sanitary Pump Station

The Mission Bay Sanitary Pump Station was constructed by the master developer in 2011 and accepted by the City in 2012. This pump station receives only wastewater (dry-weather) flows from within the Mission Bay South area and is equipped with four submersible pumps. It is designed for average wastewater flows of 2.0 mgd and peak wastewater flows of 6.0 mgd; this design capacity allows for an average wastewater contribution of 0.1 mgd and peak contribution of 0.29 mgd from Blocks 29 and 30 at the project site.[7] Testing in 2010 indicated that the pump

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5 San Francisco Department of Public Works, Memo to Manfred Wong and Bessie Tam of the San Francisco Public Utilities Commission, *Mariposa Pump Station (MPS) Dry Weather Flow Hydraulic Analysis*. February 3, 2015.

6 San Francisco Public Utilities Commission, *Task 600, Technical Memorandum No. 603, Collection System Configurations Analysis and Impact on Combined Sewer Discharge, Final Draft*. December, 2010.

7 San Francisco Department of Public Works, 2015. Hydraulic Assessment of Mission Bay Sanitary Pump Station. February 25.

station has the capability of pumping 6.7 mgd, but new testing would be needed to confirm this conclusion because the capacity of all pumps operating simultaneously was not measured during the 2010 test. Monitoring by the SFPUC in 2015 indicates that existing average wastewater flows to the pump station are 2.2 mgd and peak flows are 3.3 mgd.

5.7.3.2 Sewer System Improvement Program

The SFPUC is currently implementing the Sewer System Improvement Program (SSIP), a 20-year, multi-billion dollar citywide program to upgrade the City's aging sewer infrastructure and ensure a reliable and seismically safe sewer system. Bayside projects currently planned under this program include the Central Bayside System Improvement Project, which will include improvements to provide redundancy to the Channel force main (which transports flows from the Channel Pump Station to the SEWPCP); operational and seismic improvements to the SEWPCP; operational improvements to the North Point Wet Weather Facility; and green infrastructure projects to manage stormwater before it enters the combined sewer system.

5.7.3.3 San Francisco Municipal Separate Storm Sewer Systems (MS4s)

Municipal separate storm sewer systems (MS4s) within San Francisco are stormwater systems that carry stormwater in a separate set of pipes from the SFPUC's combined sewer system. These MS4 systems do not discharge to the combined sewer system and are operated in compliance with State Water Resources Control Board Water Quality Order No. 2013-001-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit for Waste Discharge Requirements for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems. The separate stormwater system constructed by the master developer in Mission Bay South is subject to this permit.

As described above, the separate stormwater system for the Mission Bay South area includes four drainage zones within the geographic boundaries of the reconfigured Central sub-basin and one drainage zone within the geographic boundaries of the reconfigured Mariposa sub-basin.[8] Stormwater in each of the drainage zones flows by gravity to one of five stormwater pump stations, as shown on Figure 5.7-2. Construction of this separate stormwater system is scheduled to be completed in 2015.

5.7.4 Regulatory Framework

Please see Section 5.9, Hydrology and Water Quality, Regulatory Framework, for descriptions of federal, state, and local regulations regarding wastewater and stormwater.

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8 San Francisco Redevelopment Agency and Catellus Development Corporation, Mission Bay South Infrastructure Plan.

5.7.5 Impacts and Mitigation Measures

5.7.5.1 Significance Thresholds

For the impacts analyzed in this section, the project would have a significant impact related to utilities and service systems if it were to:

- Require or result in the construction of new wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects; or
- Result in a determination by the wastewater treatment provider that would serve the project that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments.

The complete list of CEQA significance criteria used in the utilities and service systems analysis is included in the Initial Study (see Appendix NOP-IS, pp. 64 through 72), which explains why the proposed project would have a sufficient water supply available to serve the project and would not require new or expanded water supply resources or entitlements (Impact UT-1). Similarly, the Initial Study explains why the project would not require or result in the construction of new water treatment facilities or expansion of existing facilities (Impact UT-2); would be served by landfills with sufficient capacity to accommodate the project's solid waste needs (Impact UT-3); and would comply with federal, state, and local statutes related to solid waste (Impact UT-4). Therefore, no further analysis of these subjects is presented in this section.

The criterion related to the potential to exceed the wastewater treatment requirements of the San Francisco Bay Region Regional Water Quality Control Board is addressed in Section 5.9, Hydrology and Water Quality, under Impact HY-1, in combination with the water quality criterion regarding the potential to violate any water quality standards or waste discharge requirements. The remaining significance criteria are addressed below.

5.7.5.2 Approach to Analysis

Construction Impact Methodology

The impact analysis in this section focuses on Utilities impacts related to operation of the project because the project construction's temporary increase in demand on wastewater and storm drainage services over the 26-month construction duration would not be substantial and would not warrant construction or expansion of existing wastewater or storm drainage facilities. However, as discussed in Section 5.9, Hydrology and Water Quality, Impact HY-1a, construction dewatering discharges would result in short-term increases in demand on the existing wastewater or storm drainage facilities but, proposed dewatering discharge methods would include options for direct discharge to the Bay under an existing general NPDES permit to ensure that any discharges to the combined sewer system would be within the capacity of existing facilities and would not require the construction or expansion of existing facilities. Therefore, construction-related impacts to wastewater and storm drainage facilities are not further addressed in the analysis below.

Operations Impact Methodology

In order to address the known capacity issues related to wastewater facilities, the project's direct impact on the capacity of existing facilities addresses whether the project's wastewater flows would be within the capacity of the existing facilities under existing conditions, while the cumulative impact analysis accounts for the long-term effects of wastewater flows of the project in combination with the flows from past, present, and foreseeable future projects served by the same infrastructure.

With respect to stormwater facilities, however, the stormwater system improvements already constructed and currently under construction address both the near-term and long-term needs. Therefore, the impact analysis accounts for the cumulative effects of stormwater flows of the project in combination with the flows from past, present, and foreseeable future projects within the drainage basin, and the project's direct impacts are analyzed in the context of cumulative impacts. A separate project impact analysis is not provided.

Methodology for Analysis of Direct Impacts

Require or result in the construction of new wastewater treatment facilities or expansion of existing facilities: This analysis compares the estimated peak wastewater flows from the proposed project to the remaining capacity of the Mariposa Pump Station and Mission Bay South Pump Station sewer drainage areas as well as downstream facilities. If the increase in wastewater flows is within the remaining capacity, the impact would be less than significant.

Methodology for Analysis of Cumulative Impacts

Cumulative impacts related to utilities systems result from past, present, and future projects that would utilize the same infrastructure. Accordingly, the geographic scope of cumulative wastewater impacts includes areas that drain to the reconfigured Mariposa and Central sub-basins of the combined sewer system. The geographic scope of cumulative stormwater impacts includes areas that drain to the same stormwater drainage basin.

The cumulative analysis utilizes a list-based approach to analyze the effects of the project in combination with past, present, and probable future projects in this geographic area, including wastewater and storm water flows resulting from full build-out of the Mission Bay South area and development of the Mission Bay Campus under the UCSF Long Range Development Plan (LRDP, described in Section 5.1.5.2, Cumulative Projects for Operational Impacts). The analysis evaluates future flows from these projects, then considers whether or not there would be a significant, adverse cumulative impact associated with project implementation in combination with past, present, and probable future projects in the geographical area, and if so, whether or not the project's contribution to the cumulative impact would be significant (i.e., cumulatively considerable).

Require or result in the construction of new wastewater treatment facilities or expansion of existing facilities: This analysis compares the estimated peak wastewater flows from the proposed project in combination with existing wastewater flows and wastewater flows from the Mission Bay South Plan area at full build out to the existing capacity of the Mariposa Pump Station and Mission Bay South Pump Station sewer drainage areas as well as downstream facilities. The analysis uses this information to determine whether new or upgraded wastewater treatment facilities, such as pump stations and sewer lines used to convey the wastewater, would be required. If the total wastewater flow is within the existing capacity, then the project's contribution to cumulative wastewater facilities impacts would be less than significant.

Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities: The impact analysis assesses the stormwater flows from the proposed project site and considers whether these flows in combination with other Mission Bay South area flows would exceed the capacity of the separate stormwater system constructed in Mission Bay South by the master developer. If the anticipated combined stormwater flows at build out of Mission Bay South would be within the capacity of the stormwater system, then the project's contribution to cumulative stormwater facilities impacts would be less than significant.

Result in a determination by the wastewater treatment provider that it has inadequate capacity for the project flows in addition to existing commitments. This analysis compares the estimated peak wastewater flows from the proposed project in combination with existing and planned future flows to the capacity of the Mariposa Pump Station and Mission Bay Sanitary Pump Station sewer drainage areas as well as downstream facilities. If the SFPUC determines that no new wastewater treatment facilities would be required, then the project's contribution to this cumulative impact would be less than significant.

5.7.5.3 Impact Evaluation

Project Impacts

Impacts UT-1 to UT-4: See Initial Study (Appendix NOP-IS)

Impact UT-5: The proposed project in itself would not require or result in the construction of new wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects. (Less than Significant)

As discussed above in Section 5.7.2.2, Mission Bay FSEIR Impacts and Mitigation Measures, the Mission Bay Plan includes reconfiguration of the Central and Mariposa sub-basins of the City's combined sewer system to collect wastewater and stormwater in separate systems. The northern portion of the project site is now included in the reconfigured Central sub-basin, and the southern portion of the project site is now included in the reconfigured Mariposa sub-basin, although project-related wastewater flows could be directed to either sub-basin.

The sewer analysis for the proposed project conducted by BKF Engineers estimates that the daily average wastewater flow during an event at full capacity (e.g., a sold-out NBA basketball game) would be 0.164 mgd, and the daily peak wastewater flows would be 1.074 mgd.[9,10] The preliminary project design indicates that 0.844 mgd of the peak wastewater flows from the project site would be discharged to the sewer drainage area of the Mariposa Pump Station (within the reconfigured Mariposa sub-basin), and 0.230 mgd of the peak flows could be directed to the Mission Bay Sanitary Pump Station located at Park P15 (within the reconfigured Central sub-basin).[11]

Mariposa Pump Station

The SFPUC has indicated that with the recent addition of peak wastewater flows from UCSF planned developments, the total existing peak dry-weather flows to the Mariposa sub-basin would be up to 2.54 mgd[12] which would exceed the 1.2 mgd capacity of the Mariposa Pump Station. To address this, the SFPUC is constructing interim improvements to temporarily increase the dry-weather capacity of the pump station to 3.5 mgd by cross connecting the dry- and wet-weather force mains and upsizing the influent sewer, as discussed in Section 5.7.5.3, Combined Sewer System. With the proposed additional discharge of 0.844 mgd of peak wastewater flows from the project site to this pump station, the total peak wastewater flows would be increased to 3.38 mgd. This is within the 3.5 mgd capacity of the interim improvements.

Mission Bay Sanitary Pump Station

As discussed in Section 5.7.5.3, Combined Sewer System, the Mission Bay Sanitary Pump Station has the capability of pumping up to 6.7 mgd of wastewater and existing peak flows to the pump station are 3.3 mgd. The project's addition of 0.230 mgd would increase peak flows to 3.53 mgd, which would be within the 6.7 mgd capacity of the pump station.

Because the addition of project-related peak wastewater flows would be within the remaining capacity of the interim improvements already planned and currently under construction by the SFPUC for the Mariposa Pump Station and would be within the remaining capacity of the Mission Bay Sanitary Pump Station, the proposed project would not require the construction of new wastewater treatment facilities or expansion of existing facilities, and this project-level impact would be *less than significant*.

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9 BKF Engineers, 2015. *Water and Sewer Analyses for Golden State Warriors Arena @ Mission Bay Blocks 29-32*. January 9.

10 As described in the Utilities and Service Systems section of the Initial Study (see Appendix NOP-IS), the *annual average* water demand for the project would be 0.100 mgd. For wastewater planning purposes, wastewater flows are directly related to water usage; however, for sizing of wastewater infrastructure, daily peak flows are used rather than annual average flows. While the daily average wastewater flow during an event at full capacity would be 0.164 mgd, events would not be held every day, and the annual average wastewater flows would be similar to the estimated 0.100 mgd water demand.

11 Moala, Tommy T., Assistant General Manager, Wastewater Enterprise, San Francisco Public Utilities Commission, 2015. Letter to Clarke Miller, Strada Investment Group. May 15.

12 Hydroconsult Engineers, Inc. 2015. Combined Sewer Impact Analysis, Golden State Warriors Arena EIR. February 18.

Comparison of Impact UT-5 to Mission Bay FSEIR Impact Analysis

As discussed in Section 5.7.2.2, Mission Bay FSEIR Impacts and Mitigation Measures, the FSEIR estimated that peak wastewater flows from the project site to the Mariposa Pump Station and the Mission Bay Sanitary Pump Station would be 0.29 mgd. The project's addition of 0.844 mgd of peak flows to the Mariposa Pump Station would exceed this amount, but the impact would remain less than significant because the additional flows would be within the capacity of interim improvements already planned by the SFPUC. The project's addition of 0.230 mgd of peak flows to the Mission Bay Sanitary Pump Station would be less than the originally estimated 0.29 mgd and would be within the remaining capacity of the pump station. Therefore, the project would not result in new or substantially more severe impacts related to wastewater facilities than was previously identified in the Mission Bay FSEIR.

Cumulative Impacts

Impact C-UT-1: See Initial Study (Appendix NOP-IS)

Impact C-UT-2: The proposed project, in combination with past, present, and foreseeable future development in the Mission Bay South area, would require or result in the construction of new wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects. (Significant and Unavoidable)

Mariposa Pump Station

As discussed above in Impact UT-5, total wastewater flows to the Mariposa Pump Station would be 3.38 mgd with the addition of flows from the proposed project. The SFPUC estimates that an additional 1.20 mgd of peak flows would result from UCSF planned developments that have not been constructed (including the Phase 2 Medical Center and developments on Blocks 25b and 33/34) as well as the mixed use development on Block 40.[13] This would increase peak flows to the pump station to 4.58 mgd and would exceed the 3.5 mgd capacity of the interim improvements planned by the SFPUC. Therefore, permanent improvements to the pump station and a long term increase in capacity would be needed to accommodate the proposed project in combination with other proposed and planned development in the Mission Bay South Plan area. In addition, as discussed in Section 5.9, Hydrology and Water Quality, the increased wastewater flows from the proposed project in combination with other foreseeable future projects could increase the volume of combined sewer discharges (CSDs) from the Mariposa Pump Station which could necessitate improvements to the Mariposa wet weather pump station.

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13 Hydroconsult Engineers, Inc. 2015. Combined Sewer Impact Analysis, Golden State Warriors Arena EIR. February 18.

As the owner and operator of the combined sewer system, the SFPUC is responsible for construction of the needed improvements to the wastewater facilities in the Mariposa sub-basin. Engineering planning and design for these improvements or replacement have not been completed, and are preliminarily scheduled to commence by mid-2015. However, the SFPUC anticipates that improvements might include actions such as complete pump station replacement, enlarging or realigning the existing sewer main on Mariposa Street between 3rd Street and the Mariposa Pump Station; upgrading and adding dry weather pumps with potential temporary wet weather pump modifications; upgrading or replacing the dry-weather sump in the pump station; constructing new connections to the transport and storage box structure and rehabilitating the structure; and improving the hydraulic capacity of the downstream gravity sewers, if needed.[14] If a new dry weather pump station is required, it could potentially be constructed within approximately a quarter mile radius of the existing Mariposa Pump Station.

Construction of the permanent improvements to the wastewater facilities in the Mariposa sub-basin to accommodate increased peak flows from the proposed project in combination with other foreseeable projects in the Mission Bay South Plan area could potentially result in significant environmental effects. Therefore, this would be a *significant* cumulative impact and the project's contribution would be cumulatively considerable.

While the SFPUC has conducted flow monitoring to establish wastewater flows at the pump station and provided a conceptual description of the permanent improvements that could be required, the SFPUC has not completed the planning and design of specific improvements or replacement to these pump stations. However, regardless of the design of the specific improvements, it can be assumed that the pump station, force main, and conveyance system improvements would generally be built at or near the same location as the existing facilities (i.e., within the same sewage drainage sub-basin). Standard construction techniques would likely be used and confined within a limited area, with construction lasting for several months to a year. Construction could include activities such as construction staging, clearing and grubbing, limited excavation and grading, foundation work, and construction/installation of the new facilities. Depending on site-specific conditions, groundwater dewatering and material off-haul could be required as part of the construction activities. These construction activities would be expected to result in temporary increases in truck and construction employee traffic, noise, and air pollutant and greenhouse gas emissions. In addition, depending on the site-specific design and location, the pump station improvements could result in physical effects on cultural resources, biological resources, water quality, and hazardous materials. Most, if not all, of these potential impacts can generally be mitigated to a less-than-significant level with typical mitigation measures, similar to those identified in the Initial Study and the SEIR for this project. Long-term operational impacts would likely be less than significant because operation of the pump stations would be similar to existing operations of these facilities.

14 San Francisco Public Utilities Commission, 2014. Email to Chris Kern, San Francisco Planning Department and Elaine Warren, City Attorney's Office, Mariposa Pump Station Description for GSW Admin DEIR. December 24.

Prior to SFPUC's implementation of the required long term wastewater facilities improvements (e.g., permanent pump station, force main, and conveyance system improvements), project-level CEQA review would be required to identify potential impacts associated with construction and operation of these improvements and project-specific mitigation measures for any significant impacts. This analysis cannot be performed until the SFPUC identifies the specific improvements that will be constructed. CEQA environmental review of the future improvements/replacement of the Mariposa and/or Mission Bay Sanitary Pump Station, associated force mains, and conveyance system would ensure that measures to avoid or minimize impacts on the environment would be considered in the approval process for these improvements.

The SFPUC has not identified a timetable for completing these long term improvements.

Thus, in the absence of specific plans and design for pump station improvements and the completion of CEQA environmental review for those improvements, it is not possible to determine at this time whether impacts resulting from construction and/or operation of the required long term wastewater facilities improvements could be mitigated to a less than significant level. Furthermore, implementation of any improvements to the City's facilities is outside of the project sponsor's control. Lastly, there is uncertainty in timing as to when the SFPUC will be able to complete the necessary capacity improvements. Therefore, because the cumulative increase in wastewater flows would require the construction of new wastewater facilities or expansion of existing facilities, the construction of which could cause significant environmental effects, this impact would be *significant and unavoidable* and the project’s contribution would be cumulatively considerable.

While the system can currently accommodate project-related wastewater flows as discussed in Impact UT-5, the capacity of the Mariposa Sanitary Pump Station could be exceeded as future projects are implemented, including UCSF’s Phase 2 Medical Center. It is assumed that the SFPUC will implement the permanent pump station and associated force main and conveyance piping improvements at the Mariposa Pump Station as soon as feasible, but the schedule for these improvements is currently unknown and completion could occur after the proposed project is constructed and operational.[15] In the event that additional future wastewater flows would exceed the pump station capacities before the needed wastewater system improvements could be completed, it is assumed that the SFPUC would make internal operational or piping changes to accommodate the additional flows in the interim in order to remain in compliance with RWQCB permit requirements. The interim system modifications would be subject to the approval of the RWQCB under the terms of the Bayside NPDES permit. Approval by the RWQCB would ensure that water quality of the Bay would be protected during the interim period. Any interim system modifications are assumed to be operational or internal to the existing pump stations and therefore would not result in any physical environmental effects.

15 Note that the SFPUC is considering a design/build project delivery model which will expedite implementation of the pump station and force main improvements.

Mission Bay Sanitary Pump Station

As discussed above in Impact UT-5, total wastewater flows to the Mission Bay Pump Station would be 3.53 mgd with the addition of flows from the proposed project. UCSF has indicated to the SFPUC that under full build out of its recently approved LRDP, UCSF flows to this pump station would be 6.63 mgd, close to the most recently measured capacity of 6.7 mgd. To address this, the LRDP recommends replacing the existing pumps to increase the capacity to 7.34 mgd, although this recommendation has not been approved by the SFPUC. The SFPUC has indicated that potential upgrades and modifications might include actions such as replacing existing pumps with larger pumps; installing additional pumps; enlarging the pump station wet well and installing associated controls; and modifying or realigning the force main.[16] Operation of the larger pump station could result in greater maintenance needs, requiring additional visits by operations staff as well as additional trips by dump trucks to collect and dispose of accumulated debris.[17]

Construction of the permanent improvements to the Mission Bay Sanitary Pump Station and associated wastewater facilities to accommodate the projected cumulative increased peak flows from the proposed project could potentially result in significant environmental effects, similar to the improvements to the wastewater facilities in the Mariposa sub-basin. Therefore, this would be a significant cumulative impact. However, the projects contribution would not be cumulatively considerable (*less than significant*) because the Mission Bay Sanitary Pump Station was designed to accommodate 0.29 mgd of wastewater flows from the project site, and the project would discharge only 0.23 mgd to the pump station which is less than the design flow rate.

Summary of Impact C-UT-2, Wastewater Treatment Capacity

As discussed above, the SFPUC has determined that under the proposed project in combination with full build out of Mission Bay South, wastewater flows could exceed the capacity of the Mariposa Pump Station and associated force mains and conveyance piping. Therefore, improvements to the Mariposa Pump Station and associated facilities would be required to accommodate the cumulative wastewater flows. While temporary or interim measures to accommodate the flows would not result in significant environmental effects because they would be operational or internal to the pump stations, construction of the permanent improvements could potentially result in significant environmental effects. Because specific plans and design for permanent pump station improvements have not been finalized and CEQA environmental review has not been completed, it is not possible at this time to conclude whether impacts resulting from these improvements could be mitigated to a less than significant level. Furthermore, implementation of any improvements to the City's pump stations and force mains is outside of the project sponsor's control and there is uncertainty in timing as to when the SFPUC will be able to complete the necessary capacity improvements. Therefore, this

[16] Eickman, Kent, Technical Services Manager, San Francisco Public Utilities, 2015, Memorandum to Chris Kern, Senior Planner, San Francisco Planning Department, regarding Mission Bay Sanitary Pump Station. May 15, 2015.

[17] San Francisco Water Power Sewer, Memo from Irina Torrey, Bureau Manager, to Chris Kern, Environmental Planning Division, San Francisco Planning Department. Review of Screencheck Administrative Draft Supplemental Environmental Impact Report Sections 3.0 - Project Description, 5.7 - Utilities, and 5.9 - Hydrology and Water Quality for the Event Center and Mixed-Use Development at Mission Bay (Golden State Warriors Arena); Planning Department Case Number E 2014.1441E. May 15, 2015.

would be a *significant and unavoidable* impact related to requiring construction of new wastewater facilities or the expansion of existing wastewater facilities in the Mariposa sub-basin, with no feasible mitigation available to the project sponsor.

Cumulative wastewater flows would also exceed the capacity of the Mission Bay Sanitary Pump Station, resulting in a significant impact related to construction and/or expansion of related wastewater facilities. However, the project's the projects contribution would not be cumulatively considerable (*less than significant*) because the Mission Bay Sanitary Pump Station was designed to accommodate 0.29 mgd of wastewater flows from the project site, and the project would discharge only 0.23 mgd to the pump station which is less than the design flow rate, and the estimated wastewater flows from the previously entitled office space.[18]

Mitigation: None currently available.

Comparison of Impact C-UT-2 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR concluded that, as designed, the wastewater collection systems would have sufficient capacity for the estimated wastewater flows at full build out of Mission Bay South and the effects related to expansion of existing wastewater treatment facilities or construction of new facilities would be less than significant. As described above, the proposed project would generate an average daily wastewater flow of 0.164 mgd during an event at full capacity, which is less than what was identified in the Mission Bay FSEIR, but the peak flow is estimated to be 1.074 mgd, nearly twice what was estimated in the Mission Bay FSEIR.

The Mission Bay FSEIR Community Services and Utilities section (p. V.M.51) stated that if a specific development phase triggers the need for increased sewer capacity, upgraded sewer lines, or expanded sewer service, the proposed improvements would require the approval of the San Francisco Clean Water Program (now part of the SFPUC) staff. The proposed improvements would be based on the "adjacency" concept, meaning that the improvements would need to provide adequate conveyance and storage capacity for the phase under development and for expected future development to be served by the improved sewer facilities. Large scale improvements needed for cumulative effects of development phases would be reviewed by the Clean Water Program (i.e., SFPUC) staff and could include improvements such as installation of new sewer lines or a pump station. While the Mission Bay FSEIR acknowledged the potential for needed upgrades to the wastewater system, specific upgrades were not identified. Therefore, the project would result in a *substantially more* severe significant cumulative impact than was identified in the Mission Bay FSEIR.

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[18] Moala, Tommy T., Assistant General Manager, Wastewater Enterprise, San Francisco Public Utilities Commission, 2015. Letter to Clarke Miller, Strada Investment Group. May 15.

Impact C-UT-3: The proposed project, in combination with past, present, and foreseeable future development in the Mission Bay South area, would not require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects. (Less than Significant)

Currently, the project site contains a paved parking lot on the north and west portions of the site, and the remainder of the site consists of an undeveloped lot largely covered in gravel, with sparse ruderal vegetation and a depressed area that collects surface drainage. Implementation of the project would eliminate the undeveloped portions of the site and would increase the overall impervious surfaces at Blocks 29-32, thereby increasing the volume of stormwater runoff.

The project site would be served by the Mission Bay South storm drain infrastructure, as constructed and operated by the master developer,[19] which will include two separated stormwater systems within the perimeter streets. As described in the stormwater hydraulic analysis prepared for the project,[20] stormwater flows from the northern portion of the project site would be routed by gravity to Storm Drain Pump Station No. 1 (SDPS-1), which has been designed to handle stormwater flows generated from the planned build-out of the tributary drainage area. This pump station has five high-flow or wet weather pumps, with a combined design capacity of 27,810 gallons per minute.

Stormwater flows from the southern portion of the project site would be conveyed to Storm Drain Pump Station No. 5 (SDPS-5) located to the south of proposed project site, across from 16th Street within Park P23. This pump station will be equipped with five submersible wet weather only pumps, one submersible treatment pump, and two submersible dry weather pumps with a combined capacity of 32,500 gallons per minute. This system, including SDPS-5, is currently under construction and anticipated to be completed in 2015, prior to construction and operation of the proposed project.

The project stormwater analysis completed for the project sponsor concluded that the capacity of the separated stormwater system as built is adequate to serve the project as well as other development projects that would be constructed at full build out of Mission Bay South. Therefore, the project, either individually or cumulatively, would not require the construction of new stormwater drainage facilities nor expansion of the existing facilities, and this impact would be *less than significant*.

Mitigation: Not required.

[19] The initial stormwater infrastructure, including the pump station, is anticipated to be completed in fall 2015, although final completion, particularly the bioswales, is not expected to be completed until 2016.
[20] BKF, Mission Bay Blocks 29-32 – Stormwater Memorandum, January 6, 2015

Comparison of Impact C-UT-3 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR determined that with the sewer system improvements proposed as part of the plan, including reconfiguration of the Central and Mariposa sub-basins and construction of a separate stormwater system, the Mission Bay Plan would accommodate the projected changes to stormwater flows. The Mission Bay FSEIR concluded that the effects of implementation of the Mission Bay Plan on stormwater collection and treatment facilities would be less than significant.

Because project-related stormwater flows would be within the capacity of the Mission Bay South infrastructure and the project would be consistent with the projected build out condition, the project would not result in any new or substantially more severe significant impacts than those identified in the Mission Bay FSEIR.

Mitigation Measure M.5 in the Mission Bay FSEIR Community Services and Utilities section requires conveying all stormwater runoff from newly developed areas in the former Bay basin to the combined sewer system prior to completion of the initial-flow diversion system. However, this mitigation measure is not applicable to the proposed project because the Bay basin has been incorporated into the reconfigured Central sub-basin, and the project would discharge to the Mission Bay separate stormwater system that has already been constructed within the geographic boundaries of the Central sub-basin and is currently being constructed within the geographic boundaries of the Mariposa sub-basin. Construction of the separate stormwater system will be completed before construction of the proposed project is scheduled to begin.

Impact C-UT-4: The project, in combination with past, present, and foreseeable future development in the Mission Bay South area, would result in a determination by the SFPUC that it has inadequate capacity to serve the project's projected wastewater demand in addition to its existing commitments. (Significant and Unavoidable with Mitigation)

As discussed in Impact C-UT-2, Improvements to the Mariposa Pump Station as well as associated force mains and gravity sewers connecting to the SEWPCP would be required to accommodate cumulative wastewater flows.[21] As stated above, the capacity shortfall for this pump station is due to the proposed project in combination with the cumulative effects of increased wastewater flows from other projects in the sewer drainage area that have been identified subsequent to the publication of the Mission Bay FSEIR. In particular, existing and planned UCSF developments (including the existing Phase 1 Medical Center and the planned Phase 2 Medical Center and developments on Blocks 25b and 33/34) as well as the planned mixed use development on Block 40 contribute to the cumulative wastewater flows in the subbasin.[22]

21 San Francisco Department of Public Works, Memo to Manfred Wong and Bessie Tam of the San Francisco Public Utilities Commission, *Mariposa Pump Station (MPS) Dry Weather Flow Hydraulic Analysis*. February 3, 2015.

22 Hydroconsult Engineers, Inc. 2015. Combined Sewer Impact Analysis, Golden State Warriors Arena EIR. February 18.

The UCSF LRDP Final EIR also notes that average dry weather flows to the Mariposa Pump Station exceed previous projections and the existing capacity for dry weather flows at the time of Final EIR publication, even without flows from the Mission Bay campus. As stated in the UCSF LRDP Final EIR, the Mariposa Pump Station would need to be upgraded and the SFPUC is analyzing temporary measures (referred to as "interim improvements" in Impacts UT-5 and C-UT-2) to accommodate flows in the interim period between opening the Phase 1 Medical Center on February 1, 2015 and construction of a long-term solution to increase the dry-weather capacity of the Mariposa Pump Station.

Based on this, the UCSF LRDP EIR concluded that there would be a significant and unavoidable cumulative impact because improvements to the Mariposa Pump Station could be required to accommodate wastewater flows from the Mission Bay campus site; construction of the improvements could result in environmental effects; it was unknown whether the SFPUC would approve the upgrades or require additional modifications; and implementation of the necessary improvements is outside of the UCSF jurisdiction.

Because the SFPUC has determined that there is currently inadequate capacity to serve the project's wastewater demand (as well as UCSF's demand), this cumulative impact would be *significant*. Implementation of **Mitigation Measure M-C-UT-4, Fair Share Contribution for Pump Station Upgrades**, would offset the project's contribution to this impact. The measure would require the project sponsor to contribute its fair share to the SFPUC for the required improvements to the Mariposa Pump Stations and associated wastewater facilities. However, because the necessary improvements have not been completely defined and implementation of the improvements to the City's wastewater system is outside of the project sponsor's control, this impact would be *significant and unavoidable, with mitigation*.

Mitigation Measure M-C-UT-4: Fair Share Contribution for Mariposa Pump Station Upgrades

The project sponsor shall pay its fair share for improvements to the Mariposa Pump Station and associated wastewater facilities required to provide adequate sewer capacity within the project area and serve the project as determined by the SFPUC. The contribution shall be in proportion to the wastewater flows from the proposed project relative to the total design capacity of the upgraded pump station(s). The project sponsor shall not be responsible for any share of costs to address pre-existing pump station deficiencies.

Comparison of Impact C-UT-4 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR Community Services and Utilities impacts section estimated that the Mission Bay Plan would generate approximately 2.5 mgd of wastewater at build-out (average dry weather flow), and it concluded that as designed, the wastewater collection systems would have sufficient capacity for these estimated flows. The Mission Bay FSEIR determined that, based on anticipated land uses as offices, the estimated average wastewater flow to each sub-basin from the project site would be 0.096 mgd and the estimated peak flow would be 0.29 mgd; this corresponds to a total average flow of 0.192 mgd and a total peak flow of 0.578 mgd. At that time, the SFPUC had not indicated that there could be inadequate capacity to serve individual project's wastewater demand within the Mission Bay Plan area in addition to its other known commitments. Therefore, this impact was less than significant as analyzed in the Mission Bay FSEIR.

However, as described above, the project would result in a *new* significant impact not previously identified in the Mission Bay FSEIR because project-related peak wastewater flows would be greater than analyzed in the Mission Bay FSEIR and subsequent to publication of the Mission Bay FSEIR, the SFPUC has determined that the wastewater system would have inadequate capacity to serve the project's projected wastewater demand in the Mariposa sub-basin in combination with all development projects that would be constructed at full build out under the Mission Bay Plan.

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5.8 Public Services

5.8.1 Introduction

This section of the SEIR addresses potential impacts associated with public services—including fire protection, emergency medical services, and law enforcement—due to implementation of the proposed project. The section evaluates whether the project would require new or physically altered governmental facilities to maintain adequate service ratios, response times, or other performance objectives, the construction of which would result in substantial adverse physical impacts on the environment. Potential project effects on other public services, including public school facilities, health services, childcare services, library services, and street maintenance services are addressed in the Initial Study, Section 12, Public Services, and potential project effects on public parks are addressed in the Initial Study, Section 10, Recreation (see Appendix NOP-IS).

5.8.2 Summary of Mission Bay FSEIR Public Services, and Community Services and Utilities Sections

The Mission Bay FSEIR Community Services and Utilities setting section characterized existing fire and police protection services serving the Mission Bay plan area and surrounding area at that time. The Mission Bay FSEIR noted that there were no San Francisco Fire Department (SFFD) fire stations operating within the Mission Bay plan area in 1998; however, the plan area was served by up to six surrounding fire stations. The Mission Bay FSEIR also reported that the Mission Bay South area was located within the San Francisco Police Department's (SFPD) Bayview District.

The Mission Bay FSEIR Community Services and Utilities impacts section determined that the Mission Bay plan would potentially result in a significant increase in demand for fire protection and associated emergency medical services in the Mission Bay plan area, and that a new fire station and additional fire department personnel and equipment would be required in the Mission Bay South plan area at build-out in order to facilitate access in the event of a major emergency and maintain adequate levels of service. The FSEIR also indicated the Mission Bay plan would increase demand for a new police station and additional police protection personnel.

The Mission Bay plan included the provision of land at the corner of Third Street and Mission Rock Street in the Mission Bay plan area for a new police/fire station. The Mission Bay FSEIR concluded that with implementation of Mitigation Measures M.6a (Construct New Fire Station) and M.6b (Provide New Engine Company) that would ensure funding for additional fire protection personnel, equipment and fire station, impacts to fire protection services would be less than significant. Furthermore, the Mission Bay FSEIR determined that the new police station proposed under the Mission Bay plan would increase community involvement and lower crime rates in the Mission Bay plan area and ensure impacts to police protection services would be less than significant. Potential impacts associated with the construction and operation of the new police/fire station itself were included in the overall analysis of the Mission Bay plan in the FSEIR.

As explained below, the new Public Safety Building at Third Street and Mission Rock Street in the Mission Bay plan area became operational in April 2015.

5.8.3 Setting

5.8.3.1 Fire Protection and Emergency Medical Services

San Francisco Fire Department

The SFFD provides fire protection and emergency medical services for the City and County of San Francisco. Emergency medical transportation to San Francisco hospitals is provided by a dynamically deployed fleet of both public and private ambulance services.

Currently, the nearest SFFD stations to the project site that would provide the first response for fire suppression, rescue, and emergency medical service include the following:

- Station 4 in Public Safety Building at Third Street and Mission Rock Street (one-third mile from the project site)
- Station 8 at 36 Bluxome Street and Fourth Street (one mile from the project site)
- Station 25 at 3305 Third Street at Cargo Way (1.3 miles from the project site)
- Station 29 at 299 Vermont Street at 16th Street (0.9 miles from the project site)

The City's Public Safety Building at Third and Mission Rock Streets, which includes Station 4, became operational in April 2015. The traffic signals at the intersection of Mission Rock Street with Third Street and Terry Francois Boulevard can be controlled by the SFFD for preemptive signal control to allow unimpeded travel by SFFD emergency vehicles through these intersections in an emergency.

Table 5.8-1 summarizes the existing SFFD staffing and equipment in the project area.

TABLE 5.8-1
SUMMARY OF EXISTING SFFD STAFFING AND EQUIPMENT IN PROJECT AREA

SFFD Fire Station	Staffing per Shift	Total Members	Special Unit	Fire Engines/ Trucks	Command Unit
No. 4: Third St. / Mission Rock St.	9	35		1 engine 1 truck	
No. 8: Bluxome St. / Fourth St.	10	40		1 engine 1 truck	Battalion Chief
No. 25: 3305 Third Street at Cargo Way	4	16		1 engine	
No. 29: 299 Vermont Street at 16th Street	4	16		1 engine	

SOURCE: San Francisco Fire Department, 2015

Table 5.8-2 summarizes the number of SFFD responses in the project area from December 2013 through November 2014 and the average response time.

TABLE 5.8-2
SUMMARY OF SFFD RESPONSES FOR FIRE STATIONS IN PROJECT AREA
(DECEMBER 2013 THROUGH NOVEMBER 2014[a])

SFFD Fire Station No.	Fire Responses	Medical Responses	Total Responses	Average Response Time (minutes)
4[b]	1,038	580	1,618	5.98
8	1,681	5,599	7,280	5.98
25	1,045	1,551	2,596	6.53
29	1,204	2,972	4,176	5.71

a SFFD data reported for December 1, 2013 through November 30, 2014.
b New SFFD Fire Station No. 4 at San Francisco Public Safety Building in Mission Bay became operational in April 2015. Reported response data presented in this table is from existing fire stations that currently serve Station 4's proposed response area.

SOURCE: San Francisco Fire Department, 2015

The SFFD formerly operated and maintained the Auxiliary Water Supply System (AWSS) used for fire protection use only, but since publication of the Mission Bay FSEIR, management of this system has been transferred to the San Francisco Public Utilities Commission's (SFPUC) City Distribution Division. This high pressure water supply system is distinct and separate from the City's domestic water and standard fire hydrant system. The AWSS consists of 150 miles of 8- to 20-inch diameter mains, 1,550 special fire hydrants, a high elevation water reservoir and two large water tanks, emergency saltwater pump stations, and series of underground cisterns. The two AWSS emergency saltwater pumping stations (located at Second Street/Townsend Street and at Fort Mason) each have a pumping capacity of 10,000 gallons per minute (gpm) to supplement the AWSS with saltwater. An existing AWSS water line extends along Third Street adjacent to the project site (see Initial Study, Section 11, Appendix NOP-IS for more discussion).

The SFFD fire boats the *Phoenix* and the *Guardian (*stationed at Station No. 35 at Pier 22½) can make those connections directly into the AWSS via five special manifolds installed along the Bay shoreline to serve as a backup to the City's landside saltwater pumping stations. The nearest SFFD fire boat manifolds to the project site are at Islais Creek/Third Street to the south, and at Pier 22½ to the north. The *Phoenix* has a pumping capacity of over 9,600 gpm, equal to that of one of the landside pumping stations. The *Guardian* has the largest pumping capacity of any fireboat in the world (24,000 gpm) and is the only fireboat that is outfitted with a 5½-inch monitor tip, capable of pumping 9,000 gpm onto a fire from just one of its monitors. The SFFD has also received federal grant money to procure a third fireboat, anticipated to be operational in summer 2015 and stationed at Pier 22½.[1]

1 San Francisco Fire Department, communications with Assistant Deputy Chief Ken Lombardi, January 11, 2015 and January 21, 2015.

5.8.3.2 Law Enforcement Services

San Francisco Police Department

The SFPD provides law enforcement services in the City and County of San Francisco. The SFPD is mandated by the City Charter to maintain a sworn staff of 1,971, excluding officers assigned to the San Francisco International Airport, and officers not available for field duty (e.g., due to on-duty injuries, temporary modified duty, medical leave, and administrative leave). During 2014, the Department averaged 1,715 total full-duty sworn officers. In 2012, the SFPD initiated a six-year hiring plan to gradually increase the number of SFPD officers (with an average of three recruit academies of 50 new hires planned per year) and the mandated SFPD staffing level goal is anticipated to be reached in mid-2018.[2]

The SFPD assigns its officers to ensure adequate staff are available to provide minimum safety services as well as to staff special events and deploy officers to meet unexpected needs when services require "all hands," such as during October of every year when multiple major events are held in the City.[3]

Patrol functions are performed by the police officers of the SFPD Field Operations Bureau from ten district stations. The project site is currently within the jurisdiction of the SFPD's Bayview District. The SFPD Bayview District currently covers an approximately 9.1-square mile area, extending south from the Mission Creek Channel covering all of Mission Bay South plan area, and continuing south through the Potrero Hill, Dogpatch and Bayview neighborhoods to the San Mateo County line. The SFPD Bayview District Station is located at 201 Williams Street, approximately 2½ miles south of the project site.

However, with the recent relocation of the SFPD headquarters and Southern District Station to the Public Safety Building at Third Street at Mission Rock Street, the SFPD district boundaries are being revised. By June 2015, the project site is anticipated to be within the jurisdiction of the SFPD's Southern District.[4] The SFPD Southern District currently covers an approximately 3-square mile area, from roughly Market Street on the north, The Embarcadero waterfront on the east, the Mission Creek Channel on the south, and Division Street on the west, but these boundaries are expected to be revised by June 2015 to include Mission Bay Blocks 29-32. The Southern District Station contains five patrol sectors on the mainland and one on Treasure Island, in addition to several foot beats and officers that patrol on bicycles.

The SFPD's Southern District is responsible for managing the law enforcement services for many events each year, including San Francisco Giants home games at AT&T Park, Oracle World, Macworld, Google Convention, St. Patrick's Day Parade, and Gay Pride Parade, and in 2013, the 34th America's Cup event. The SFPD routinely provides increased police protection for special

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2 San Francisco Police Department, *2013 Annual Report*, available online at http://sf-police.org/index.aspx?page=3992, accessed January 22, 2015.

3 *Ibid*.

4 San Francisco Police Department, communications with Captain Michael Redmond, Commanding Officer, Southern District Station, January 5, 2015, January 6, 2015, and January 15, 2015.

events, including assigning additional SFPD personnel (police officers and on-site command/dispatch center) specifically for these events. The level of SFPD personnel required for a particular event is determined by the SFPD's Event Commander in coordination with the event sponsor in advance of the event as well as by levels established in event security/operations plans. The Department of Parking and Traffic typically provides traffic control services for special events.[5]

For example, for San Francisco Giants home games at AT&T Park, the SFPD typically provides on-duty officers from five or more SFPD district stations to provide police protection in the ballpark vicinity during games, along with motorized patrol support from the SFPD Honda unit and the SFPD Southern District Station's radio car as needed. In addition, the SFPD's Municipal Transportation Agency (MTA) Division provides officers to assist with facilitation of pedestrian traffic through Muni Metro areas for Giants games. Additional off-duty officers are used to provide additional police protection within the interior of the ballpark. Also, the SFPD maintains agreements with certain parking lot operators in Mission Bay, where SFPD bicycle officers provide security at lots used by ballgame patrons.[6]

Table 5.8-3 summarizes the average annual number and types of crimes that occurred within the Mission Bay Plan area between 2012 and 2014. The SFPD indicates that the crime rate within the immediate project site vicinity (e.g., one-half mile radius of the project site) is lower than elsewhere within the Bayview District, as well as lower than the City as a whole.[7]

TABLE 5.8-3
SUMMARY OF ANNUAL CRIMES IN
MISSION BAY PLAN AREA[a] (AVERAGE 2012-2014)

Crime	Number
Arson	1
Assault	20
Burglary	65
Larceny/Theft	489
Robbery	20
Sex Offense	2
Vehicle Theft	42
Total	**638**

[a] The area for which the SFPD collected statistics approximates, but does not match exactly, the Mission Bay Plan area.

SOURCE: San Francisco Police Department, 2015

5 *Ibid*.
6 *Ibid*.
7 *Ibid*.

Port of San Francisco Police

The Port of San Francisco employs one police officer based at Pier 26 who responds to complaints and actively patrols the Port property from Pier 90 to Aquatic Park (including the area directly east of the project site) from 7:00 a.m. to 4:00 p.m., Monday through Friday. SFPD provides backup to the Port's officer and law enforcement services after 4:00 p.m. and on weekends.

San Francisco Sheriff's Department

The San Francisco Sheriff's Department (SFSD) manages the San Francisco County Jail and protects City-owned critical infrastructure. In addition, the SFSD augments law enforcement at the request of the SFPD.

California Highway Patrol

The California Highway Patrol (CHP) provides law enforcement services on state highways, including the San Francisco-Oakland Bay Bridge. The nearest CHP station to the project site is Station 335, at 455 Eighth Street in San Francisco.

University of California Police Department

The University of California Police Department (UCPD) provides police protection services for University of California properties and facilities, including the University of California at San Francisco (UCSF) Mission Bay campus. The UCPD is comprised of the Field Services Division, which provides police and investigative services, the Professional Standards Division, and the Homeland Security and Emergency Management Division. The UCSF Police Department maintains its headquarters at 654 Minnesota Street, and a patrol substation at the Mission Bay campus.

5.8.4 Regulatory Framework

5.8.4.1 State Regulations

California Master Mutual Aid Agreement

The California Master Mutual Aid Agreement is a framework agreement between the State of California and local governments for aid and assistance by the interchange of services and facilities, including but not limited to fire, police, medical and health, communication, and transportation services and facilities to cope with the problems of rescue, relief, evacuation, rehabilitation, and reconstruction.

California Fire Code

State fire regulations are set forth in Sections 13000, et seq. of the California Health and Safety Code, which includes regulations concerning building standards (as set forth in Title 24 of the California Code of Regulations, the California Building Code), fire protection and notification systems, fire protection devices (such as fire extinguishers and smoke alarms), high-rise building and child care facility standards, and fire suppression training. California Fire Code Section 403.2

addresses public safety for both indoor and outdoor gatherings, including emergency vehicle ingress and egress, fire protection, emergency medical services, public assembly areas and the directing of both attendees and vehicles (including the parking of vehicles), vendor and food concession distribution, and the need for the presence of law enforcement and fire and emergency medical services personnel at the event.

5.8.4.2 Local Regulations

San Francisco General Plan

The *San Francisco General Plan* provides general policies and objectives to guide land use decisions and development throughout the city, as described in Chapter 4, Plans and Policies. The Community Facilities Element of the General Plan contains the following objectives and policies relevant to public services:

> ***Objective 1*****:** Distribute, locate and design police facilities in a manner that will enhance the effective, efficient and responsive performance of police functions.
>
> ***Policy 1.1*****:** Locate police functions that are best conducted on a centralized basis in a police headquarters building.
>
> ***Policy 1.2*****:** Provide the number of district stations that balance service effectiveness with community desires for neighborhood police facilities.
>
> ***Policy 1.3*****:** Enhance closer police/community interaction through the decentralization of police services that need not be centralized.
>
> ***Policy 1.4*****:** Distribute, locate, and design police support facilities so as to maximize their effectiveness, use, and accessibility for police personnel.
>
> ***Policy 1.6*****:** Design facilities to allow for flexibility, future expansion, full operation in the event of a seismic emergency, and security and safety for personnel, while still maintaining an inviting appearance that is in scale with neighborhood development.
>
> ***Policy 1.7*****:** Combine police facilities with other public uses whenever multi-use facilities support planning goals, fulfill neighborhood needs, and meet police service needs.
>
> ***Policy 2.1*****:** Provide expanded police/community relations and police services through outreach programs, primarily utilizing existing facilities.
>
> ***Policy 2.2*****:** Establish police district boundaries along natural neighborhood edges, and reinforce neighborhood identity by locating district stations near the centers of their service areas.
>
> ***Policy 2.3*****:** Design police facilities to maximize opportunities for promoting community/ police relations through dual use of facilities.
>
> ***Objective 5*****:** Development of a system of firehouses which will meet the operating requirements of the Fire Department in providing fire protection services and which will

be in harmony with related public service facilities and with all other features and facilities of land development and transportation provided for in other sections of the General Plan.

San Francisco Police Code

The San Francisco Police Code contains regulations for various types of activities such as automobile use, permitting and licensing, and disorderly conduct. The City's noise ordinance is also part of the Police Code (Article 29) – see Section 5.3, Noise Regulatory Framework.

San Francisco Fire Code

The San Francisco Fire Code was revised in 2007 to regulate and govern the safeguarding of life and property from fire and explosion hazards arising from the storage, handling, and use of hazardous substances, materials, and devices, and from conditions hazardous to life or property in the occupancy of buildings and premises; to provide for the issuance of permits, inspections, and other SFFD services; and to provide for the assessment and collection of fees for those permits, inspections, and services. The SFFD reviews building plans to ensure that fire and life safety is provided and maintained in the buildings that fall under its jurisdiction. SFFD building plan review applies to all of the following occupancy types:

- All Assembly Occupancies (including restaurants and other gathering places for 50 or more occupants)
- All Educational Occupancies (including commercial day care facilities)
- All Hazardous Occupancies (including repair garages, body shops, fuel storage, and emergency generator installation)
- All Storage Occupancies where potential exists for high-piled storage as defined by Fire Code
- All Institutional Occupancies
- All High-Rise Buildings of all occupancies
- Residential Occupancies, such as hotels, motels, lodging houses, residential care facilities, apartment houses, small- and large-family day care homes, and R-1 artisan buildings (excluding minor residential repairs such as kitchen and bath remodeling and dry rot repair)
- Certified family-care homes, out-of-home placement facilities, halfway houses, drug and/or alcohol rehabilitation facilities
- Tents, awnings, or other fabric enclosures used in connection with any occupancy
- All fire alarm and fire suppression systems

In coordination with the San Francisco Department of Building Inspection and the Port Building Department, the SFFD conducts plan checks to ensure that all structures, occupancies, and systems outlined above are designed in accordance with the San Francisco Building Code prior to the issuance of a building permit.

5.8.5 Impacts and Mitigation Measures

5.8.5.1 Significance Thresholds

The project would have a significant impact related to public services if the project were to:

- Result in substantial adverse physical impacts associated with the provision of or need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any public services such as fire protection, law enforcement, or other services.

Impacts regarding emergency vehicle access are addressed in Section 5.2, Transportation and Circulation.

5.8.5.2 Approach to Analysis

Methodology for Analysis of Direct Impacts

The proposed project could have a significant impact on public services if (1) it would require the construction of new or physically altered governmental facilities in order to maintain acceptable levels of public services, *and* (2) the construction or alteration of such facilities would result in one or more substantial adverse impacts on the environment. While the proposed project includes provision of space at the event center for the SFFD and SFPD to use during games/events (e.g., command center), the physical impacts related to construction and operation of those facilities are addressed as part of the proposed project and included within the analyses in the appropriate environmental resource topic sections of this SEIR.

Other effects that could result from the proposed project—such as the potential for an increase in crime, public drinking, outdoor crowd noise, building defacement, public urination, ticket scalping, pan-handling, vandalism, litter, graffiti, and other activities that may result in a diminished quality of life for neighborhood residents—are not considered impacts under CEQA unless such effects result in the need for the construction of new or physically altered governmental facilities in order to maintain acceptable levels of public services, *and* the construction of such facilities result in adverse physical environmental impacts. These quality of life issues would be considered as part of OCII and the City's project planning and approval processes, outside of the CEQA environmental review process.

Nevertheless, the proposed project would incorporate certain services, facilities, and site management practices that would minimize the project's effects on the quality of life for the surrounding neighborhood. These include: the provision of on-site space, including a command center at the event center for use by the sponsor's security personnel, SFPD, SFFD, and San Francisco Municipal Transportation Agency (SFMTA); provision of private security guards to regularly patrol buildings and grounds, and increased security for games/events to provide on-site crowd management and public safety; inclusion of applicable on-site security equipment; use of traffic control personnel and implementation of a transportation management plan for games/events to facilitate safe movement of, and minimize potential conflicts among pedestrians, bicyclists, and vehicles; use of maintenance and cleaning staff to regularly clean and maintain the buildings and grounds and provide litter control; incorporation of public restroom facilities in proposed buildings and open space areas; and installation of recycling/trash/compost receptacles as required by the City.

The impact analysis below first considers whether the project would require the construction of new or altered governmental facilities (beyond those included in the proposed project), in order to maintain acceptable performance standards for public services. If new or altered public service facilities are determined to be required to serve the project, then the analysis evaluates whether construction of such facilities would have a substantial adverse physical impact on the environment. For example, if the SFPD determined that a new police station would be required to be constructed to maintain adequate service levels for law enforcement, the impact analysis would evaluate whether construction or operation of the new police station would have significant impacts on the physical environment.

If the project were to result in increased demand for law enforcement, fire protection, and/or emergency medical services, there could be economic impacts that are unrelated to the construction of new or altered facilities. Costs incurred by the agencies that would provide law enforcement, fire protection, and emergency medical services would not be considered an environmental impact under CEQA, and as such, CEQA environmental review does not address mitigation measures to compensate public service agencies for such costs.

For purposes of the impact analysis, it is assumed that project improvements would be designed and constructed in compliance with all applicable building and fire codes, which include requirements for fire alarms, smoke detectors, sprinkler systems, fire extinguishers, and the number and location of exits.

Methodology for Analysis of Cumulative Impacts

The geographic scope of potential cumulative impacts on public services encompasses the areas served by the SFFD, SFPD, and other federal and state government facilities that provide fire protection, emergency medical, and law enforcement services in the project area.

Foreseeable past, present, and probable future projects in the project area that could result in cumulative impacts on public services in combination with the proposed project are described in Section 5.1, Impact Overview. For the public services cumulative impact analysis, future development projects considered in the analysis include those that would require law enforcement services and fire protection/emergency medical services. Similar to the analysis for project impacts, the cumulative impact analysis assumes that construction and operations of other projects in the immediate vicinity would also be completed in compliance with applicable regulations regarding the provision of public services. The analysis considers whether or not there would be a significant, adverse cumulative impact associated with project implementation in combination with past, present, and probable future projects in the immediate vicinity, and if so, whether or not the project's contribution to the cumulative impact would be significant (i.e., cumulatively considerable).

5.8.5.3 Impact Evaluation

Impact PS-1: See Initial Study (Appendix NOP-IS)

Construction

Fire Protection, Emergency Medical Services, and Law Enforcement

Impact PS-2: Construction of the proposed project would not result in substantial adverse physical impacts associated with the provision of or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection, emergency medical services, or law enforcement. (Less than Significant)

As discussed in Chapter 3, Project Description, construction of the proposed project is anticipated to begin in late 2015, and occur over an approximate 26-month period. The number of construction workers present on-site daily would vary, depending on the specific construction activities being performed and the overlap between construction phases. During peak overlapping construction periods, there would be between approximately 330 and 700 construction workers at the project site. The presence of construction workers on-site could result in an incremental, temporary increase in demand for fire protection, emergency medical services, and law enforcement. As described in Section E.3, Population and Housing, in the Initial Study (see Appendix NOP-IS), it is expected that a portion of the construction labor needs would be met by residents of San Francisco, who are currently being served by these City services and therefore would not represent an increase in demand for City services. In any case, this incremental, temporary increase in demand for services during construction could be accommodated by the existing fire protection, emergency medical services, and law enforcement services and would not require construction of new or physically altered facilities to maintain services. Therefore, maintaining acceptable fire protection, emergency medical services, and law enforcement during construction of the proposed project would be *less than significant*, and no mitigation would be required.

Mitigation: Not required.

Comparison of Impact PS-2 to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR did not specifically address potential construction-related impacts to fire protection, emergency medical, or law enforcement services. However, because project impacts would be less than significant, the project would result in no new or substantially more severe significant impacts than was previously identified in the FSEIR.

Operation

Fire Protection and Emergency Medical Services

Impact PS-3: Operation of the proposed project would not result in substantial adverse physical impacts associated with the provision of or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection or emergency medical services. (Less than Significant)

An increase in population at the project site and vicinity, including patrons attending games and other events, customers frequenting proposed retail uses and restaurants; event center, office and retail employees; and visitors to the proposed public plazas would result in periodic increases in demand for fire protection and emergency medical services compared to existing conditions. Because the project does not include any residential uses, there would be no permanent increase in population at the project site. As discussed below, the periodic increases in demand for fire protection and emergency medical services would not require construction of new or physically altered fire protection or emergency medical facilities.

The population increases associated with the project would be minimal in comparison to the population served by the existing fire stations in the project area. The increase in calls for fire protection and medical emergency response would not be substantial in light of the existing demand and capacity for fire protection and emergency medical services in the City. The project site is located in an existing urban area and would not extend demand of the SFFD beyond the current limits of its service capabilities. The proposed development would neither adversely affect SFFD service standards nor require an increase in SFFD staff that would require the construction of new fire protection facilities.[8]

As discussed above in the Setting, the newly-operational Fire Station 4 operates within the Public Safety Building, approximately one-third mile north of the project site; this fire house would serve as a first responder to fire and emergency medical incidences at the project site. In addition, there are several other existing fire stations (e.g., Fire Stations No. 8, 25 and 29) located within the project site vicinity that would provide supplemental fire protection and emergency medical response personnel and equipment at the project site, if needed.[9]

A high pressure AWSS water line currently extends along Third Street adjacent to the project site that would serve the proposed project. There are no AWSS deficiencies in the project area, and if needed, existing emergency saltwater pump stations and/or the SFFD fire boats could provide a supplemental source for emergency water for the AWSS.[10]

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8 Communications with Assistant Deputy Chief Ken Lombardi, San Francisco Fire Department, January 11, 2015 and January 21, 2015.
9 *Ibid*.
10 *Ibid*.

As part of project operations for games and large events at the event center, the Warriors or other event sponsors would provide on-site medical services, including a first aid station and on-site medical personnel to provide first aid to game/event patrons or employees that may require medical assistance, which would further reduce potential effects on general emergency medical response providers.

The proposed development would be designed to comply with the most up-to-date building and fire codes and include state-of-the-art fire safety measures and equipment, including but not limited to, use of fire retardant building materials, inclusion of emergency water infrastructure (fire hydrants and sprinkler systems), installation of smoke detectors and fire extinguishers, emergency response notification systems, and provision of adequate emergency access ways within the project site for emergency vehicles. Project fire safety plans would be subject to review and approval by the SFFD.

Furthermore, as part of the project, a proposed command center at the event center would be used prior to, during, and after games/events by the SFFD, SFPD, SFMTA, and/or the project's private security and emergency medical staff to coordinate incident response, facilitate communication and surveillance, implement the transportation management plan (TMP), and deploy parking control officers (PCOs).

The periodic increase in demand for fire protection services discussed above would not require construction of new or physically altered fire protection facilities. The existing SFFD fire stations in the project vicinity (including the newly-operational Fire Station 4, located one-third mile north of the site), in combination with the proposed provision for on-site emergency medical staff for games/events, and provision of on-site fire prevention/protection measures, equipment and facilities at the project site, are currently adequate to meet the increases in demand for fire protection and emergency medical response services associated with the proposed project. No additional new or physically altered facilities would be necessary. Therefore, the proposed project would have a *less than significant* impact related to the construction of new or physically altered fire protection facilities.

Mitigation: Not required.

Comparison of Impact PS-3 to Mission Bay FSEIR Impact Analysis

As discussed above, the Mission Bay FSEIR determined that the Mission Bay plan would potentially result in a significant increase in demand for fire protection services in the Mission Bay plan area, and that a new fire station and additional fire department personnel and equipment would be required in the Mission Bay South plan area at build-out in order to facilitate access in the event of a major emergency, and maintain adequate levels of service. The Mission Bay FSEIR concluded that with implementation of Mitigation Measures M.6a (Construct New Fire Station) and M.6b (Provide New Engine Company) to ensure funding for additional fire protection personnel, equipment and fire station, impacts to fire protection services would be less than significant. The City's Public Safety Building at Third and Mission Rock Streets, which includes SFFD Fire Station 4 became operational in April 2015, and consequently, Mission Bay

FSEIR Mitigation Measures M.6a and M.6b have been implemented and are not applicable to the proposed project.

Therefore, the project would not result in any new or substantially more severe significant impacts than those previously identified in the Mission Bay FSEIR.

Law Enforcement Services

Impact PS-4: Operation of the proposed project would not result in substantial adverse physical impacts associated with the provision of or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for law enforcement services. (Less than Significant)

An increase in population at the project site and vicinity, including patrons attending games and events, customers frequenting proposed retail uses and restaurants, event center, office and retail employees, and visitors to the proposed public plazas would result in a periodic increase in demand for law enforcement services. Because the project does not include any residential uses, there would be no permanent increase in population at the project site. The periodic increases in demand for law enforcement services would not require construction of new or physically altered law enforcement facilities.

During non-event periods at the project site, the proposed project would require typical SFPD police protection services, which are expected to be similar to those services currently being provided to other mixed-use developments in the City. As discussed above, the newly-operational SFPD headquarters and Southern District police station are based in the Public Safety Building in Mission Bay, approximately one-third mile north of the project site. In addition, the event center, office and retail uses would provide their own on-site private security personnel and install proper security equipment (e.g., security nightlighting, CCTV system for video surveillance, and security gates/locks) similar to other mixed use developments in the City. The event center would also provide an on-site command center for on-site security personnel to monitor access to the site and provide communications resources seven days a week, 24 hours a day.

However, when games and other large capacity events would occur at the event center, an increased level of SFPD police protection personnel would be required on- and/or off-site for patrolling and responding to potential incidences associated with the temporary increases in visitors. The SFPD anticipates that for games/events at the proposed event center, typical police responses would be associated with actions such as citations, ejections of fans from the arena and arrests, public intoxication, thefts from vehicles, and low-level assaults.[11] The temporary

[11] San Francisco Police Department, communications with Captain Michael Redmond, Commanding Officer, Southern District Station, January 5, 2015, January 6, 2015 and January 15, 2015.

increases in project-related visitors within the immediate vicinity of the adjacent UCSF Mission Bay campus could also result in periodic incidences requiring response from the UCSF Police Department.

As discussed in the Setting, the SFPD routinely provides increased police protection for sports games (e.g., SF Giants baseball home games at AT&T Park) and other events in the City, and assigns and dedicates additional SFPD personnel specifically for these games/events. Accordingly, the SFPD would increase local staffing for the games/events at event center, as needed. The level of SFPD personnel required on- and/or off-site for games/events would be determined in advance of the game/event by the SFPD's Event Commander in coordination with the Warriors and/or event sponsor and would be specified in event security/operations plans.[12]

During games and events at the event center, the Warriors and/or event sponsor would also provide increased private security to assist in on-site crowd management and public safety during events, and would use traffic control personnel to assist in implementing the TMP to facilitate safe movement of, and minimize potential conflicts among pedestrians, bicyclists, and vehicles.

Furthermore, as part of the project, space within the event center would be provided for SFPD personnel to use during games/events for police administrative and operational functions, and could include police-related facilities typically included at sports arenas such as temporary detention facilities. In addition, as discussed in Impact PS-3, above, a separate proposed command center at the event center would be used prior to, during, and after games/events by the SFPD, SFFD, SFMTA and/or the project's private security and emergency medical personnel to coordinate incident response, facilitate communication and surveillance, and implement the TMP and PCOs. Consequently, adequate police protection services and facilities would be available and provided for the games/events at the project site, and such services would not detract from other SFPD police operations within the City.[13] See cumulative impacts below regarding impacts on SFPD personnel during concurrent events at the project site and AT&T Park.

The periodic increase in demand for law enforcement services discussed above would not require construction of new or physically altered police stations. The existing police protection facilities in the project site vicinity, including the newly-operational Southern District police station located one-third mile north of the site, in combination with proposed event security/operations plans, and provision of on-site security facilities and personnel for the project, are currently adequate to meet the increase in demand for service associated with the proposed project. No new or physically altered facilities would be necessary. Therefore, the proposed project would have a *less than significant* impact related to the construction of new or physically altered police protection facilities.

12 *Ibid*.
13 *Ibid*.

Mitigation: Not required.

Comparison of Impact PS-4 to Mission Bay FSEIR Impact Analysis

As discussed above, the Mission Bay FSEIR determined that the Mission Bay plan would increase demand for a new police station and additional police protection personnel, although not significantly. The Mission Bay FSEIR also concluded that a new police station proposed under the Mission Bay plan would increase community involvement and lower crime rates in the Mission Bay plan area and ensure impacts to police protection services would be less than significant. Consistent with the Mission Bay plan, the City's Public Safety Building at Third and Mission Rock Streets, which includes new SFPD headquarters and Southern Station, became operational in April 2015.

Therefore, the project would not result in any new or substantially more severe significant impacts than those previously identified in the Mission Bay FSEIR.

Cumulative Impacts

Impact C-PS-1: See Initial Study (Appendix NOP-IS)

Impact C-PS-2: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative impacts on fire protection, emergency medical, and law enforcement services. (Less than Significant)

The geographic scope of the potential cumulative impacts of the proposed project related to public services includes the areas served by the fire and police stations and other facilities of the federal, state, and local government agencies that provide fire protection, emergency medical, and law enforcement services in the project area.

As stated above, the proposed project would increase demand for fire protection, emergency medical, and law enforcement services. The project could have a significant cumulative impact if (1) this increase in demand would make a cumulatively considerable contribution to the public service demands of other past, present, and future projects described in Section 5.1 in this SEIR that, in combination, would require the construction of new or physically altered governmental facilities (i.e., fire or police stations); *and* (2) the construction of such facilities would have a significant adverse impact on the environment.

Neither the SFPD nor SFFD have identified a citywide service gap. Therefore, the increased need for law enforcement or fire protection services resulting from the proposed project and reasonably foreseeable projects would not be above levels anticipated by the SFFD or SFPD. With respect to the potential need for SFPD police protection for multiple special events that may occur concurrently within the City (e.g., a game or event at the project site in combination with a SF Giants baseball home game at AT&T Park), the SFPD indicates that separate security/operations plans and dedicated SFPD personnel would be used concurrently for each individual event.[14] When considering that dedicated SFPD staff, in combination with each event sponsors' private security and public safety staff, would be available to serve the respective events, no delays in response times would be expected to occur for the individual events or for service in the City as a whole.

Given these factors, the contribution to cumulative impacts by the project would not be considerable, and the impact would be *less than significant*.

Mitigation: Not required.

Comparison of Impact C-PS-2 to Mission Bay FSEIR Impact Analysis

The 1998 Mission Bay FSEIR did not contain an analysis of cumulative impacts on fire protection, emergency medical, and law enforcement services *per se*, although as a program EIR, the FSEIR analyzed the fire protection, emergency medical, and law enforcement services impact of the Mission Bay North and South Redevelopment Plans as a whole, covering development throughout an area over 300 acres in size, which is essentially a cumulative analysis.

As described above, with completion of the City's Public Safety Building at Third and Mission Rock Streets, public services impacts of the Mission Bay Plan previously identified in the FSEIR have now been reduced to less than significant. Consequently, the cumulative impacts for the Plan area are now less than significant. Therefore, the project would not result in any new or substantially more severe significant impacts than those previously identified in the Mission Bay FSEIR.

[14] *Ibid*.

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5.9 Hydrology and Water Quality

5.9.1 Introduction

This section describes the potential effects of the project on the existing hydrology and water quality in the project area, with a focus on operational impacts associated with changes in stormwater and wastewater flows. The potential for flooding as a result of sea level rise is also addressed.

The impact evaluation in the Hydrology and Water Quality section of the Initial Study (see Appendix NOP-IS, pp. 86 through 98) explains why the proposed project would not result in new significant impacts or substantially increase the severity of impacts on hydrology and water quality with respect to depletion of groundwater and interference with groundwater recharge; alteration of drainage patterns; degradation of water quality; placement of housing within a 100-year flood zone; placement of structures within a 100-year flood zone; flooding as a result of failure of a levee or dam; and inundation by seiche, tsunami, or mudflow.

Project effects on the capacity of wastewater and stormwater systems, which are related to water hydrology and water quality impacts, are addressed in Section 5.7, Utilities and Service Systems, of this SEIR.

5.9.2 Summary of Mission Bay FSEIR Hydrology and Water Quality Analysis

Hydrology and water quality setting information and impact analyses were addressed in the Mission Bay FSEIR in the Hydrology/Water Quality and Community Services/Utilities sections as well as in the Mission Bay Initial Study Water and Geology/Topography sections. Those sections of the Mission Bay FSEIR discuss and analyze a preliminary approach to managing stormwater and wastewater in the Mission Bay South area. However, the approach that was ultimately adopted and implemented was described and analyzed as a Mitigation Scenario B in the Mission Bay FSEIR Summary of Comments and Responses (FSEIR Volume III, beginning on p. XII.253). Information from these sections relevant to the analysis of hydrology and water quality impacts is summarized below.

5.9.2.1 Mission Bay FSEIR Setting

Mission Bay Plan Stormwater Drainage Setting

The Mission Bay FSEIR Hydrology/Water Quality setting section characterized existing drainage patterns and municipal sewer treatment facilities serving the Mission Bay Plan area at the time of FSEIR publication. As presented in that description, the Mission Bay Plan area was located in the City's Bayside drainage basin, in which combined stormwater and sanitary sewage were collected in the same set of pipes, conveyed to and treated at the Southeast Water Pollution Control Plant (SEWPCP) near Islais Creek, and treated wastewater was then discharged to the

Bay in a deep water outfall at Pier 80. At that time, the Mission Bay Plan area was located in four sub-basins, with the project site draining to two of the sub-basins. The north and east portions of the Blocks 29-32 site drained to the Bay sub-basin, in which stormwater drained directly to the Bay, and the balance of Blocks 29-32 drained to the Mariposa sub-basin of the Bayside drainage basin of the combined sewer system. Stormwater collected in the Mariposa sub-basin was directed to the Mariposa Pump Station, and from there, to the SEWPCP.

As reported in the Mission Bay FSEIR, the annual average dry weather flows at the SEWPCP at that time were estimated at 67 million gallons per day (mgd). During wet weather, the SEWPCP could treat up to 150 mgd to a secondary level, and an additional 100 mgd to a primary level.[1] In addition, up to an additional 150 mgd of wet weather flows received primary treatment at the North Point Water Pollution Control Plant, increasing total wet weather treatment capacity for the Bayside drainage basin to 400 mgd. As also reported in the Mission Bay FSEIR, if rainfall resulted in total combined wastewater and stormwater flows exceeding the total capacity of the SEWPCP, the North Point facility, and storage/transport facilities, then excess flows are directed to combined sewer discharge (CSD) structures located along the City's bayside. These flows receive flow-through treatment (similar to primary treatment) and were discharged to the Bay in compliance with the City's National Pollutant Discharge Elimination System (NPDES) permit issued by the Regional Water Quality Control Board (RWQCB).

Mission Bay Plan Flooding Setting

The Mission Bay FSEIR Initial Study Water section summarized relevant information from the 1990 Mission Bay FEIR regarding the issue of potential flooding. The 1990 Mission Bay FEIR indicated that the elevation of the Mission Bay Plan area ranged from approximately +6 to -2 feet San Francisco City Datum (SFD)[2], or 17 to 9 feet based on the 1988 North American Vertical Datum (NAVD88). Groundwater in the Mission Bay Plan area was reported at 3.5 to 9 feet below ground surface, and contiguous with the mean sea level in the adjacent Bay. As referenced in the Mission Bay FSEIR Initial Study, the 1990 Mission Bay FEIR determined that proposed structures or roadways in Mission Bay placed at elevations at or below -2 feet SFD (9 feet NAVD88), after settling on the site, could be subject to tidal flooding during the 100-year flood event, and that if sea levels were to rise, groundwater levels in Mission Bay could also rise.

5.9.2.2 Mission Bay FSEIR Impacts and Mitigation Measures

As discussed in Section 5.7, Utilities and Service Systems, the Mission Bay Draft SEIR described major sewer upgrades within the Mission Bay Plan area that were proposed as part of the Mission Bay Plan. Additional improvements were planned as part of Mitigation Scenario B

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1 Secondary treatment is the treatment of wastewater or sewage involving removal of organic matter using biological and chemical processes. This is a higher level of treatment than primary treatment, which is removal of floating and settleable solids using physical operations such as screening and sedimentation.

2 San Francisco City Datum (SFD) establishes the City's zero point for surveying purposes at approximately 8.6 feet above the mean sea level established by 1929 U.S. Geological Survey datum, and approximately 11.3 feet above the 1988 North American Vertical Datum.

described in the Comments and Responses of the Mission Bay FSEIR. The adopted approach included reconfiguring the Central and Mariposa sub-basins of the combined sewer system for the collection of wastewater and; constructing a separate stormwater collection system in the entire Mission Bay South Plan area. ; The separate stormwater system in the reconfigured Central sub-basin has been constructed, and the separate stormwater system in the reconfigured Mariposa sub-basin is currently under construction and anticipated to be completed in 2015, prior to construction and operation of the proposed project.

Mission Bay Plan Effects on Stormwater Drainage

The Mission Bay FSEIR Hydrology and Water Quality impacts section described the proposed Mission Bay Plan's drainage plan, which included reconfiguring the drainage basins of the combined sewer, as shown on Figure 5.7-1 in Section 5.7, Utilities and Service Systems. As part of Mitigation Scenario B, a new separate stormwater system was proposed in both the reconfigured Central and Mariposa sub-basins. With construction of this system, stormwater that previously discharged to the combined sewer system or directly to the Bay would drain into the new separate stormwater infrastructure. The reconfigured Central and Mariposa sub-basins of the combined sewer system would convey wastewater to the SEWPCP for treatment.

The separate stormwater system is currently being implemented by the master developer and includes four drainage zones within the geographic boundaries of the reconfigured Central sub-basin (construction completed) and one drainage zone within the geographic boundaries of the reconfigured Mariposa sub-basin (currently under construction). Stormwater in each of the drainage zones flows by gravity to one of five stormwater pump stations in the locations shown on Figure 5.7-2, including Pump Station SDPS-5 near the east end of 16th Street. When construction of the fifth drainage basin is completed (anticipated to be in 2015, prior to construction and operation of the proposed project), all stormwater runoff from Mission Bay South will be conveyed through the separate stormwater system and discharged to the Bay and China Basin Channel (Mission Creek).

The Mission Bay FSEIR Hydrology and Water Quality section indicated that implementation of the Mission Bay Plan would contribute pollutants to the Bay through: (1) the discharge to municipal wastewater effluent from the SEWPCP; (2) the discharge of treated combined sewer overflows (CSOs) (these events are now referred to as combined sewer discharges or CSDs); and (3) the discharge of untreated stormwater. As described below, the Mission Bay FSEIR found that these water quality impacts would be less than significant. As also discussed below, the Mission Bay FSEIR included Mitigation Measures K.3 and K.4 to address cumulative effects related to an increase in CSDs and water quality effects of untreated stormwater discharges, and these mitigation measures were implemented as part of Mitigation Scenario B of the FSEIR Comments and Responses.

Mission Bay Plan Effects on Volume and Quality of Municipal Wastewater Effluent

The Mission Bay FSEIR estimated that under the original Mission Bay Draft SEIR approach the Mission Bay Plan would generate municipal wastewater and increase the total effluent discharged from the SEWPCP to the Bay by about 3 percent, and result in an approximate 3 percent increase in the pollutant loading to the Bay from the City's municipal wastewater effluent discharges. The Mission Bay FSEIR reported that for the most part, the quality of municipal wastewater from the Mission Bay Plan area would not differ substantially from the quality of other City wastewater conveyed to the SEWPCP, and would not materially change the concentrations of pollutants in the effluent. The Mission Bay FSEIR determined that the effluent increases would be well within the City's treatment plant capacity, and would not cause a violation of the City's NPDES permit requirements for its discharge from the SEWPCP. The Mission Bay FSEIR also determined that the pollutant concentrations in the treated wastewater would be within water quality screening values, including water quality objectives adopted by the RWQCB.

However, the Mission Bay FSEIR determined that the University of California, San Francisco (UCSF) and some commercial or industrial operations could involve the discharge of some pollutants not typically associated with most other San Francisco wastewater, and these sources could potentially discharge chemicals, radioactive materials, and biohazardous materials to the SEWPCP. If improperly handled, these discharges could potentially result in a violation of the NDPES permit. The FSEIR identified Mitigation Measure K.2 in the Hydrology and Water Quality section, which required facilities with these discharges to install sampling ports to facilitate demonstration of compliance with discharge limitations. Implementation of this measure would reduce impacts related to municipal wastewater effluent to less than significant.

Mission Bay Plan Effects of Volume and Quality of Combined Sewer Discharges

The Mission Bay FSEIR estimated that under the Mission Bay Draft SEIR approach, the Mission Bay Plan would increase the average annual volume of CSDs (formerly referred to as combined sewer overflows, or CSOs) by approximately 0.2 percent, and increase the duration of each overflow event by a few minutes. The Mission Bay FSEIR reported that the Mission Bay Plan would not change the concentrations of pollutants in the treated CSDs. In addition, this slight increase in CSD volumes and duration would not cause a violation of the City's NPDES permit requirements for the CSDs, and thus, would not adversely affect existing near-shore aquatic biota or water-contact recreation in the Bay. Given these factors, the Mission Bay FSEIR concluded that Mission Bay Plan effects of CSDs on water quality would be less than significant.

Mission Bay Plan Effects of Volume and Quality of Direct Stormwater Discharge

The Mission Bay FSEIR reported that under the Mission Bay Draft SEIR approach, the Mission Bay Plan would increase the volume of stormwater directly discharged from the Plan area to the Bay by approximately 2 percent and would also change the concentration of pollutants in the stormwater discharge due to the intensification of land uses proposed in the Mission Bay Plan. However, the Mission Bay FSEIR concluded that any potential increase in pollutants from stormwater discharges would be very small relative to those associated with municipal wastewater and treated CSDs. The Mission Bay FSEIR determined that this increase in volumes and change in pollutant concentrations would not adversely affect existing aquatic biota in the Bay. Given these factors, the Mission Bay FSEIR concluded that Mission Bay Plan effects of direct stormwater discharge on water quality would be less than significant.

Mission Bay Plan Effects on Sediment Quality

The Mission Bay FSEIR reported that the RWQCB identified China Basin Channel (Mission Creek) and Islais Creek as candidate toxic hot spots for sediment quality. The Mission Bay FSEIR indicated under the original Mission Bay Draft SEIR approach, the Mission Bay Plan would increase the volume of CSDs from the combined sewer system to Islais Creek as well as the volume of direct stormwater discharges to China Basin Channel (Mission Creek). The Mission Bay FSEIR concluded that increased discharges would cause a corresponding increase in sediment deposition at these locations. However, the discharges would not measurably change the physical or chemical composition of the sediment layer, nor affect any determination by the RWQCB to designate China Basin Channel (Mission Creek) or Islais Creek as toxic hot spots. Given these factors, the Mission Bay FSEIR concluded that Mission Bay Plan effects on sediment quality in Islais Creek and China Basin Channel (Mission Creek) would be less than significant.

Mission Bay Plan Effects on Water Contact Recreation

The Mission Bay FSEIR reported that under the original Mission Bay Draft SEIR approach the Mission Bay Plan would increase CSDs from both the Mariposa and Islais Creek sub-basins of the City's combined sewer system, which could affect water quality as well as the use of these areas for water contact recreation. However, the Mission Bay FSEIR concluded that water contact recreation occurs infrequently on the Bayside, and there would be no impact related to water contact recreation.

Mission Bay Plan Contribution to Cumulative Effects

The Mission Bay FSEIR concluded that there were no significant cumulative impacts identified from the estimated increased volume and pollutant load of treated municipal wastewater effluent, treated CSDs, and direct stormwater discharges, because there would not be substantial degradation in water quality of the Bay or near-shore waters, no toxic effect on aquatic biota, and no substantial change in sediment quality or beneficial uses.

However, the Mission Bay FSEIR determined that due to the lack of conclusive evidence refuting a causal relationship between treated CSDs, stormwater discharges, and sediment quality, the Mission Bay Plan could contribute to a potentially significant cumulative impact on water quality of near-shore waters of the Bay from multiple sources of CSDs and direct stormwater discharges to China Basin Channel (Mission Creek) under the Mission Bay Draft SEIR approach. The Mission Bay FSEIR concluded that the estimated Plan contribution (0.2 percent) to the potential cumulative increase (11 percent) in Bayside CSD volumes, and the contribution of Plan-related stormwater discharges to possible cumulative impacts would be reduced to less than significant with the implementation of Mitigation Measures K.3 and K.4 regarding CSD volumes and alternative treatment technologies for treatment of direct stormwater discharges (described below).

Mission Bay Plan Phased Development Effects on Water Quality from Stormwater

The Mission Bay FSEIR discussed U.S. Environmental Protection Agency (U.S. EPA) Phase II stormwater regulations that had been proposed but not finalized at the time of publication of the Mission Bay FSEIR. These proposed regulations would require the City to develop and implement a stormwater management program to reduce the discharge of pollutants from stormwater to the maximum extent practicable and to protect water quality. The Mission Bay FSEIR indicated that the absence of adopted regulatory requirements for a stormwater management program that addressed Mission Bay stormwater quality, and a failure to implement other best management practices (BMPs) to minimize stormwater pollution, could potentially conflict with the intent of the proposed stormwater permit requirements and result in a significant impact.

Mitigation Measure M.5 in the Mission Bay FSEIR Community Services and Utilities section (see Section 5.7, Utilities and Service Systems) required conveying all stormwater runoff from newly developed areas in the Bay drainage basin to the combined sewer system prior to completion of the initial-flow diversion system. Mitigation Measure K.5 in the Mission Bay FSEIR Hydrology and Water Quality section identified implementation of an individual stormwater management program that utilizes BMPs for Mission Bay until the Phase II regulations become final and Mission Bay is included in the City’s stormwater management program. Implementation of this measure would reduce impacts to less than significant.

Mission Bay Plan Effects on Flooding

The Mission Bay FSEIR Initial Study included Mitigation Measures K.6a through K.6f, adapted from the 1990 Mission Bay FEIR that required structures in the Mission Bay area to be designed and located in a way to protect low-lying shoreline areas from the dangers of tidal flooding, including consideration of a rise in relative sea level. The mitigation specified that to address effects of sea level rise, specific flood protection and engineering and building analyses must be conducted by a licensed engineer where structures are proposed below an elevation of -1 foot SFD (10 feet NAVD88). Potential measures identified by the mitigation included setback from the water’s edge, installation of seawalls, dikes and/or berms during construction of infrastructure; reducing the amount of excavation for utilities or basements; and use of topsoil to raise the level of public open spaces. With implementation of this mitigation, the Mission Bay FSEIR determined that the Plan's effects related to flooding and sea level rise would be less than significant.

5.9.2.3 Mission Bay FSEIR Mitigation Approach

As discussed above, the Mission Bay FSEIR determined that the Mission Bay Plan could contribute to a potentially significant cumulative impact on the quality of near-shore waters of the Bay as a result of combined sewer discharges and direct stormwater discharges to China Basin Channel (Mission Creek). The Plan’s contribution to this cumulative impact would be reduced to less than significant with implementation of FSEIR Mitigation Measures K.3 and K.4 requiring the master developer and the City to design and construct sewer improvements and implement alternative technologies to avoid increases in CSD volumes and to reduce settleable solids and floatable materials in stormwater discharges to China Basin Channel (Mission Creek). As written in the FSEIR, Measure K.3 applies to the entire project area and Measure K.4 applies only to the planned separate stormwater system that would discharge stormwater flows directly to China Basin Channel (Mission Creek) and the Bay.

The Mission Bay FSEIR Summary of Comments and Responses (in Volume III, beginning on p. XII.253) identified Mitigation Scenario B, which included separating the stormwater collection system and sanitary sewer in the reconfigured Mariposa sub-basin as well as in the reconfigured Central sub-basin. All stormwater runoff from Mission Bay South would flow to one of five pump stations (shown on Figure 5.7-2, see Section 5.7, Utilities and Service Systems) via gravity and would be pumped to China Basin Channel (Mission Creek) or the Bay after vortex treatment to reduce the total settleable solid concentrations in the runoff. Other methods identified to reduce particulate matter in the stormwater discharges included street sweeping to remove particulates from streets and parking lots. Under this mitigation approach, the separate stormwater systems would no longer divert 80 percent of the initial stormwater flows to the combined sewer system, but instead, all stormwater from the Mission Bay South area would be directed to a separate stormwater system and discharged directly to the Bay. The master developer ultimately adopted and is currently implementing Mitigation Scenario B, as described in the Mission Bay South Infrastructure Plan.

The FSEIR estimated that by diverting all stormwater runoff from the combined sewer system, implementation of Mitigation Scenario B would increase direct stormwater discharges from Mission Bay South to the Bay by 107.2 million gallons per year. Because none of the stormwater from Mission Bay South would be discharged to the combined sewer system, this mitigation approach would reduce the total Bayside CSD volume by 33 million gallons per year relative to baseline conditions at the time of Mission Bay FSEIR publication. Implementation of this mitigation approach satisfies the requirements of Mission Bay FSEIR Mitigation Measures K.3 and K.4.

5.9.3 Setting

5.9.3.1 Combined Sewer System

The Bayside drainage basin covering the east side of San Francisco consists of three distinct regulatory receiving water CSD basins and their watershed associations: North Shore (North Shore watershed), Central (Channel watershed in its entirety and a portion of Islais Creek watershed), and South (remainder of the Islais Creek Watershed and the entirety of Yosemite and Sunnydale watersheds), as shown on **Figure 5.9-1**. As also described in the Mission Bay FSEIR, the SEWPCP continues to treat up to 150 mgd of wastewater from each of these CSD basins to a secondary level.[3] During dry weather, wastewater flows consist mainly of municipal and industrial sanitary sewage, and the annual average wastewater flow during dry weather is 60 mgd[4] (reduced by 7 mgd from the 67 mgd reported in the Mission Bay FSEIR in 1998). The average dry weather design flow capacity of the SEWPCP is 84.5 mgd; therefore the existing flows are about 71 percent of the treatment capacity, and all dry weather wastewater flow is

3 Secondary treatment is the treatment of wastewater or sewage involving removal of organic matter using biological and chemical processes. This is a higher level of treatment than primary treatment, which is removal of floating and settleable solids using physical operations such as screening and sedimentation. Secondary treatment is less intensive than tertiary treatment, in which additional chemical and biological treatment processes are used to remove additional compounds that may be required for discharge or reuse purposes.

4 San Francisco Water Power Sewer, *San Francisco's Wastewater Treatment Facilities*. June, 2014.

SOURCE: San Francisco Water Power Sewer, 2013; RWQCB, 2013

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E: Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.9-1
Bayside Drainage Basin Urban Watersheds

treated to a secondary level at the SEWPCP. The treated wastewater is then discharged to the Bay through the deep water outfall at Pier 80, located immediately to the north of the Islais Creek Channel in compliance with the current NPDES permit.

In areas of the City without separate stormwater systems, the combined sewer system collects large volumes of stormwater runoff in addition to municipal and industrial sanitary sewage during wet weather (generally October through April). The combined wastewater and stormwater flow is conveyed to treatment facilities, including the SEWPCP and North Point Wet Weather Facility, before eventual discharge to the Bay. The combined flows that exceed the total 400 mgd capacity of the SEWPCP and the North Point Wet Weather Facility and the 125-million-gallon storage capacity of the transport and storage structures receive the equivalent of primary treatment in the structures; excess flows are directed to CSD structures located along the shoreline in compliance with the City's NPDES permit issued by the RWQCB.

The CSD structure for the reconfigured Mariposa sub-basin discharges to the Central Basin of Lower San Francisco Bay[5] at Mariposa Street when the 11.2 mgd wet weather capacity of the Mariposa Pump Station and 0.7 million gallon capacity of the Mariposa storage and transport box is exceeded (see Section 5.7, Utilities and Service Systems, for a description of these facilities). The Mariposa sub-basin is designed for a long-term average of 10 CSDs per year.[6] Although the system was designed and constructed based on meeting this long-term average, it is understood that some years are wetter than others. Therefore, the NPDES permit allows the 10-discharge annual average to be exceeded in any particular year as long as the long-term average is maintained at the appropriate level. Historically, the Mariposa sub-basin has exceeded an average of 10 overflows per year.[7]

The CSDs from the reconfigured Central sub-basin in the project vicinity are discharged to Mission Creek via six discharge structures when flows at the Channel Pump Station exceed 80 mgd, or when total flows to the SEWPCP from the Channel and Bruce Flynn Pump Stations and SEWPCP lift station exceed 250 mgd. The facilities in this basin are also designed for a long-term average of 10 overflows per year, and the basin has historically reported an average of 10 overflows per year.[8]

5.9.3.2 Flooding

Some low lying areas along San Francisco’s Bay shoreline are subject to flooding during periods of extreme high tides, storm surge and waves, although these occurrences are relatively rare in San Francisco compared to areas prone to hurricanes or other major coastal storms or to developed areas near or below sea level. In 2008, the City and County of San Francisco (CCSF)

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5 This basin is a surface water body that is an inlet of Lower San Francisco Bay, and is not the same as the Central sub-basin of the City’s combined sewer system where the northern portion of the project site is located.

6 San Francisco Public Utilities Commission, *Task 500, Technical Memorandum No. 509, Combined Sewer Discharges, Final Draft*. December, 2010.

7 San Francisco Public Utilities Commission, *Task 600, Technical Memorandum No. 603, Collection System Configurations Analysis and Impact on Combined Sewer Discharge, Final Draft*. December, 2010.

8 San Francisco Public Utilities Commission, *Task 600, Technical Memorandum No. 603, Collection System Configurations Analysis and Impact on Combined Sewer Discharge, Final Draft*. December, 2010.

adopted interim flood maps depicting the 100-year flood zone along the City's Bay shoreline; the identified flood zones in the project area are shown on **Figure 5.9-2**. The 100-year flood zone represents areas that are subject to flooding once every 100 years on average or that have a 1-percent chance of flooding in any single year. Flooding in these areas has the potential to damage buildings and infrastructure. Due to the continuing development of Mission Bay, some of the areas identified as being subject to flooding may no longer be flood prone when grading is completed to raise building sites above the 100-year floodplain.

As shown on Figure 5.9-2, the project site is not located within a currently identified 100-year flood zone based on the City's interim floodplain maps. Therefore, this section discusses the factors contributing to coastal flooding and the potential for increased flooding in the future as a result of sea level rise.

Factors Contributing to Coastal Flooding

Coastal areas are vulnerable to periodic flooding due to storm surge, extreme tides, and waves. Rising sea level due to climate change has the potential to increase the frequency, severity, and extent of flooding in coastal areas. These factors are described below.

Storm Surge. Storm surge occurs when persistent high winds and changes in air pressure push water towards the shore, which can raise the water level near the shoreline by several feet and may persist for several days. Along San Francisco's bay shoreline, storm surge typically raises the surface water elevation 2 to 3 feet during major winter storms several times a year. Extreme high tides in combination with storm surge can cause inundation of low-lying roads, boardwalks, and promenades; can exacerbate coastal flooding; and can interfere with stormwater and sewer outfalls.

The degree of storm surge depends on the severity of the storm as well as tidal levels at the time of the storm and is characterized using a return period which represents the expected frequency of a storm event occurring based on historical information. One-year storm surge is expected to occur each year while 100-year storm surge (which represents more extreme conditions) has a one percent chance of occurring in any year.

Tides. Diurnal (twice daily) high tides along San Francisco's bay shoreline typically range from approximately 5 to 7 feet (NAVD88), though annual maximum tides may exceed 7 feet. The twice yearly extreme high and low tides are called "king tides." These occur each year during the winter and summer when the earth, moon and sun are aligned, and may be amplified by winter weather. King tides and other high tides can result in temporary inundation of low-lying roads, boardwalks, and waterfront promenades. A portion of The Embarcadero Promenade near Pier 14 and the Marina area in San Francisco experience inundation under current king tide conditions.[9]

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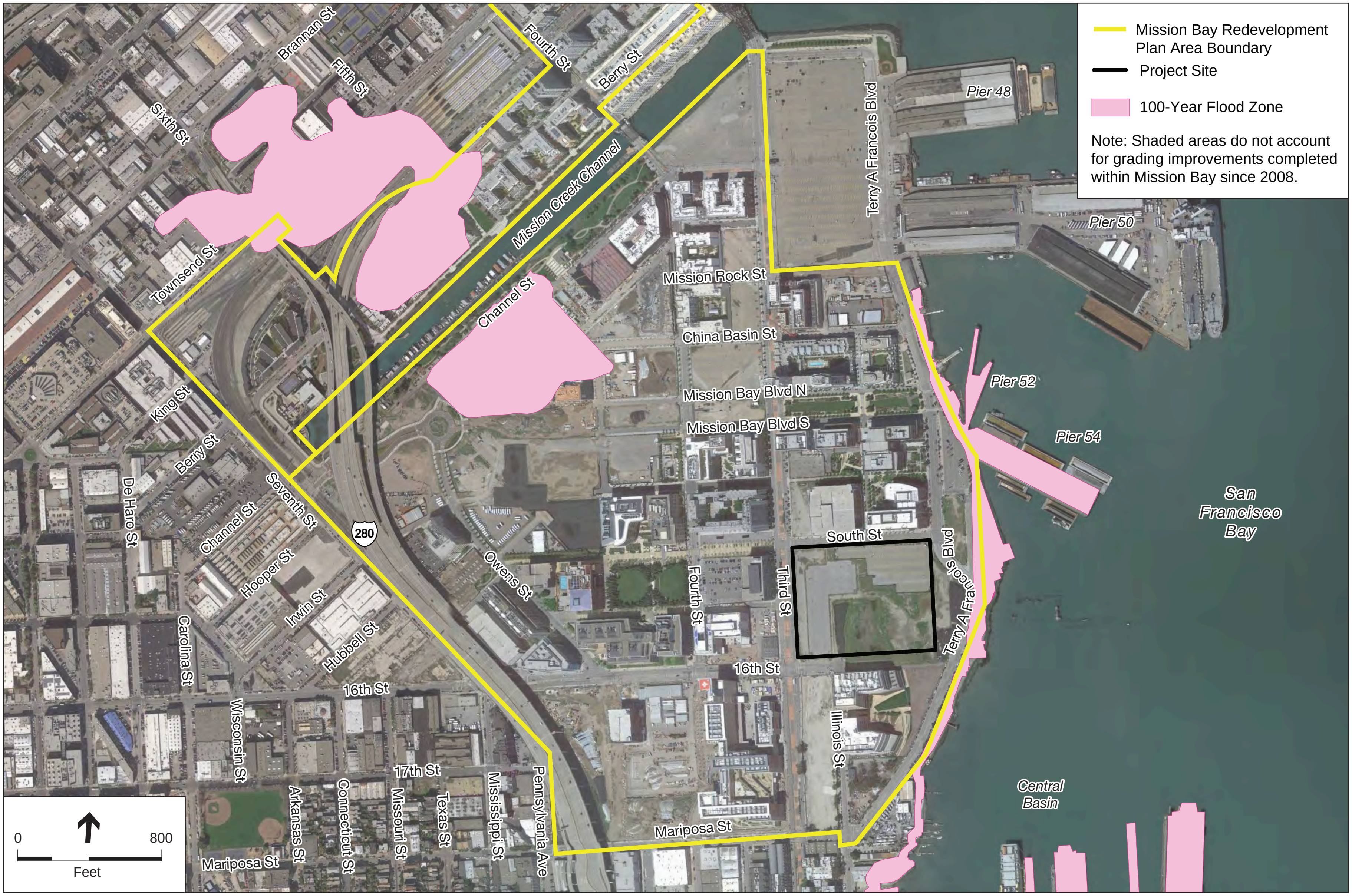
9 San Francisco Public Utilities Commission. *Climate Stressors and Impact: Bayside Sea Level Rise Mapping, Final Technical Memorandum.* June 2014. A copy of this document is available for review at the San Francisco Planning Department, 1650 Mission Street, Suite 400, in Case File No. 2014.1441E.



SOURCE: City and County of San Francisco, 2008

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.9-2
2008 Adopted Interim Flood Map of 100-Year Flood Zones

Waves. Waves and wave run-up primarily affect a narrow band along the shoreline where wave energy can damage structures and overtop both natural embankments and shoreline protection structures such as seawalls and levees. The influence of waves diminishes inland as wave energy dissipates. In addition, the Pacific Ocean waves which are generally larger than those originating in the Bay are substantially dampened along the Bay shoreline due to transformation processes within San Francisco Bay.

Sea Level Rise. Seas are rising globally due to climate change, and they are expected to continue to rise at an accelerating rate for the foreseeable future. The sea level at the San Francisco tidal gauge has risen 8 inches over the past century.

The National Research Council's (NRC) 2012 report, *Sea Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future* (the NRC Report) provides a scientific review of sea level rise for the West Coast and provides the most recent regional sea level rise predictions for 2030, 2050, and 2100, relative to the year 2000 sea level.[10] In this report, the NRC projects that sea levels in the San Francisco Bay area will rise 11 inches by 2050 and 36 inches by 2100 as presented in **Table 5.9-1**. As presented in the NRC Report, these sea level rise projections represent likely sea level rise values based on the current understanding of global climate change and assuming a moderate level of greenhouse gas (GHG) emissions[11] and extrapolation of continued accelerating land ice melt patterns, plus or minus one standard deviation.[12]

TABLE 5.9-1
SEA LEVEL RISE ESTIMATES FOR
SAN FRANCISCO BAY RELATIVE TO THE YEAR 2000

Year	Projection
2030	6 ± 2 inches
2050	11 ± 4 inches
2100	36 ± 10 inches

SOURCE: National Research Council, 2012

10 National Research Council, *Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future*. Washington, DC: The National Academies Press, 2012. Available on the internet at: http://www.nap.edu/catalog.php?record_id=13389. Accessed on October 1, 2014.

11 Future emissions of greenhouse gases depend on a collection of human decisions at local, regional, national, and international levels as well as potential unknown technological developments. For this reason, future changes in greenhouse gas emissions cannot be accurately estimated, and a range of emissions levels is considered in the NRC Report. Estimates of sea level rise relative to thermal expansion of the oceans were formulated using the mid-level, or moderate level, of predicted changes in greenhouse gas emissions (from a combination of fossil and non-fossil fuels), as well as an assumption of high economic growth; this represents scenario "A1B" as described by the Intergovernmental Panel on Climate Change (IPCC).

12 One standard deviation roughly corresponds to a 15 percent/85 percent confidence interval, meaning that there is approximately 15 percent chance the value will exceed the high-end projection (8 inches for the 2030 example) and a 15 percent chance the value will be lower than the low-end projection (4 inches in 2030).

The estimates represent the permanent increase in Mean Sea Level and the associated average daily high tide conditions (represented by Mean Higher High Water, or MHHW)[13] that could result from sea level rise; they do not take into account storm surge, extreme tides, or waves, all of which can result in water levels that are temporarily higher than MHHW as discussed above.

In March 2013, the California Ocean Protection Council updated its 2010 statewide sea level rise guidance to adopt the NRC Report as the current, best available science on sea level rise for California.[14] The California Coastal Commission supports the use of the NRC Report as the best science currently available in its 2013 Draft Sea-Level Rise Policy Guidance, which also emphasizes the importance of regularly updating sea level rise projections as the science continues to advance.[15] The San Francisco Bay Conservation and Development Commission (BCDC) also considers the NRC Report to be the best available science-based prediction of sea level rise for San Francisco Bay. Accordingly, this SEIR considers the NRC Report to be the best science currently available on sea level rise affecting San Francisco for both CEQA and planning purposes.

Although the NRC Report provides the best available sea level rise projections for San Francisco Bay at this time, scientific uncertainty remains regarding the rate and magnitude of sea level rise. Sea level rise projections beyond 2050 are highly dependent on assumptions regarding future global GHG emissions and future changes in the rate of land ice melting. As a result of the uncertainties inherent in these assumptions, the range of sea level rise predictions becomes substantially broader beyond 2050 (see Table 5.9-1). In recognition of this uncertainty, the State of California Sea-Level Rise Guidance recommends an adaptive management approach for development in areas that may be subject to sea level rise beyond 2050.

Sea Level Rise Inundation Mapping

The San Francisco Public Utilities Commission (SFPUC), as part of the planning for its Sewer System Improvement Program, has developed a series of maps published in 2014 that represent areas of inundation along both the Bay and Ocean shorelines of San Francisco. These maps use a 1-meter horizontal grid resolution[16] based on the 2010/2011 California Coastal Mapping Program LiDAR.[17] The inundation maps leverage data from the Federal Emergency Management Agency's (FEMA) California Coastal Mapping and Analysis Project, which includes detailed coastal engineering analyses and mapping of the San Francisco Bay shoreline.

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13 Mean higher high water is the higher of each day's two high tides averaged over time.

14 *State of California Sea-Level Rise Guidance Document.* Developed by the Coastal and Ocean Working Group of the California Climate Action Team (CO-CAT), with science support provided by the Ocean Protection Council's Science Advisory Team and the California Ocean Science Trust. March 2013 Update. Available on the internet at http://www.opc.ca.gov/webmaster/ftp/pdf/docs/2013_SLR_Guidance_Update_FINAL1.pdf. Accessed on October 1, 2014.

15 California Coastal Commission *Draft Sea Level Rise Policy Guidance, Public Review Draft. October* 14, 2013. Available on the internet at: http://www.coastal.ca.gov/climate/SLRguidance.html. Accessed on October 1, 2014.

16 The horizontal grid resolution of a digital elevation model (DEM) defines the scale of the features that are modeled; this is generally the minimum resolution necessary to depict levees, berms, and other topographic features important to diverting floodwaters.

17 LiDAR (Light Detection and Ranging) is a remote sensing technology that measures distance by illuminating a target with a laser and analyzing the reflected light. LIDAR is commonly used to create high-resolution terrain models, topography data sets, and topographic maps.

The SFPUC inundation maps evaluate scenarios that represent the NRC projections of sea level rise in combination with the effects of storm surge. They represent permanent inundation that could occur as a result of total water level rises (over and above year 2000 MHHW) based on daily tidal fluctuations. Each scenario also addresses temporary inundation that could occur from extreme tides and from 1-year, 2-year, 5-year, 25-year, 50-year, and 100-year storm surge. Flooding as a result of storm surge would occur on a temporary basis, during and immediately after a storm event or extreme tide.

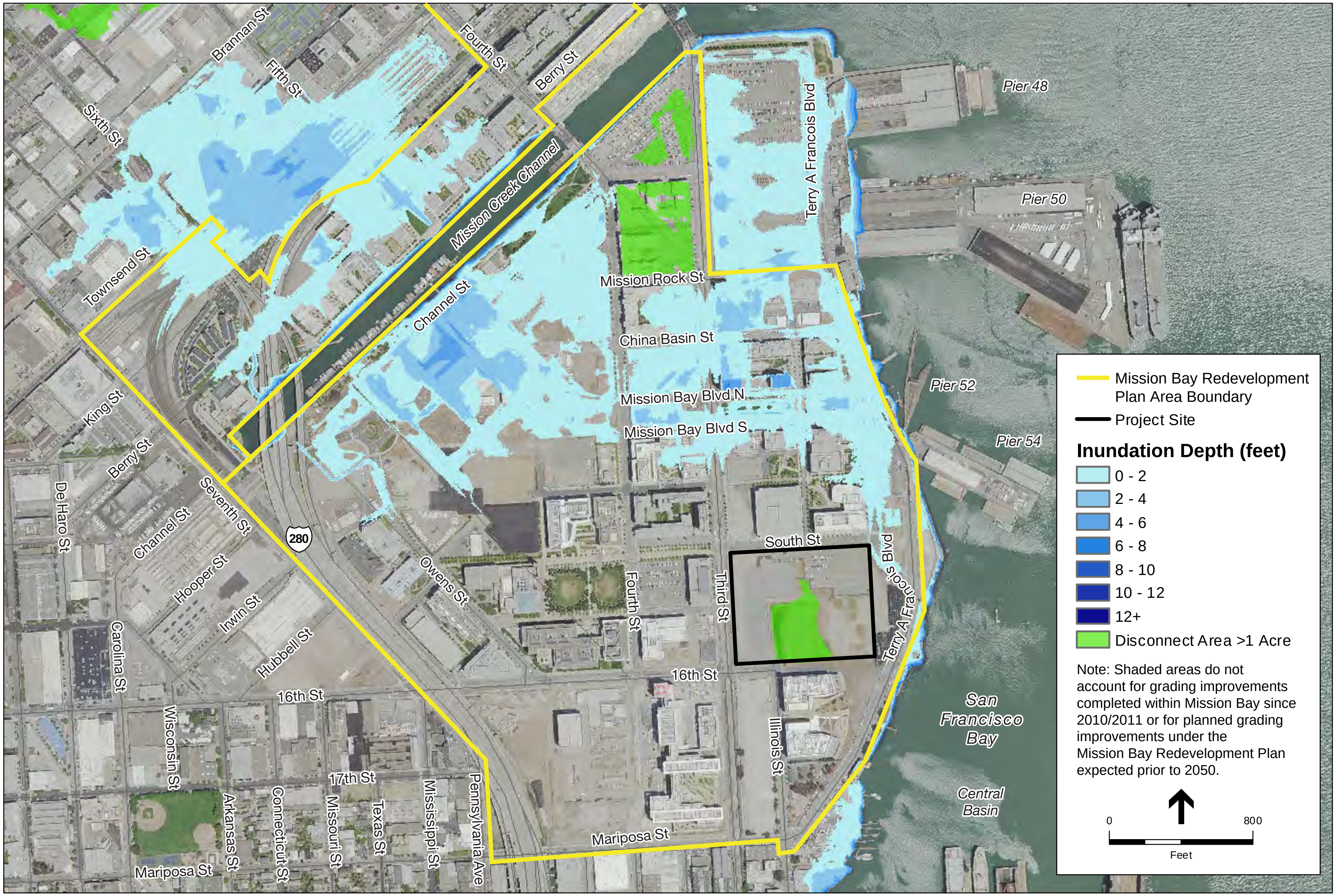
The scenarios used in this SEIR analysis, listed below, are representative of inundation that could occur by the year 2050 and the year 2100, based on the NRC's projected level of sea level rise and considering a 100-year storm surge:

- MHHW plus 12 inches of sea level rise (representative of NRC's projected sea level rise by 2050);
- MHHW plus 36 inches of sea level rise (representative of NRC's projected sea level rise by 2100);
- MHHW plus 52 inches of sea level rise (representative of NRC's projected sea level rise by the year 2050 in combination with a 100-year storm surge); and
- MHHW plus 77 inches of sea level rise (representative of NRC's projected sea level rise by the year 2100 in combination with a 100-year storm surge).

The SFPUC cautions that its maps represent a "do nothing" scenario, in which no measures are taken to prevent future flooding and no area-wide measures such as waterfront protection structures are constructed. In the event that the City undertakes area-wide measures to protect against inundation in the future, the mapping would need to be revised to reflect the modified inundation areas with construction of these measures. In addition, because the SFPUC sea level rise maps are based on 2010/2011 topographic mapping, they do not account for planned increases in the base elevation of sites within Mission Bay that are provided in the 1998 Mission Bay Redevelopment Plan to prevent future flooding due to sea level rise.

As shown on **Figure 5.9-3**, the SFPUC inundation maps indicate that the project site would not be inundated with water level rises of 12 inches, which is expected by 2050, even when the effects of 100-year storm surge are considered.[18] In addition, the project site would not be inundated with 36 inches of sea level rise which is expected by 2100. However, when the effects of a 100-year storm surge are considered in combination with 36 inches of sea level rise, the site could be flooded to depths of between 2 and 4 feet as shown on **Figure 5.9-4**.[19]

[18] Note that the green zone shown within the project site on Figure 5.9-3 is the open excavation that is not hydrologically connected to flooding zones and would be filled when the site is developed.
[19] Note that greater inundation depths are indicated on Figure 5.9-4 in the area of the open excavation, but this excavation would be filled when the site is developed.



Note: Inundated area within the project site shown in green color is an existing open excavation that is not hydrologically connected to the flooding zones and would be filled as part of the project when the site is developed.

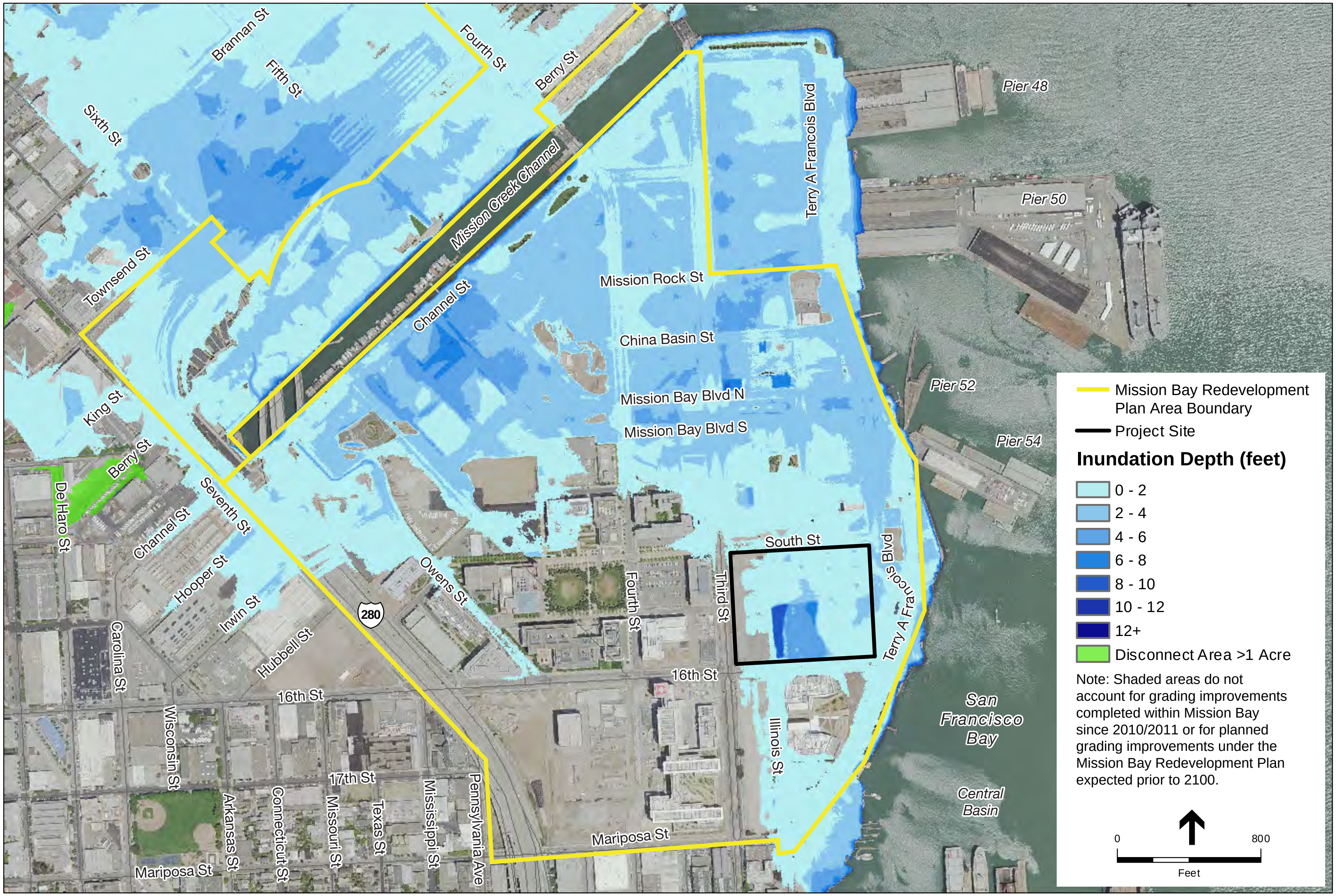
SOURCE: USDA, 2014; San Francisco Public Utilities Commission, 2014; AECOM, 2014; ESA, 2015

Note: The flood zones depicted are based on topographic data from 2010/2011 and do not account for planned increases in the base elevation of sites within Mission Bay that are provided for in the Mission Bay Redevelopment Plan. Actual flood zones will be determined by topography under built out conditions, and the effects of area-wide flood protection measures that may be provided in the future.

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.9-3

Projected Inundation by 2050, with 12 Inches of Sea Level Rise Plus 100-Year Storm Surge



Note: Inundated area within the project site with depths greater than four feet is an existing open excavation that would be filled as part of the project when the site is developed.

SOURCE: USDA, 2014; San Francisco Public Utilities Commission, 2014; AECOM, 2014; ESA, 2015

Note: The flood zones depicted are based on topographic data from 2010/2011 and do not account for planned increases in the base elevation of sites within Mission Bay that are provided for in the Mission Bay Redevelopment Plan. Actual flood zones will be determined by topography under built out conditions, and the effects of area-wide flood protection measures that may be provided in the future.

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5.9-4
Projected Inundation by 2100, with 36 Inches of Sea Level Rise Plus 100-Year Storm Surge

Planning for Sea Level Rise in San Francisco

The City has convened an inter-agency Climate Adaptation Working Group to identify ways to make sure that it is prepared to adapt to effects of sea level rise. Participating agencies include the Department of the Environment, SFPUC, Planning Department, City Administrator's office, Port of San Francisco (Port), San Francisco International Airport (SFO), Department of Public Works (DPW), Municipal Transportation Agency (MTA), Department of Public Health, and Department of Recreation and Parks. The working group is focusing its effort on the City's most imminent adaptation concerns, including sea level rise along Ocean Beach and shores, flooding from storm surge and extreme rain events, an increased likelihood of extreme heat, and decreased fog that supports redwoods and local ecosystems. To address sea level rise and flooding, the working group is focusing on efforts to improve the existing coastal flood protection infrastructure in time to prevent significant flooding impacts from sea level rise. The working group will establish requirements addressing proper flood insurance for structures in low lying areas, flood-resilient construction of new developments within inundation areas, and a low-carbon foot print for new developments. The working group is also assessing the use of natural solutions such as wetlands to protect the shoreline.

On September 22, 2014, the City's Capital Planning Committee (CPC) adopted the *Guidance for Incorporating Sea Level Rise into Capital Planning in San Francisco: Assessing Vulnerability and Risk to Support Adaptation*, which was prepared by an inter-agency committee including the CPC, SFPUC, Port, SFO, DPW, MTA, and the Planning Department.[20] Accordingly, the City's capital planning program now requires the preparation of project-level sea level rise vulnerability and risk assessments for all City capital projects with a cost of $5 million or more that are located in areas potentially vulnerable to future flooding due to sea level rise.

Mayor Edwin M. Lee also established two interdepartmental committees to manage the City's efforts on addressing sea level rise: the Sea Level Rise (SLR) Coordinating and SLR Technical Committees. The SLR Coordination Committee was established in February of 2005 and is a director-level committee co-chaired by the Director of Citywide Planning at the Planning Department and the City Engineer and Deputy Director at the Department of Public Works. SLR Coordination Committee members also include the Chief Resiliency Officer, and senior staff from the Mayor's Office, the City Administrator's Office, SFO, the Port, the SFPUC, MTA, Department of Building Inspection (DBI), Office of Community Investment and Infrastructure (OCII), Office of Economic and Workforce Development (OEWD), and the Capital Planning Committee. The responsibilities of the Coordination Committee are as follows:

1. Coordinate the efforts of city departments and advise the Mayor's Office on policies, strategies, initiatives, and resolutions to deal with and plan for potential impact on San Francisco from sea level rise;

[20] City and County of San Francisco Sea Level Rise Committee, *Guidance for Incorporating Sea Level Rise into Capital Planning in San Francisco: Assessing Vulnerability and Risk to Support Adaptation*. September 22, 2014. Available online at http://onesanfrancisco.org/wp-content/uploads/San%20Francisco%20SLR%20Guidance%20Adopted%209.22.14%2012182014.pdf, accessed on February 5, 2015.

2. Coordinate local efforts and initiatives with the work of other governmental entities and various stakeholders at the regional, state, and national levels such as U.S. EPA, U.S. Department of Housing and Urban Development (HUD), Department of the Interior, California Coastal Commission, California Ocean Protection Council, Bay Conservation and Development Commission, etc.;
3. Provide guidance and specific recommendations to City departments with regard to land use and strategies to protect assets and communities along the shoreline;
4. Oversee and guide the existing SLR Technical Committee and implementation of the Capital Planning Guidance to address vulnerability and risks, and adaptability of the city's physical infrastructure; and
5. Promote coordination and collaboration among city departments, private utility providers, and other stakeholders.

The SLR Coordinating Committee is first charged with assessing the City's risk to sea-level rise. Once the data analysis phase is complete, the SLR Coordinating Committee will coordinate the City's SLR vulnerability assessment and adaptation planning efforts with local, regional, and national governmental and non-governmental organizations and with community stakeholders, as needed. Key to this effort will be determining how to best involve the community.

The SLR Technical Committee was established in February of 2015 and is comprised of the same membership that developed the Capital Planning Committee's Sea Level Rise Guidance, including the SFPUC, Port, DPW, SFO, SFMTA, SFMTA, Capital Planning, and the Planning Department. This committee is charged with assisting all city agencies with consistent implementation of the Guidance, revising the Guidance as needed, and assisting the SLR Coordinating Committee as requested.

The SFPUC is also addressing sea level rise as part of its Sewer System Improvement Program, and is conducting a detailed analysis of the potential for new and existing combined sewer infrastructure to be affected by sea level rise. [21] Accordingly, all new facilities will be built using a climate change criterion so the combined sewer system will be better able to respond to rising sea levels. Because rising sea levels and storm surge could potentially inundate the combined sewer system and exacerbate existing flooding from the sewer system, or cause new flooding, the SFPUC is also evaluating alternatives such as the installation of backflow preventers on the combined sewer discharge structures to restrict the intrusion of Bay water into the combined sewer system.

5.9.3.3 Trash in Waterways

Trash is of concern for San Francisco Bay because Lower San Francisco Bay is listed as an impaired water body under Section 303(d) of the Clean Water Act for trash. Plastic in the marine environment breaks into smaller and smaller pieces and it is eaten—often with fatal consequences—by fish,

[21] San Francisco Public Utilities Commission. *Bayside Drainage Basin Urban Watershed Opportunities, Final Draft Technical Memorandum.* July, 2014.

turtles, birds, and whales.[22] Aquatic debris threatens sensitive ecosystems and has been documented to kill or harm nearly 700 wildlife species. The debris also interferes with navigation, degrades natural habitats, costs millions of dollars in lost revenue, and is a threat to human health and safety. Most aquatic debris comes from land-based sources including littering, legal and illegal dumping, a lack of or poor waste management practices and recycling capacity, stormwater discharges, animal interference with garbage, and extreme natural events. The growing quantity of single-use plastic packaging contributes substantially to the amount of trash transported to waterways.

5.9.4 Regulatory Framework

5.9.4.1 Federal Regulations

Clean Water Act – Water Quality

In 1972, the Clean Water Act (CWA) established the basic structure for regulating discharges of pollutants into the waters of the United States and gave the U.S. EPA the authority to implement pollution control programs. The CWA sets water quality standards for contaminants in surface waters. The statute employs a variety of regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, to finance municipal wastewater treatment facilities, and to manage polluted runoff. The U.S. EPA has delegated responsibility for implementation of portions of the CWA, including water quality control planning and programs in California to the State Water Resources Control Board (SWRCB) and the nine RWQCBs. Water quality standards applicable to the project are listed in the *Water Quality Control Plan for the San Francisco Bay Basin* (Basin Plan), discussed further below under State Regulations.

Section 303(d) and Total Maximum Daily Loads

In accordance with Section 303(d) of the CWA, States must present the U.S. EPA with a list of "impaired water bodies," defined as those water bodies that do not meet water quality standards. The CWA requires the development of total maximum daily loads (TMDLs) to improve water quality of impaired water bodies. Implementation of this program in the project area is conducted by the RWQCB and is discussed below in Section 5.9.4.2, State Regulations.

Section 402

Section 402 of the CWA authorizes the U.S.EPA to establish a nationwide surface water discharge permit program for municipal and industrial point sources known as the NPDES program. Under Section 402, the San Francisco Bay RWQCB has set standard conditions for each permittee in the Bay Area, including effluent limitation and monitoring programs. Discharges of stormwater and wastewater from the proposed project would be subject to NPDES permits issued to the CCSF that are described in Section 5.9.4.2, State Regulations, below.

[22] National Resources Defense Council, *NRDC News Brief, Waste in our Water: The Annual Cost to California Communities of Reducing Litter That Pollutes our Waterways*. August, 2013.

Federal Combined Sewer Overflow Control Policy

In 1994, the U.S. EPA adopted the Combined Sewer Overflow Control Policy (CSO Control Policy), which became part of the CWA in December 2000. This policy establishes a consistent national approach for controlling discharges from combined sewers to the nation's waters. Using the NPDES permit program, the permittee is required to implement the following nine minimum controls that constitute the technology-based requirements of the CWA and can reduce the frequency of CSDs and their effects on receiving water quality:

1. Conduct proper operation and regular maintenance programs for the combined sewer system and CSD outfalls;
2. Maximize the use of the collection system for storage;
3. Review and modify pretreatment programs to minimize the effect of non-domestic discharges to the collection system;
4. Maximize flow to the SEWPC and North Point Facility for treatment;
5. Prohibit CSDs during dry weather;
6. Control solids and floatable materials in CSDs;
7. Develop and implement a pollution prevention program focused on reducing the effect of CSDs on receiving waters;
8. Notify the public of CSDs; and
9. Monitor to effectively characterize CSD effects and the efficacy of CSD controls.

The City is currently implementing these controls as required by the CSO Control Policy and has also developed a long-term control plan to optimize operations of the wastewater collection and treatment system and maximize pollutant removal during wet weather.

Consistent with the CSO Control Policy and the Long-Term Control Plan, the City captures and treats 100 percent of the combined sewage flow collected in the combined sewer system during precipitation events. Captured flows are directed first to the SEWPCP and North Point Facility for primary or secondary treatment. Flows in excess of the capacity of these facilities are diverted to storage and transport boxes constructed around much of the City, and receive the equivalent to primary treatment prior to discharge to San Francisco Bay. The Long-Term Control Plan specifies operational parameters that must be met in each drainage basin before a CSD can occur, and includes the following long-term average annual design goals for CSDs:

- Four CSD events along the North Shore
- Ten CSD events from the Central Basin
- One CSD event along the Southeast Sector

Although the Mariposa sub-basin has historically exceeded the long-term goal of ten CSD events per year as discussed above, the City is currently meeting these long-term average design goals for the overall Bayside drainage basin.

5.9.4.2 State Regulations

California Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code) provides for protection of the quality of waters of the State of California for use and enjoyment by the people of California. The act also establishes provisions for a statewide program for the control of water quality, recognizing that waters of the state are increasingly influenced by interbasin water development projects and other statewide considerations, and that factors such as precipitation, topography, population, recreation, agriculture, industry, and economic development vary regionally within the state. The statewide program for water quality control is therefore administered most effectively on a local level with statewide oversight. Within this framework, the act authorizes the SWRCB and RWQCBs to oversee the coordination and control of water quality within California.

San Francisco Bay Water Quality Control Plan (Basin Plan)

San Francisco Bay waters are under the jurisdiction of the San Francisco Bay RWQCB which established regulatory standards and objectives for water quality in the Bay in the *Water Quality Control Plan for the San Francisco Bay Basin*, commonly referred to as the Basin Plan.[23] The Basin Plan identifies existing and potential beneficial uses for surface waters and provides numerical and narrative water quality objectives designed to protect those uses. The preparation and adoption of water quality control plans is required by the California Water Code (Section 13240) and supported by the federal CWA. Because beneficial uses, together with their corresponding water quality objectives, can be defined per federal regulations as water quality standards, the Basin Plan is a regulatory reference for meeting the state and federal requirements for water quality control. Adoption or revision of surface water standards is subject to the approval of the U.S. EPA.

The proposed project site is located adjacent to Lower San Francisco Bay which extends from approximately the Bay Bridge on the north to the Dumbarton Bridge on the south. The CSD structure for the Mariposa sub-basin of the City's combined sewer system discharges to Central Basin, an inlet of Lower San Francisco Bay along the City's bay shoreline. The CSD structures for the Central sub-basin of the combined sewer system discharge to Mission Creek which ultimately drains to Lower San Francisco Bay. Identified beneficial uses for Central Basin of Lower San Francisco Bay and Mission Creek include commercial and sport fishing, estuarine habitat, wildlife habitat, water contact recreation, noncontact water recreation, and navigation. Identified beneficial uses for Lower San Francisco Bay include industrial service supply, commercial and sport fishing, shellfish harvesting, estuarine habitat, fish migration, preservation of rare and endangered species, fish spawning, wildlife habitat, water contact recreation, noncontact water recreation, and navigation.

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[23] San Francisco Bay Regional Water Quality Control Board (RWQCB), *Water Quality Control Plan for the San Francisco Bay Basin* (Basin Plan), June 29, 2013. Available online at http://www.swrcb.ca.gov/rwqcb2/water_issues/programs/planningtmdls/basinplan/web/docs/BP_all_chapters.pdf. Accessed February 5, 2015.

Impaired Water Bodies and Total Maximum Daily Loads

As described above under Section 303(d) of the CWA, States must present the U.S. EPA with a list of "impaired water bodies," defined as those water bodies that do not meet water quality standards. The proposed project is located approximately 230 feet inland from Lower San Francisco Bay. The RWQCB has listed Lower San Francisco Bay as an impaired water body for chlordane, DDT, dieldrin, dioxins, furan compounds, mercury, PCBs, invasive species, and trash.[24]

The Central Basin of Lower San Francisco Bay, where the CSD structure for the Mariposa sub-basin discharges, is listed as an impaired water body for the chlordane, DDT, dieldrin, dioxin compounds, furan compounds, polynuclear aromatic hydrocarbons, polychlorinated biphenyls, mercury, selenium, and invasive species. The sediments of the Central Basin are listed for mercury and polycyclic aromatic hydrocarbons.

Mission Creek, where the CSD structures for the reconfigured Central sub-basin of the combined sewer system discharge, is listed as an impaired water body for ammonia, hydrogen sulfide, and polycyclic aromatic hydrocarbons. The sediment of Mission Creek is listed for chlordane, dieldrin, lead, mercury, PCBs, silver, and zinc.

As required by the CWA, the U.S. EPA requires the development of TMDLs to improve water quality of impaired water bodies. The first step of the TMDL process is development of a TMDL report describing the water quality problem, detailing the pollutant sources, and outlining the solutions. An implementation plan, included in the TMDL report, describes how and when pollution prevention, control, or restoration activities will be accomplished and who will be responsible for these actions. The final step of the TMDL process is adopting and amending the Basin Plan to legally establish the TMDL and to specify regulatory requirements for compliance. As part of a Basin Plan amendment, waste load allocations are specified for entities that have permitted discharges.

TMDLs for polychlorinated biphenyls and mercury in San Francisco Bay have been approved by the U.S. EPA and officially incorporated into the Basin Plan. The RWQCB also adopted the San Francisco Bay Watershed Permit (Order No. R2-2012-0096) which addresses mercury and polychlorinated biphenyls (PCBs) in municipal and industrial wastewater discharges.[25]

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[24] State Water Resources Control Board, 2010 Integrated Report (Clean Water Act Section 303(d) List / 305(b) Report) — Statewide. http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml. Accessed on October 2, 2014.

[25] San Francisco Bay Regional Water Quality Control Board, *Waste Discharge Requirements for Mercury and PCBs from Municipal and Industrial Wastewater Discharges to San Francisco Bay, Order No. R2-2012-0096, NPDES No. CA0038849*, adopted December 12, 2012. http://www.waterboards.ca.gov/sanfranciscobay/board_decisions/adopted_orders/2012/R2-2012-0096.pdf pdf, accessed on October 2, 2014.

NPDES Waste Discharge Regulations

As discussed above in Section 5.9.4.1, Federal Regulations, Section 402 of the federal CWA established the NPDES program to protect water quality of receiving waters. The NPDES program requires all facilities that discharge pollutants into waters of the United States to obtain a permit. The permit provides two levels of control – technology-based limits and water-quality-based limits – to control discharge of pollutants for the protection of water quality. Technology-based limits are based on the ability of dischargers in the same category to treat wastewater, while water quality-based limits are required if technology-based limits are not sufficient to protect the water body. Water quality-based effluent limitations required to meet water quality criteria in the receiving water are based on criteria specified in the National Toxics Rule, the California Toxics Rule, and the Basin Plan. NPDES permits must also incorporate TMDL wasteload allocations when they are developed. In California, the SWRCB and the RWQCBs implement and enforce the NPDES program.

Small MS4 General Stormwater Permit

In 2003, the SWRCB adopted the General Permit for the Discharge of Storm Water from Small Municipal Separate Storm Sewer System (MS4s), SWRCB Order No. 2003-0005-DWQ. An updated permit, Order No. 2013-001-DWQ, was adopted by the SWRCB on February 5, 2013 and became effective on July 1, 2013 (the updated Phase II General MS4 NPDES Permit). Areas that drain to separate stormwater collection systems in San Francisco are subject to this permit. The Mission Bay FSEIR was published in 1998, prior to passage of the first Phase II General MS4 NPDES Permit.

The updated Phase II General MS4 Permit identifies specific BMPs and management measures to be addressed and requires permittees to submit a guidance document to the SWRCB documenting their strategies for complying with permit requirements. The required program includes specific elements related to program management, education and outreach on stormwater impacts, public involvement/participation, illicit discharge detection and elimination, construction site stormwater runoff and control, pollution prevention/good housekeeping for permittee operations, post-construction stormwater management for new development and re-development, water quality monitoring requirements, program effectiveness assessment, and annual reporting. For renewal permittees such as the CCSF, the guidance document must identify and describe BMPs included in their previous Stormwater Management Plan that may be more protective of water quality than the minimum requirements of the updated permit, and identify whether the permittee proposes to maintain, reduce, or cease implementation of the BMP.

While the UCSF Mission Bay Campus utilizes the Mission Bay South separate stormwater system that has been constructed within the reconfigured Central sub-basin and will use the separate system under construction in the Mariposa sub-basin along with the rest of the development in Mission Bay South, the campus is considered a non-Traditional Small MS4 permittee under the updated Phase II General MS4 NPDES permit. In accordance with this permit, UCSF has implemented its own management program for stormwater discharges from campus facilities.

Southeast Plant, North Point, and Bayside Facilities NPDES Permit

The City currently holds an NPDES permit (RWQCB Order No.R2-2013-0029) adopted by the RWQCB in August 2013, that covers the SEWPCP, the North Point Wet Weather Facility, and all of the Bayside wet-weather facilities, including CSDs to the Bay.[26] The permit specifies discharge prohibitions, dry-weather effluent limitations, wet-weather effluent performance criteria, receiving water limitations, sludge management practices, and monitoring and reporting requirements. The permit prohibits overflows from the CSD structures during dry weather, and requires wet-weather overflows to comply with the nine minimum controls specified in the federal Combined Sewer Overflow Control Policy, described above, and the City's Long Term Control Plan. Areas in the Bayside drainage basin that drain to the City's combined sewer system are subject to this permit.

As discussed above in Section 5.9.4.2, Federal Regulations (Federal Combined Sewer Overflow Control Policy), the NPDES permit does not explicitly regulate the number, volume, duration, or frequency of CSDs from the combined sewer system, but instead requires that the system meets the long-term average annual design goals for CSDs from each sub-basin. Under the Long-Term Control Plan, the City must optimize operations of the combined sewer system to minimize CSD frequency, magnitude, and duration and maximize pollutant removal during wet weather and must also provide treatment of all discharges from the combined sewer system, including CSDs. The NPDES permit also requires the City to monitor the water quality of all CSDs and the efficacy of wet weather discharge controls. If the CSDs cause a violation of water quality standards in the receiving water, the City must evaluate its Long-Term Control Plan and combined sewer system operation to ensure compliance with water quality standards.

Volatile Organic Compound and Fuel General NPDES Permit

The RWQCB has issued Order Number R2-2012-0012 which is a general permit for the discharge of extracted and treated groundwater resulting from the cleanup of groundwater polluted by volatile organic compounds and fuels (VOC and Fuel General Permit).[27] The permit specifies water quality criteria for the discharges, receiving water limitations, and discharge prohibitions (including flow rate and restrictions on scouring and erosion). Monitoring requirements for demonstrating permit compliance are also specified. To obtain authorization to discharge under this permit, the discharger must submit a Notice of Intent describing the proposed discharge and treatment system and the RWQCB must issue an Authorization to Discharge once it is determined that the discharger is eligible to discharge under the permit.

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[26] Regional Water Quality Control Board, San Francisco Bay Region, National Pollutant Discharge Elimination System (NPDES) Permit No. CA0037664, Order No.R2-2013-0029, for City and County of San Francisco Southeast Water Pollution Control Plant, North Point Wet Weather Facility, Bayside Wet Weather Facilities and Wastewater Collection System., adopted January 31, 2008.

[27] San Francisco Bay Regional Water Quality Control Board, General Waste Discharge Requirements for Discharge or Reuse of Extracted and Treated Groundwater Resulting from the Cleanup of Groundwater Polluted by Volatile Organic Compounds (VOC), Fuel Leaks and Other Related Wastes (VOC and Fuel General Permit). Order No. R2-2012-0012, NPDES No. CAG912002.

5.9.4.3 Local and Regional Regulations and Plans

Stormwater and Wastewater Management

SFPUC Storm Water Management Plan

San Francisco has obtained coverage under the updated Phase II General MS4 Permit described above for separate storm sewer systems under its jurisdiction. In accordance with this permit, the SFPUC is required to submit a guidance document to the SWRCB documenting its strategies for complying with permit requirements. San Francisco's Storm Water Management Plan (SWMP), prepared under the previous General MS4 Permit,[28] will remain in effect until the guidance document is completed. The SWMP is comprised of six program areas that address water quality: public education and outreach, public involvement/participation, illicit discharge detection and elimination, construction site stormwater runoff control, post-construction stormwater management in new development and redevelopment, and pollution prevention/good housekeeping for municipal operations. The SWMP thereby requires implementation of a variety of stormwater pollution reduction measures that mirror these six program areas, including the implementation of stormwater BMPs (such as construction period BMPs and post-construction BMPs).

The project area would drain to the new separate stormwater system and would be subject to all provisions and regulatory requirements set forth by the SFPUC, including compliance with the SWMP and the guidance document, once the SFPUC assumes jurisdiction over the storm sewer system.

Stormwater Design Guidelines

Development projects that discharge stormwater to either the combined sewer system or a separate stormwater system must comply with Article 4.2 of the San Francisco Public Works Code, Section 147, which was adopted in 2010 (subsequent to publication of the Mission Bay FSEIR). The SFPUC and the Port of San Francisco have developed *San Francisco Stormwater Design Guidelines* in accordance with the requirements of the Phase II General MS4 NPDES Permit and Article 4.2, Section 147. [29] The SFPUC is currently updating the guidelines to reflect changes in the updated Phase II General MS4 Permit.

The Stormwater Design Guidelines require compliance with specified stormwater management requirements and provide five tools to help project developers achieve compliance with stormwater management requirements:

- A step-by-step guide describing how to manage stormwater onsite
- A set of stormwater BMP fact sheets

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[28] San Francisco Public Utilities Commission, *San Francisco Stormwater Management Plan, Annual Report 2009 (Year 6)*, March 30, 2010.

[29] San Francisco Public Utilities Commission and Port of San Francisco, *San Francisco Stormwater Design Guidelines, November 2009*, http://www.sfwater.org/modules/showdocument.aspx?documentid=2779, accessed on October 2, 2014.

- A vegetation palette to assist in BMP-appropriate plant selection
- Sizing calculators to determine the required size of each BMP
- Maintenance checklists explaining the types and frequencies of the maintenance activities associated with each BMP

In accordance with the San Francisco Stormwater Design Guidelines, developers of projects that disturb more than 5,000 square feet of ground and discharge to a separate stormwater system must implement BMPs to reduce the flow rate and volume and improve the quality of stormwater going into the separate stormwater system. For covered projects, the stormwater management approach must capture and treat rainfall from the design storm of 0.75 inches. These projects would reduce or eliminate downstream water pollution by reducing impervious cover, eliminating sources of contaminants, treating pollutants in stormwater runoff, or increasing onsite infiltration.

The SFPUC inspects stormwater BMPs once they are constructed, and any issues noted by the inspection must be corrected. The owner is responsible for completing an annual self-certification inspection, and must submit completed checklists and maintenance logs for the year to the SFPUC. In addition, the SFPUC inspects all stormwater BMPs every third year. Any issues identified by either inspection must be resolved before the SFPUC can renew the certificate of compliance.

Projects that are required to implement the *San Francisco Stormwater Design Guidelines* are also subject to review by the San Francisco Building Inspection Commission, and are subject to building codes that include provisions for managing drainage for new construction. Specifically, Section 1101.1.1 of the San Francisco Plumbing Code and Section 1503.4 of the San Francisco Building Code allow roofs and other building areas to drain to locations other than the combined sewer.

Wastewater Discharges to the Combined Sewer System

Discharges of non-sewage wastewater to the combined sewer system are subject to the permit requirements specified in Article 4.1 of the San Francisco Public Works Code and supplemented by Department of Public Works Order No. 158170. The permit requires development and implementation of a pollution prevention program and specifies discharge limitations for specific chemical constituents as well as general conditions for the discharge. In addition, the discharge must meet the pretreatment standards specified in Article 4.1 and the discharger must monitor the discharge quality for compliance with permit limitations. The discharger must also submit periodic reports to the SFPUC and the CCSF conducts periodic inspections to ensure compliance.

San Francisco Sea Level Rise Guidance

As noted above, the CCSF has developed guidance for incorporating sea level rise into the planning of capital projects in San Francisco.[30] The guidance presents a framework for considering the effects of sea level rise on capital projects implemented by the CCSF and selecting appropriate adaptation

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[30] City and County of San Francisco Sea Level Rise Committee, *Guidance for Incorporating Sea Level Rise into Capital Planning in San Francisco: Assessing Vulnerability and Risk to Support Adaptation*. September 22, 2014. Available online at http://onesanfrancisco.org/wp-content/uploads/San%20Francisco%20SLR%20Guidance%20Adopted%209.22.14%2012182014.pdf, accessed on February 5, 2015.

measures based on site-specific information. The planning process described in the guidance includes six primary steps:

- Review sea level rise science
- Assess vulnerability
- Assess risk
- Plan for adaptation
- Implement adaptation measures
- Monitor

As of September 2014, the CCSF considers the NRC report as the best available science on sea level rise in California. However, the guidance acknowledges that the science of sea level rise is continually advancing and projections of sea level rise may need to be updated at some point to reflect the most updated science. Sea level rise inundation maps prepared by the SFPUC, described above in Section 5.9.3.2, Flooding, are considered the most up-to-date maps and take into account both water level rises and the temporary effects of storm surge along the shoreline based on existing topography and conditions. The guidance states that the review of available sea level science should determine whether the project site could be subject to flooding during the lifespan of the project.

For those projects that cost $5 million or more that could be flooded during their lifespan, the guidance requires a vulnerability assessment based on the degree of flooding that could occur, the sensitivity of the project to sea level rise, and the adaptive capacity of the project site and design (the ability to adjust to sea level rise impacts without the need for substantial intervention or modification). The risk assessment takes into consideration the likelihood that the project could be adversely affected by sea level rise and the related consequences of flooding. An adaptation plan is required for projects that are found to be vulnerable to sea level rise and have a potential for substantial consequences. The plan should focus on those aspects of the project that have the greatest consequences if flooded. It should include clear accountability and trigger points for bringing adaptation strategies online as well as a well-defined process to ensure that milestones are being met and the latest science is being considered.

The CCSF sea level rise guidance document also acknowledges that there is some flexibility in how to plan for adaptations, and it may not always be feasible or cost effective to design and build for long-term potential sea level rise scenarios that are of a highly uncertain nature, such as the upper end of the NRC report range for the year 2100 (66-inches of sea level rise). In this case, a capital project constructed by the City could be designed and constructed to be resilient to the likely mid-century sea level rise (11± 4 inches by 2050). Under this guidance, an alternative approach for a city capital project would be to build the project to be resilient to the *likely* sea level rise by 2100 (36 inches), while including adaptive capacity to be resilient to the *upper range* of sea level rise estimates for 2100 (66 inches).

Under CEQA, the CCSF considers city projects that could be vulnerable to 100-year flooding in combination with sea level rise during their lifespan to have a significant risk related to flooding.

San Francisco Floodplain Management

San Francisco's Floodplain Management requirements are specified in the San Francisco Administrative Code, Article XX, Sections 2A.280 through 2A.285. For buildings located within a flood-prone area, this code requires the following:

- The building must be adequately anchored to prevent flotation, collapse, or lateral movement.
- The building must be constructed with materials and utility equipment that is resistant to flood damage, and with methods and practices that minimize flood damage.
- Electrical, heating, ventilation, plumbing, and air conditioning equipment must be designed or located to prevent water from entering or accumulating within the components during flooding.
- All water supply and sanitary sewage systems must be designed to minimize or eliminate infiltration of flood waters into the system as well as discharges from the systems into floodwaters.

For projects located in areas that could be prone to flooding from the combined sewer system during wet weather, the SFPUC may require additional actions such as provision of a pump station for sewage flows, raised elevation of entryways, special sidewalk construction, and deep gutters.[31]

Trash Management

Article 6 of the San Francisco Health Code, Garbage and Refuse, requires that properties have appropriate containers placed in appropriate locations for the collection of refuse. In accordance with this article, the refuse containers must be constructed with tight fitting lids or sealed enclosures, and the contents of the container may not extend above the top of the rim. The property owner must also have adequate refuse collection service. Article 6 also prohibits the dumping of refuse onto any streets or lands within San Francisco.

5.9.5 Impacts and Mitigation Measures

5.9.5.1 Significance Thresholds

For the impacts analyzed in this section, the project would have a significant impact related to hydrology and water quality if it were to:

- Violate any water quality standards or waste discharge requirements;
- Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- Otherwise substantially degrade water quality; or

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[31] San Francisco Planning Department, Planning Director Bulletin No. 4, Review of Project Identified in Areas Prone to Flooding.

- Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam.

The analysis of violation of water quality standards or waste discharge requirements discussed in Impact HY-6 below also addresses the following significance criterion from Section 5.7, Utilities and Service Systems:

- Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board.

The complete list of CEQA significance criteria used in the hydrology and water quality analysis is included in the Initial Study (see Appendix NOP-IS, pp. 86 through 98), which also explains why the proposed project would not result in new significant impacts or substantially increase the severity of impacts previously identified in the 1998 FSEIR on hydrology and water quality with respect to degradation of water quality during construction (Impact HY-1); depletion of groundwater and interference with groundwater recharge (Impact HY-2); alteration of drainage patterns (Impact HY-3); placement of housing within a 100-year flood zone; placement of structures within a 100-year flood zone (Impact HY-4); and flooding as a result of failure of a levee or dam; and inundation by seiche, tsunami, or mudflow (Impact HY-5). Therefore, no further analysis of these subjects is presented in this section. The hydrology and water quality section of the Initial Study determined that all construction-related hydrology and water quality impacts of the proposed project would be less than significant.

5.9.5.2 Approach to Analysis

Methodology for Analysis of Direct Impacts

Construction Impacts

Subsequent to publication of the Initial Study, the project sponsor conducted additional evaluation of dewatering requirements during construction and provided additional information regarding construction dewatering discharge options. This section presents a revised analysis of the water quality impacts of groundwater discharges based on the additional information. The analysis assumes that construction dewatering activities would be conducted in compliance with all applicable regulations, and the impact would be considered less than significant if proposed dewatering activities would not violate any water quality standards or waste discharge requirements, or otherwise degrade water quality. All other construction-related impacts of the proposed project are unchanged from what is presented in the Initial Study (see Appendix NOP-IS).

Operational Impacts

This section addresses two impacts associated with long-term operation of the proposed project. The first impact analyzes the potential for project-related changes in wastewater and stormwater to result in water quality effects; this impact addresses related significance criteria and is broken down into various aspects of wastewater and stormwater management. The second impact analyzes the potential for flooding impacts as related to sea level rise. The approach to analyzing these impacts is shown below relative to the applicable significance criteria:

Exceed wastewater treatment requirements, violate water quality standard or waste discharge requirement, exceed the capacity of a storm drainage system, provide a substantial source of stormwater pollutants, or substantially degrade water quality**:** This analysis is related to the analysis presented in Section 5.7, Utilities and Service Systems, which evaluates impacts related to the *capacity* of wastewater or stormwater facilities, but this impact analysis focuses primarily on the potential to affect *water quality*. The impact analysis is broken down as described below.

- *Dry weather flows to combined sewer system:* The analysis considers whether the project would contribute additional wastewater to the City's combined sewer system to the extent that the contribution would cause the system to exceed the treatment requirements (with respect to volume and treatment level) or other permit requirements of the San Francisco Bay RWQCB NPDES permit for the SFPUC's Bayside wastewater facilities. The impact is considered less than significant if the increase in dry weather flows remains within the treatment capacity of the SEWPCP.

- *Wet weather flows to combined sewer system*: The impact analysis examines whether project-related increases in wastewater flows would contribute to combined sewer discharges during wet weather. The impact is considered less than significant if the increased flows would not increase the frequency of combined sewer discharges above the long-term average specified in the NPDES permit for the SEWPCP, the North Point Wet Weather Facility, and Bayside wet-weather facilities.

- *Effluent discharges from SEWPCP*: For the analysis of impacts related to changes in the quality of effluent discharges from the SEWPCP, the analysis considers whether discharges of wastewater to the combined sewer system would cause effluent quality to exceed the discharge limitations of the NPDES permit for the SEWPCP. If not, the impact is considered less than significant.

- *Direct discharges of stormwater runoff and storm drainage capacity*: The analysis considers whether the post-construction flows would be within the capacity of the newly constructed separate stormwater system in Mission Bay South or provide an additional source of stormwater pollutants that could degrade water quality. The impact is considered less than significant if the flows would be within the capacity of the stormwater system, and would not result in an additional source of stormwater pollutants.

- *Litter*: The analysis considers whether compliance with regulatory requirements for trash management would prevent substantial water quality degradation from litter that could be transported to the Bay via stormwater runoff or wind. If so, the impact is considered less than significant.

Expose people or structures to a significant risk from future flooding: The analysis considers whether people or structures on the project site could be exposed to a significant risk of loss, injury or death involving flooding as a result of sea level rise in combination with storm surge and extreme tides. The impact is considered less than significant if the project site would not be inundated during a 100-year coastal flood within the life of the project, or if the project would conform to flood resistant building standards and be capable of adapting to future flood hazard conditions.

Methodology for Analysis of Cumulative Impacts

Cumulative impacts related to combined sewer discharges and stormwater system inadequacies in the reconfigured Mariposa and Central sub-basins are operational impacts that could ultimately affect the water quality of Lower San Francisco Bay. Accordingly, the geographic scope of cumulative water quality impacts includes areas that drain to the reconfigured Mariposa and Central sub-basins. The cumulative analysis utilizes a list-based approach to analyze the effects of the project in combination with past, present, and probable future projects in this geographic area, including wastewater and stormwater flows resulting from full build-out of the Mission Bay South area and development of the Mission Bay Campus under the UCSF Long Range Development Plan (described in Section 5.1.5.2, Cumulative Projects for Operational Impacts), and assumes that operations of these projects would have to comply with the same regulatory requirements as the project. The analysis then considers whether or not there would be a significant, adverse cumulative impact associated with project implementation in combination with past, present, and probable future projects in the geographical area, and if so, whether or not the project's contribution to the cumulative impact would be significant (i.e., cumulatively considerable).

5.9.5.3 Impact Evaluation

Impacts HY-1 to HY-5: See Initial Study (Appendix NOP-IS), which includes all construction-related impacts of the proposed project, except that Impact HY-1 is modified below to account for new information regarding groundwater discharges during construction-related dewatering.

Project Impacts: Construction

Impact HY-1a: The project would not violate water quality standards or otherwise substantially degrade water quality with respect to construction-related dewatering. (Less than Significant)

Impact HY-1 of the Initial Study evaluated the potential for groundwater dewatering discharges during construction to violate water quality standards or waste discharge requirements or otherwise substantially degrade water quality. Subsequent to publication of the Initial Study, the project sponsor developed additional information regarding construction dewatering discharge options, and the discussion below augments the discussion in the Initial Study.

Water Quality Effects of Groundwater Dewatering During Construction

Construction dewatering is expected to last approximately nine months. The initial estimated and peak water discharge rate is 1,850 gallons per minute (gpm) and would last three to four days.[32] By the end of the first week, the discharge rate would decrease to about 300 gpm, and by the end of the second week, to about 100 gpm. By the end of the initial 45-day construction period, the

[32] Shipman, Dorinda and Kimbrel, Elizabeth, Langan Treadwell Rollo, 2015. Memorandum to Kate Aufhauser, Golden State Warriors and Clarke Miller, Strada Investment Group regarding Construction Dewatering Discharge Options, Golden State Warriors Arena, San Francisco, California. February 17, 2015.

discharge rate would decrease to approximately 30 to 40 gpm, and this rate is expected to last for the remaining duration of the dewatering period, approximately seven and a half months. The project sponsor has evaluated multiple options for discharge of groundwater produced during construction dewatering including the following: (1) directly discharging to the City's combined sewer system; (2) installing an on-site dewatering treatment system and discharging the treated water to the Bay through an existing outfall if the capacity of the Mariposa pump station would be exceeded with the discharge; and (3) a combination of the first two options.()

For water discharged from the construction site to the combined sewer system, the discharges would be subject to the City's Industrial Waste Ordinance, adopted in 1992. This ordinance is found in Article 4.1 of the Public Works Code, as supplemented by Order No. 158170, which regulates the quantity and quality of discharges to the combined sewer system. In accordance with Article 4.1 and Order No. 158170, the discharge permit would contain appropriate discharge standards and may require installation of meters to measure the volume of the discharge. Although the groundwater could contain contaminants related to past site activities, as well as sediment and suspended solids, the construction contractors would be required to treat the groundwater as necessary to meet permit requirements prior to discharge to the combined sewer system, and discharge rates would be controlled so that the capacity of the sewer system would not be exceeded.

If discharged directly to the Bay, the discharges would be subject to permitting requirements of the RWQCB under the VOC and Fuel General NPDES permit, described in Section 5.9.4.2, State Regulations, which specifies water quality criteria and monitoring requirements for discharges of extracted and treated groundwater. Accordingly, under this option, the project sponsor or its contractors would be required to submit a Notice of Intent to the RWQCB describing the proposed discharge and treatment system, and the RWQCB must issue an Authorization to Discharge once it is determined that the discharger is eligible to discharge under the permit. The contractors would install an on-site treatment system that includes settling tanks for removal of sediments and treatment for hydrocarbons and metals. A treatability study would be conducted prior to discharge to demonstrate that the treatment system can effectively meet the discharge limitations.[33] The treated water would likely be discharged through a stormwater swale or an existing outfall pipe. Regular influent and effluent water quality monitoring would be conducted to demonstrate permit compliance.

The combined option could include directing a portion of the initial discharges to the Bay as described above until flows have subsided to the point that they are within the capacity of and meet the influent constituent concentration requirements of the Mariposa Pump Station. Discharges to both the Bay and the combined sewer system would be subject to the same permitting requirements as described above. With discharge to the combined sewer system in accordance with the City's Industrial Waste Ordinance as supplemented by Order No. 158170, or discharge to the Bay in accordance with the VOC and Fuel General NPDES permit as authorized by the RWQCB, water quality impacts related to a violation of water quality standards or

33 *Ibid.*

degradation of water quality due to discharge of groundwater produced during construction-related dewatering would be *less than significant*.

Mitigation: None required.

Comparison of Impact HY-1 (revised) to Mission Bay FSEIR Impact Analysis

The Mission Bay FSEIR determined that water quality impacts associated with groundwater discharges during construction-related discharges would be less than significant with discharge to the combined sewer system in accordance with Article 4.1 of the Public Works Code, as supplemented by Order No. 158170. While the anticipated flow rates could temporarily exceed those analyzed in the Mission Bay FSEIR, the discharge would be subject to Article 4.1 of the Public Works Code, as supplemented by Order No. 158170 or the VOC and Fuel General NPDES permit, which would ensure that the discharges do not exceed water quality criteria or cause water quality degradation. Therefore, the project would not result in any new significant impacts or substantially more severe impacts on water quality from construction-related dewatering activities than previously identified in the Mission Bay FSEIR.

Project Impacts: Operation

Impact HY-6: Operation of the proposed project could exceed the wastewater treatment requirements of the NPDES permit for the SEWPCP, violate water quality standards or waste discharge requirements, otherwise substantially degrade water quality as a result of changes in wastewater and stormwater discharges to the Bay, or exceed the capacity of the separate stormwater system constructed in Mission Bay, or provide a substantial source of polluted runoff. Operation of the proposed project would not contribute to a substantial increase in combined sewer discharges. (Less than Significant with Mitigation)

This impact discussion covers multiple sources of potential effects on water quality and is broken down as follows: dry weather flows (sanitary sewage only) to the combined sewer system; wet weather flows (sanitary sewage and stormwater) to the combined sewer system; effluent discharges from the SEWPCP; direct discharges of stormwater runoff and storm drainage capacity; and litter.

Dry Weather Flows to the Combined Sewer System

The sewer analysis for the proposed project estimates that the total average wastewater flow would be 0.164 mgd and the peak wastewater flows would be 1.074 mgd.[34] During dry weather (typically, May 1 to October 15), all wastewater generated from the proposed project would be conveyed to and treated at the SEWPCP, which currently has available dry-weather treatment capacity of about 24.5 mgd, as described above in Section 5.9.3.1, Combined Sewer System. The

34 BKF Engineers, 2015. Water and Sewer Analyses for Golden State Warriors Arena @ Mission Bay Blocks 29-32. January 9.

average flow from the project would be less than 0.7 percent of the remaining dry-weather treatment capacity of the SEWPCP, and the peak daily flow would be approximately 4.4 percent of the available capacity. Therefore, during dry weather, impacts related to exceeding the wastewater treatment requirements of the San Francisco RWQCB would be *less than significant*.

Wet Weather Flows to the Combined Sewer System

During wet weather (typically October 15 to April 30), there is a wide variation in volume of flow to the combined sewer system due to the addition of stormwater flows from areas of the City without separate stormwater systems. During severe rainstorms, the increased wet weather flows can exceed the combined 400 mgd treatment capacity of the Bayside wet weather facilities and the 125 million gallon capacity of the transport and storage boxes, resulting in a combined sewer discharge. The combined sewer system is currently in compliance with applicable regulations and permits for discharges to the Bay and Mission Creek, including discharges from the Mariposa sub-basin, although discharges from this sub-basin have historically exceeded the long-term average design goal for CSDs.

Under the proposed project, stormwater at the project site would be diverted to the Mission Bay South separate stormwater system, which would be a decrease of stormwater flows to the combined sewer system compared to existing conditions. Wastewater would be conveyed to the combined sewer system during both wet and dry weather and as discussed in Section 5.7, Utilities and Service Systems, the preliminary project design indicates that 0.844 mgd of the peak wastewater flows from the project site would be discharged to the sewer drainage area of the Mariposa Pump Station (within the reconfigured Mariposa sub-basin), and 0.230 mgd of the peak flows could be directed to the Mission Bay Sanitary Pump Station located at Park P15 (within the reconfigured Central sub-basin).[35] The increase in wastewater would represent an incremental increase in wastewater volume from the project site compared to existing conditions that could affect the overall combined sewer system's wet weather operations in both sub-basins. The potential effect would be greatest in the reconfigured Mariposa sub-basin, which has a wet weather capacity of 12 mgd. Comparatively, CSDs in the reconfigured Central sub-basin occur when flows at the Channel Pump Station exceed 80 mgd, or when total flows to the SEWPCP from the Channel and Bruce Flynn Pump Stations and SEWPCP lift station exceed 250 mgd (see Section 5.9.3.1, above, regarding the existing conditions of the City's combined sewer system).

Existing average wastewater flows from development projects completed within the Mariposa sub-basin of the combined sewer system as of February 2015 are approximately 1.21 mgd, including 0.31 mgd of existing flows from UCSF and other developments as well as infiltration flows and flows from Basin B[36] Conservatively assuming that all of the wastewater flows from the project site would discharge to the Mariposa sub-basin, the incremental increase from the project site would be an average of 0.16 mgd and the total *average* flows to the Mariposa sub-

35 Moala, Tommy T., Assistant General Manager, San Francisco Public Utilities Commission, 2015. Letter to Clarke Miller, Strada Investment Group. May 15.

36 Hydroconsult Engineers, Inc. 2015. Combined Sewer Impact Analysis, Golden State Warriors Arena EIR. February 18.

basin and pump station would be 1.38 mgd. Conservatively assuming that all 1.074 mgd of the peak wastewater flows from the project site would discharge to the Mariposa sub-basin and pump station, the total combined flows could be up to 2.28 mgd.

Hydroconsult Engineers, Inc. analyzed the effect of project-related increases in wastewater discharges on CSDs from the Mariposa sub-basin using the DPW's Hydrocalc model.[37] The modeling report is included as Appendix HYD of this SEIR. Using the wastewater flows described above and standard rainfall assumptions used by the DPW, the model estimated the annual average frequency, volume, and duration of CSDs that would occur once the Mariposa wet- and dry-weather pump stations reach the combined capacity of 11.2 mgd under existing and project conditions. The model estimates that under existing conditions, CSDs from the Mariposa sub-basin occur approximately 10 times per year with an average volume of 5.34 million gallons and duration of 17.2 hours.

The model analyzed the effects of discharging the average flows from the proposed project in combination with the existing average flows in the drainage area. Under this scenario, the frequency of CSDs would not increase, but the volume of the CSDs would increase from 5.34 to 5.63 million gallons and the duration would increase from 17.2 to 17.3 hours. As a worst case, the model also assumed that peak project-related wastewater flows would occur during every large storm which is an unlikely scenario (i.e., the model assumed that there would be a capacity event at the event center at the exact same time as every large storm of the rainy season). However, even using this worst case scenario, there would be no increase in the frequency of CSDs with the addition of peak project-related flows, but the volume of the CSDs would increase from 5.34 to 7.20 million gallons and the duration would increase from 17.2 to 19.4 hours. Under all conditions, all CSDs would receive the equivalent of primary treatment in the Mariposa transport and storage structure prior to discharge to the Bay.

If a portion of the project-related wastewater flows were discharged to the reconfigured Central Basin (via the Mission Bay Sanitary Sewer Pump Station) as indicated by the preliminary project design, a portion of the above stated increase in CSD volumes and durations would likewise shift to the Channel transport storage structure in the reconfigured Central sub-basin. However, given the relatively larger storage and pumping capacities at Channel, the effect on CSD volumes and durations would be less than that estimated for the Mariposa sub-basin.

As discussed in Section 5.9.4.2, State Regulations, the NPDES permit for the SEWPCP, the North Point Wet Weather Facility, and all of the Bayside wet-weather facilities does not limit the specific annual number of CSD events. Instead, the permit acknowledges that some years are wetter than others and requires that the combined sewer system is designed and constructed based on meeting the specified long-term average number of CSDs from each sub-basin. Therefore, the NPDES permit allows the limitation of 10 CSDs for the Mariposa sub-basin to be exceeded in any particular year, as long as the long-term average of 10 CSDS per year is met. Because average and peak wastewater flows from the project site would not increase the frequency of CSD events from the

37 *Ibid.*

Mariposa sub-basin and would be consistent with the requirements of the NPDES permit, project-level water quality impacts related to contributions to an increase in CSD frequency would be *less than significant.*

Effluent Discharges from the SEWPCP

Consistent with what was identified in the Mission Bay FSEIR, some wastewater discharges associated with future uses at the project site could involve the discharge of some pollutants not typically associated with most other San Francisco discharges. If improperly handled, discharges of unusual chemicals such as radioactive materials and biohazardous materials to the SEWPCP could result in violation of the NPDES permit for the SEWPCP, which would be a potentially significant impact. While these discharges would be regulated under Article 4.1 of the San Francisco Public Works Code, the Mission Bay FSEIR included Mitigation Measure K.2 requiring facilities anticipated to have a potentially significant discharge of pollutants to the sanitary sewer to install sampling ports to facilitate sampling to monitor discharge quality. At this time, it is not known specifically what uses might occupy the proposed office development at Blocks 29-32, and the possibility of uses that would handle radioactive or biohazardous materials cannot be precluded. Thus, as identified in the Mission Bay FSEIR, in the event that there could be future activities that handle radioactive or biohazardous materials, implementation of FSEIR Mitigation Measure K.2 (same as Mitigation Measure M-HY-6) would reduce this impact to *less than significant with mitigation*.

Direct Discharges of Stormwater Runoff and Storm Drainage Capacity

Currently, approximately half of the project site is paved, and the rest is undeveloped. Runoff from portions of the paved and unpaved areas drain to perimeter streets, but a majority of runoff is contained in a low lying area within the site. There are no storm drains on the site. The runoff that drains to the perimeter streets currently flows to the combined sewer system.

Under the proposed project, all stormwater would be diverted to the separate stormwater system constructed by the master developer in the reconfigured Central sub-basin and under construction in the reconfigured Mariposa sub-basin. Discharges of stormwater from the project site to the separate stormwater system would be subject to the regulatory requirements of the updated Phase II General MS4 NPDES Permit, Section 147 of Article 4.2 of the San Francisco Public Works Code, and the City’s Stormwater Design Guidelines, all of which were adopted since publication of the Mission Bay FSEIR and are described in Section 5.9.4, Regulatory Framework. Accordingly, the project sponsor would be required to implement BMPs to improve the quality of stormwater entering the stormwater system. The stormwater management approach must capture and treat rainfall from the design storm of 0.75 inches and include measures to reduce or eliminate downstream water pollution by reducing impervious cover, eliminating sources of contaminants, treating pollutants in stormwater runoff, or increasing onsite infiltration. The project would primarily utilize two Low Impact Development (LID) strategies to achieve the requirements for capture and treatment of stormwater: green roofs on several buildings, rainwater harvesting, and flow-through biotreatment planters. Treated water from these facilities would be directed to proposed on-site storm drains, which would connect to the separate stormwater collection system in the adjacent streets.

Implementation of BMPs and other stormwater control measures required by the updated Phase II General MS4 NPDES Permit; Article 4.2 of the San Francisco Public Works Code, Section 147; and the City's Stormwater Design Guidelines would ensure that the project does not contribute to an increase in discharge of stormwater pollutants to the Bay in discharges from the separate stormwater system. Therefore, impacts related to degradation of water quality and providing an additional source of stormwater pollutants are *less than significant* in relation to direct stormwater discharges.

As described in Impact C-UT-3 in Section 5.7, Utilities and Service Systems, the Mission Bay South stormwater system is designed to convey runoff from a 5-year storm event under build-out conditions. While the project would increase runoff relative to existing conditions because the amount of impervious surfaces would be increased, the volume of offsite stormwater discharges would be consistent with the projected build-out condition that the Mission Bay South separate stormwater system was designed to serve. Therefore, stormwater runoff from the project would not exceed the capacity of the stormwater system and this impact would be *less than significant*.

Litter

The proposed public use of the project site as an event center could increase the potential for litter. In accordance with Article 6 of the San Francisco Health Code, Garbage and Refuse, the project sponsor would be required to place containers in appropriate locations for the collection of refuse. In accordance with this article, the refuse containers must be constructed with tight fitting lids or sealed enclosures, and the contents of the container may not extend above the top of the rim. The project sponsor must also have adequate refuse collection service. Further, Article 6 prohibits the dumping of refuse onto any streets or lands within San Francisco.

The project would also be required to comply with several City ordinances which would decrease the amount of non-degradable trash generated under the proposed project, as discussed in Section 11 of the Initial Study, Utilities and Service Systems (see Appendix NOP-IS). The San Francisco Mandatory Recycling and Composting Ordinance requires facilities to separate their refuse into recyclables, compostables, and trash, and the Food Service Waste Reduction Ordinance prohibits any establishment that serves food prepared in San Francisco from using polystyrene foam (Styrofoam) to-go containers. This ordinance also requires that any containers used in the City’s programs be either recyclable or compostable.

Compliance with Article 6 of the San Francisco Health Code and the City ordinances described above would reduce the amount of non-recyclable and non-compostable wastes produced during events, and would ensure that adequate containers and refuse service are provided. This would reduce the potential for transport of litter to the separate stormwater system (including the UCSF MS-4) and Bay via wind or stormwater runoff. Furthermore, as indicated in Chapter 3, Project Description, the project sponsor would implement a number of event center site management practices to minimize potential disruption associated with event center operations, including the

San Francisco Entertainment Commission's Good Neighbor Policy. This policy includes the following provision:

- Employees of the establishment shall walk a 100-foot radius from the premises sometime between 30 minutes after closing time and 8:00 a.m. the following morning, and shall pick up and dispose of any discarded beverage containers and other trash left by area nighttime entertainment patrons.

Therefore, for reasons stated above, water quality impacts related to littering would be *less than significant*.

Summary of Impact HY-6, Water Quality Impact Analysis

Impact HY-6 describes potential water quality impacts of the proposed project related to dry weather wastewater flows and compliance with the wastewater treatment requirements of the RWQCB; wet weather wastewater flows; effluent discharges from the SEWPCP; direct discharges of stormwater; and litter. The analysis determined that project-related effects on dry weather wastewater flows would be less than significant because the wastewater flows would be within the remaining capacity of the SEWPCP. Impacts related to wet weather flows and CSDs were determined to be less than significant because the discharge of project-related peak wastewater flows would not result in an increase in frequency of CSD events from the Mariposa sub-basin.

Potential impacts related to effluent discharges from the SEWPCP would be *less than significant with mitigation*, assuming implementation of FSEIR Mitigation Measure K.2 which requires implementation of measures to ensure that businesses that discharge pollutants that are not typically associated with most wastewater discharges to the City's combined sewer system do not cause a violation of the NDPES permit for the SEWPCP. Impacts related to direct discharges of stormwater and litter would be less than significant due to compliance with existing regulations and implementation of proposed event center site management practices.

Mitigation Measure M-HY-6. Wastewater Sampling Ports

Mission Bay FSEIR Mitigation Measures K.2. Participate in the City's existing Water Pollution Prevention Program. Facilitate implementation of the City's Water Pollution Prevention Program by providing and installing wastewater sampling ports in any building anticipated to have a potentially significant discharge of pollutants to the sanitary sewer, as determined by the Water Pollution Prevention Program of the San Francisco Public Utilities Commission's Bureau of Environmental Regulation and Management, and in locations as determined by the Water Pollution Prevention Program.

Comparison of Impact HY-6 to Mission Bay FSEIR Impact Analysis

Dry-Weather Flows to Combined Sewer System. The Mission Bay FSEIR determined that, based on anticipated land uses as offices, the estimated total wastewater flow from the project site would be an average of 0.192 mgd and a peak of 0.578 mgd. The average flows for the proposed project would be less than analyzed in the Mission Bay FSEIR, but the peak flows would be almost two times greater than previously anticipated. Although the project would result in a somewhat more severe impact than analyzed in the Mission Bay FSEIR, the impact would remain less than significant because the dry-weather flows would be within the capacity of the SEWPCP. Therefore, the project would not result in new or substantially more severe impacts related to dry weather flows to the combined sewer system than was previously identified in the Mission Bay FSEIR.

Wet Weather Flows to Combined Sewer System. The Mission Bay FSEIR anticipated that stormwater within the reconfigured Central sub-basin would be collected in a separate stormwater system and wastewater flows generated within this basin would be conveyed in the City's combined sewer system. The Mission Bay FSEIR also anticipated that both stormwater and wastewater flows generated in the Mariposa sub-basin would be conveyed to the combined sewer system. With this configuration, the Mission Bay FSEIR indicated that increases in combined sewer discharges and associated pollutants were anticipated in the Mariposa and Islais Creek discharge locations. The Mission Bay Plan's contribution to an increase in the frequency, volume, or duration of combined sewer discharges would be reduced to less than significant with implementation of FSEIR Mitigation Measure K.3 requiring the master developer and SFPUC to consider sewer improvements to avoid increases in CSD volumes.

The master developer has proceeded with implementation of Mitigation Scenario B described in the FSEIR Summary of Comments and Responses (in Volume III, beginning on p. XII.253) and described in Section 5.9.2.3 (FSEIR Mitigation Approach), above. This scenario includes separating the stormwater collection system and sanitary sewer in the reconfigured Mariposa sub-basin as well as in the reconfigured Central sub-basin as originally planned in the FSEIR. Because none of the stormwater from Mission Bay South would be discharged to the combined sewer system, the Mission Bay FSEIR estimated that this mitigation approach would reduce the total Bayside CSD volume by 33 million gallons per year.

As discussed above, under the worst case conditions analyzed, discharge of the peak wastewater flows from the project site could increase the volume of each CSD from the Mariposa sub-basin by about 1.9 million gallons but would not increase the frequency of CSD events from this sub-basin. While the project would result in slightly more severe effects than analyzed in the FSEIR, this impact would be less than significant because the existing frequency of CSD events would not be exceeded and would be within the limitations of the NPDES permit for the SEWPCP, the North Point Wet Weather Facility, and Bayside wet-weather facilities. Therefore, the project would not result in new or substantially more severe impacts related to CSD events than was previously identified in the Mission Bay FSEIR.

Effluent Discharges from SEWPCP. The FSEIR concluded that UCSF and some commercial or industrial operations may involve the discharge of some pollutants not typically associated with most other San Francisco discharges, and discharges from these businesses could potentially result in a violation of the NDPES permit. The FSEIR identified Mitigation Measure K.2 in the Hydrology and Water Quality section requiring facilities with these discharges to install sampling ports to facilitate demonstration of compliance with discharge limitations. The proposed project could involve some of the same land uses, but as discussed above would require implementation of Mitigation Measure K.2 from the FSEIR. Therefore, the project would not result in new or substantially more severe impacts related to effluent discharges from the SEWPCP than was previously identified in the Mission Bay FSEIR.

Direct Discharges of Stormwater Runoff and Storm Drainage Capacity. The Mission Bay FSEIR concluded that with the sewer system improvements proposed as part of the Plan, including reconfiguration of the Central and Mariposa sub-basins and construction of a separate stormwater system in the reconfigured Central sub-basin, the Mission Bay Plan would accommodate the projected changes to stormwater flows. Impacts related to exceeding the capacity of the stormwater system would be less than significant.

The Mission Bay FSEIR also determined that the direct stormwater discharges under the Mission Bay Plan could contribute to a potentially significant cumulative impact on the quality of near-shore waters of the Bay and China Basin Channel (Mission Creek). The project's contribution would be reduced to less than significant with implementation of Mitigation Measure K.4 requiring treatment of all separate stormwater discharges.

As described above, stormwater discharges from the project would discharge to the Mission Bay South stormwater system constructed in accordance with Mitigation Scenario B described in the FSEIR Summary of Comments and Responses (in Volume III, beginning on p. XII.253). This separate stormwater system provides treatment of stormwater discharges at each of the five outfalls. Further, stormwater discharges from the project site would be subject to the regulatory requirements of the SWRCB and City which require treatment of stormwater before it is discharged to a separate stormwater system. Therefore, the project would result in less severe water quality impacts than analyzed in the FSEIR related to direct stormwater discharges, and the project would not result in new or substantially more severe impacts related to stormwater runoff and discharges than was previously identified.

Mission Bay FSEIR Mitigation Measure K.5 requires implementation of an individual stormwater management program that utilizes BMPs for Mission Bay until the Phase II regulations become final and Mission Bay is included in the City's stormwater management program. However, subsequent to publication of the Mission Bay FSEIR, the SWRCB adopted the General Permit for the Discharge of Storm Water from Small Municipal Separate Storm Sewer Systems. The CCSF also adopted Section 147 of Article 4.2 of the San Francisco Public Works Code in 2010 and published the associated Stormwater Design Guidelines. Discharges of stormwater from the project site to the separate storm sewer would be required to comply with these regulatory requirements as further described above. Therefore, Mission Bay FSEIR Mitigation Measure K.5 is not applicable to the proposed project.

Mission Bay FSEIR Mitigation Measure M.5 in the Community Services and Utilities section required conveying all stormwater runoff from newly developed areas in the Bay drainage sub-basin to the combined sewer system prior to completion of the initial-flow diversion system. However, as discussed in Section 5.7 of this SEIR, Utilities and Service Systems, this mitigation measure is no longer warranted for the proposed project because the project would discharge stormwater to the separate stormwater system being constructed in accordance with the approved Mission Bay South Infrastructure Plan.

Impact HY-7: Operation of the proposed project would not expose people or structures to a significant risk of loss, injury, or death involving flooding. (Less than Significant)

Existing grades at the project site range from -1 to +3 feet SFD (10 to 14 feet NAVD88). As discussed in Impact HY-4 of the Initial Study (see pp. 102 to 103 of the Initial Study in Appendix NOP-IS), the project site is not located within a 100-year flood zone depicted on San Francisco's interim flood maps prepared in 2008. The project site is also generally above the projected 2050 flood elevation of -0.6 feet SFD (11 feet NAVD88), which combines 12 inches of sea level rise with the effects of a 100-year storm surge. Thus, as shown on Figure 5.9-3 and described in the Setting, the project site would not be subject to flooding in 2050 with projected sea level rise.[38] In addition, the project site would not be flooded during daily high tide conditions (MHHW) with the 36 inches of sea level rise that is expected by 2100.

However, when the effects of a 100-year storm surge are considered in combination with 36 inches of sea level rise, the flood elevation would be 1.5 feet SFD (13 feet NAVD88), and the site at its existing grade could be temporarily flooded to depths of up to about 2.5 feet. This is consistent with the SFPUC mapping depicted on Figure 5.9-4, which shows flooding depths at 2-foot intervals and indicates that the site could be temporarily flooded to depths of between 2 and 4 feet.[39] Thus, the project site could be prone to flooding by 2100 based on projected sea level rise in combination with the effects of storm surge.

However, as noted in the Setting, this flooding scenario is based on 2010/2011 topographic conditions and assumes that no site-specific flood protection measures such as filling to raise the grade of low lying areas or area-wide measures such as construction of berms, levees or seawalls would be implemented to protect the project site or surrounding area during the intervening period. As such, it is likely that the actual flood zone would be different by 2100 than what is illustrated on Figure 5.9-4 under built conditions, and the actual flood zone would include only those areas of the site with ground elevations below the flood elevation of 1.5 feet SFD (13 feet NAVD88) that are not protected by area-wide flood protection measures.

Development in the flood zone could expose people or structures to a significant risk of loss, injury or death unless designed and constructed in accordance with flood resistant building standards. San Francisco's Floodplain Management Ordinance (Chapter 2A, Article XX, Sections 2A.280 through 2A.285 of the San Francisco *Administrative Code*) provides standards for

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38 Note that the green zone shown within the project site on Figure 5.9-3 is the open excavation that is not hydrologically connected to the Bay or flooding zones and would be filled when the site is developed.

39 Note that greater inundation depths are indicated on Figure 5.9-4 in the area of the open excavation, but this excavation would be filled when the site is developed.

building in flood prone areas. For building sites in flood prone areas, Section 2A.283 (b)(1) specifically requires that:

- The building must be adequately anchored to prevent flotation, collapse, or lateral movement.
- The building must be constructed with materials and utility equipment that is resistant to flood damage, and with methods and practices that minimize flood damage.
- Electrical, heating, ventilation, plumbing, and air conditioning equipment must be designed or located to prevent water from entering or accumulating within the components during flooding.
- All water supply and sanitary sewage systems must be designed to minimize or eliminate infiltration of flood waters into the system as well as discharges from the systems into floodwaters.

The Floodplain Management Ordinance is applicable only in areas that are designated by the City Administrator as susceptible to being inundated by a 100-year flood. At present, the City's designated 100-year flood zone is that shown on the 2008 interim flood map, which does not consider projected sea level rise and does not therefore include the project site. As such, the Floodplain Management Ordinance does not apply to the project site.

However, although it is not subject to the San Francisco Floodplain Management Ordinance, the project would be designed and constructed consistent with flood-resistant building standards or, in some cases, to be capable of adapting to meet these standards when needed in the future in recognition of future flood hazards due to sea level rise. These features or strategies that have been incorporated in the project design include:

- Locating the base of the main event center entry at an elevation of 10 feet SFD (21 feet NAVD88), which would be 8.5 feet above the projected flood elevation in 2100. Access to office and retail uses from the main plaza would be provided at this elevation.
- Raising pedestrian access and outdoor areas to an elevation of 10 feet SFD (21 feet NAVD88), which would be 8.5 feet above the projected flood elevation in 2100. These areas include the Third Street Plaza, main pedestrian path around the event center, Bayfront Overlook, and Bayfront Terrace. The project would also provide access to the upper floors of the Food Hall from the elevated pedestrian path.
- Locating the base of the secondary arena entry on the southeast portion of the event center at an elevation of 26 feet SFD (37 feet NAVD88), 24.5 feet above the projected flood elevation in 2100, and making it accessible from the elevated pedestrian path or stairs from the southeast plaza.
- Providing expanded height first floors in the retail uses and lobbies in the South Street and 16th Street buildings, Food Hall, and buildings fronting Terry Francois Boulevard which would provide space to raise the floor level above the projected flood elevation.
- Minimizing to the extent feasible the number of building wall penetrations below an elevation of 3.5 feet SFD (15 feet NAVD88), which is two feet higher than the projected flood elevation in 2100, to preclude inside flooding.

- Waterproofing the below ground features to address fluctuations in groundwater levels that may result from sea level rise.
- Designing the water supply and wastewater facilities to minimize or eliminate infiltration of flood waters as well as discharges from these systems into flood waters.

Three components of the proposed project would be constructed below ground, and would also be below the projected flood elevation in 2100. These include the team practice courts at an elevation of -14 feet SFD (-22.7 feet NAVD88), the below grade parking and loading dock at an elevation of -10.7 feet SFD (00.6 foot NAVD88), and the event level (floor of the basketball court) at an elevation of - 6 feet SFD (5.3 feet NAVD88). To prevent inundation of these areas by flood waters, the garage and loading dock entries would be designed to allow future installation of floodgates and a solid curb could be constructed alongside landscaped areas to prevent flood flows from encroaching onto the site. Sand bags could also be available to provide temporary protection from future flooding.

Mechanical systems for the event center that would be located in the below-grade parking could also be flooded by 2100. However, the project design includes providing space for emergency pumps in these areas, including the area adjacent to the mechanical systems. Further, the mechanical systems could be moved to areas of the site that are above future flood levels if necessary.

The project features described above would be consistent with San Francisco's Floodplain Management requirements specified in the San Francisco Administrative Code, Article XX, Sections 2A.280 through 2A.285 and discussed in the Setting. In addition, the stormwater bioretention areas and stormwater drain inlets located along the property perimeter would facilitate drainage of flood waters. Terry A. Francois Boulevard and the planned waterfront park to the east would also serve as a buffer for the project site against coastal flooding.

While the project site could be temporarily flooded at depths of up to 2.5 feet with 36 inches of sea level rise in combination with 100-year storm surge by 2100, the project would be designed and constructed to resist flood damage and provide for the safety of occupants and visitors in the event of flooding. Therefore, impacts related to flooding would be *less than significant*.

Mitigation: None required.

Comparison of Impact HY-7 to Mission Bay FSEIR Impact Analysis

As discussed above, the Mission Bay FSEIR concluded that portions of the Mission Bay Plan area could be subject to inundation as a result of sea level rise and included Mitigation Measures K.6a through K.6f for structures proposed below an elevation of -1 foot SFD (10 feet NAVD88). The mitigation required implementation of construction specifications to address effects of sea level rise that would be based on specific flood protection and engineering and building analyses by a licensed engineer where structures are proposed below an elevation of -1 foot SFD (10 feet NAVD88).

Elevations at the project site range from approximately -1 foot SFD (10 feet NAVD88) to +3 feet SFD (14 feet NAVD88),[40] however some of the project components would extend below grade. The SFPUC inundation maps completed in 2014 have provided a more detailed assessment of areas of the project site that could be inundated due to sea level rise and indicate an area greater than previously anticipated in the Mission Bay FSEIR. However, the above-described measures that are incorporated into the project design fulfill the requirements of FSEIR Mitigation Measure K.6, which is no longer warranted for the proposed project. Therefore, the proposed project would not result in new or substantially more severe significant impacts than those identified in the FSEIR regarding flooding from sea level rise.

Cumulative Impacts

Impact C-HY-1: See Initial Study (Appendix NOP-IS)

Impact C-HY-2: The proposed project, in combination with past, present, and reasonably foreseeable future projects in the site vicinity, would not exceed the wastewater treatment requirements of the NPDES permit for the SEWPCP; violate water quality standards or waste discharge requirements, or otherwise substantially degrade water quality as a result of changes in wastewater and stormwater discharges to the Bay; or exceed the capacity of the separate stormwater system constructed in Mission Bay, or provide a substantial source of polluted runoff. Cumulative wet weather flows would not contribute to an increase in combined sewer discharges. (Less than Significant)

Impacts related to the wastewater treatment requirements of the NDPES permit for the SEWPCP and contributions to CSDs could occur within the reconfigured Mariposa and Central sub-basins. Accordingly, the geographic scope of cumulative impacts related to these topics is the geographical area that drains to the reconfigured Mariposa and Central sub-basins. Regarding contributions to CSDs, the cumulative analysis considers wastewater and storm water flows resulting from full build-out of the Mission Bay South area and development of the Mission Bay Campus under the UCSF LRDP (described in Section 5.1.5.2, Cumulative Projects for Operational Impacts), and assumes that operations of these projects would have to comply with the same regulatory requirements as the project.

Impacts related to exceeding the capacity of the stormwater system and providing additional sources of stormwater pollutants could occur within the Mission Bay South separate stormwater system. Accordingly, the geographic scope of cumulative impacts related to this topic is the geographical area that drains to the same separate stormwater system.

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40 Langan Treadwell Rollo, Preliminary Geotechnical Evaluation, Block 29-32 Mission Bay, San Francisco, California. March 28, 2014.

The geographical scope for littering includes all of Lower San Francisco Bay, which is listed as an impaired water body for trash.

Dry Weather Flows to Combined Sewer System

As discussed in Section 5.7, Utilities and Service Systems, the SFPUC estimates that under full build out of Mission Bay South, average wastewater flows to the Mariposa sub-basin would be 1.69 mgd and peak wastewater flows would total 4.8 mgd, including all of the flows from the proposed project.[41] During dry weather (typically, May 1 to October 15), all wastewater generated by the project would be conveyed to and treated at the SEWPCP, which currently has available dry-weather capacity of about 24.5 mgd, as described above in Section 5.9.3.1, Combined Sewer System. The average flow at full build out of Mission Bay South would be less than 7 percent of the available dry-weather capacity of the SEWPCP, and the peak daily flow would be approximately 20 percent. Therefore, during dry weather, cumulative impacts related to exceeding the wastewater treatment requirements of the San Francisco RWQCB would be *less than significant*.

Wet Weather Flow to Combined Sewer System

Existing average wastewater flows from development projects completed within the Mariposa sub-basin of the combined sewer system as of February 2015 are approximately 1.21 mgd, including 0.31 mgd of existing flows from UCSF and other developments as well as flows from infiltration and from Basin B.[42] Assuming the addition of all of the average flow from the proposed project and average flows from future developments at full build out of Mission Bay South, the average cumulative flows to the Mariposa sub-basin and pump station would be 1.69 mgd. Conservatively assuming that all 1.074 mgd of the peak wastewater flows from the project site would discharge to the Mariposa sub-basin and pump station, the combined flows would total approximately 2.6 mgd at full build out. As described in Impact HY-6, above, Hydroconsult Engineers, Inc. analyzed the effect of cumulative increases in wastewater discharges on CSDs from the Mariposa sub-basin using the San Francisco DPW's Hydrocalc model.[43] The modeling report is included as Appendix HYD of this SEIR. Using the wastewater flows described above and standard rainfall assumptions used by the DPW, the model estimated the annual average frequency, volume and duration of CSDs that would occur once the Mariposa wet and dry-weather pump stations reach the combined capacity of 11.2 mgd. Considering average flows within the Mariposa sub-basin and all of the project site, the model estimated that under cumulative conditions, the number of CSD events would not increase, but the volume of the CSDs would increase from 5.34 to 6.32 million gallons and the duration would increase from 17.2 to 18.2 hours. Considering peak flows from the project site, the frequency of CSDs would increase from 10 to 11, the average volume would increase from 5.34 to 7.98 million gallons, and the duration would increase from 17.2 to 21.8 hours.

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41 Hydroconsult Engineers, Inc. 2015. Combined Sewer Impact Analysis, Golden State Warriors Arena EIR. February 18.
42 *Ibid.*
43 *Ibid.*

As noted in Impact HY-6, the model analyzed worst-case conditions assuming that all project-related peak wastewater flows would discharge to the Mariposa sub-basin and would occur concurrently with each large rainstorm. However, these conditions would not be expected to occur on a regular basis, if at all, and as discussed in Section 5.7, Utilities and Service Systems, a portion of the wastewater flows from the project site would be discharged to the reconfigured Central sub-basin. As discussed above, the NPDES permit for the SEWPCP, the North Point Wet Weather Facility, and all of the bayside wet-weather facilities does not limit the specific annual number of CSD events. Instead, the permit acknowledges that some years are wetter than others and requires that the combined sewer system is designed and constructed to meet the specified long-term average number of CSDs from each sub-basin. Thus, the NPDES permit allows an annual average of 10 CSDs for the Mariposa sub-basin to be exceeded in any particular year, as long as the long-term average is met. Because cumulative conditions would not likely result in exceeding the long-term annual average of 10 CSDs allowed for the Mariposa sub-basin in the NPDES permit for the SEWPCP, North Point Wet Weather Facility, and Bayside wet-weather facilities, cumulative impacts related to contributions to an increase in CSD frequency would be *less than significant.*

Further, as discussed in Section 5.7, Utilities and Service Systems, the SFPUC will be constructing future improvements to increase the capacity of the Mariposa Pump Station and associated facilities, and this would increase the amount of wastewater that could be conveyed to the SEWPCP and Northpoint Wet Weather facilities for treatment, resulting in a corresponding reduction in CSD volumes from the Mariposa sub-basin (see Impacts C-UT-2 and C-UT-4).

Effluent Discharges from SEWPCP

As discussed in Impact HY-6, if the proposed office space includes biotech uses, the project could result in discharge of biohazardous and radioactive materials that, if improperly handled, could result in violation of the NPDES permit for the SEWPCP. The cumulative effects of wastewater discharges containing such materials could result in an exceedance of the NPDES discharge limitations of the SEWPCP, resulting in a potentially significant cumulative impact. However, the project's contribution would not be cumulatively considerable (*less than significant*) with implementation of Mission Bay FSEIR Mitigation Measure K.2, which requires installation of wastewater sampling ports for business that discharge unusual materials to facilitate sampling.

Direct Discharges of Stormwater Runoff and Storm Drainage Capacity

As discussed in Impact HY-6, the project site would be served by the Mission Bay South separate stormwater infrastructure. As discussed in Impact C-UT-1 (see Section 5.7, Utilities and Service Systems), Storm Drain Pump Station No. 1 (SDPS-1) in the reconfigured Central sub-basin has been constructed and SDPS-5 in the Mariposa sub-basin is currently under construction. These stormwater pump stations and associated stormwater infrastructure would accommodate stormwater flows from the proposed project and have been designed to handle stormwater flows generated from the planned build-out of the entire tributary drainage area. Further, the project would conform to the City's *Stormwater Design Guidelines* for treatment of stormwater runoff to separate stormwater systems. Similar to the proposed project, all future projects in the vicinity that disturb greater than 5,000 square feet would be required to comply with the City's *Stormwater Design Guidelines*, which require capture and treatment of stormwater discharged to separate stormwater systems. Therefore, cumulative impacts within the Mission Bay South area related to exceeding the capacity of a stormwater system, providing additional sources of polluted runoff, and water quality degradation as a result of direct stormwater discharges would be *less than significant*.

Litter

As discussed in Impact HY-6, the project's water quality impacts related to littering would be less than significant through compliance with Article 6 of the San Francisco Health Code and the City ordinances addressing recycling and composting of wastes as well as the project's proposed event center site management practices (including implementation of the San Francisco Entertainment Commission's Good Neighbor Policy). Other projects in the area are also required to comply with these requirements. Therefore, the project's contribution to cumulative water quality impacts related to litter would not be cumulatively considerable (i.e., *less than significant*).

Comparison to FSEIR Significance Determination

Dry Weather Flow to Combined Sewer System. The Mission Bay FSEIR did not specifically address cumulative effects related to dry weather flows to the City's combined sewer system. However, the Mission Bay FSEIR Community Services and Utilities impacts section estimated that the Mission Bay Plan would generate approximately 2.5 mgd of wastewater at build-out (average dry weather flow), or 3.7 percent of the volume of wastewater treated at the SEWPCP at the time of FSEIR publication, and determined this to be a *less than significant* impact.

Under full build out of Mission Bay South, average wastewater flows in the Mariposa sub-basin would be 1.69 mgd, or less than 3 percent of the 60 mgd of wastewater currently treated at the SEWPCP. Therefore, the proposed project would not result in any new significant impacts or substantially severe impacts relative to those analyzed in the Mission Bay FSEIR.

Wet Weather Flow to Combined Sewer System. The Mission Bay FSEIR determined that the Plan's estimated 0.2 percent contribution to the 11 percent cumulative increase in Bayside combined sewer discharge volumes would be a significant impact. The Plan's contribution would be reduced to *less than significant with mitigation*, assuming implementation of FSEIR Mitigation Measure K.3 requiring design and construction of sewer improvements to ensure that wastewater and stormwater flows from the Plan area to the combined sewer do not contribute to combined sewer discharges.

As described in Section 5.9.2.3 (FSEIR Mitigation Approach) above, the master developer has implemented Mitigation Scenario B that includes separating the stormwater collection system and sanitary sewer in the reconfigured Central and Mariposa sub-basins in Mission Bay South. Implementation of this mitigation approach satisfies the requirements of Mission Bay FSEIR Mitigation Measure K.3 and is estimated to reduce total Bayside CSD volume by 33 million gallons per year, less than baseline conditions before the Mission Bay Plan was implemented.

As discussed above, under the worst case conditions analyzed, cumulative wastewater discharges to the Mariposa sub-basin could increase the volume of each CSD from the Mariposa sub-basin by about 7.98 million gallons but would not increase the long-term average frequency of CSD events from this sub-basin. While the cumulative wastewater flows would result in slightly more severe effects than analyzed in the FSEIR, this impact would be less than significant because the long-term average frequency of CSD events would not be exceeded and the system would remain in compliance with the NPDES permit for the SEWPCP, the North Point Wet Weather Facility, and Bayside wet-weather facilities. Therefore, the project would not result in new or substantially more severe cumulative impacts related to CSD events than was previously identified in the Mission Bay FSEIR.

Effluent Discharges from SEWPCP. Cumulative impacts related to exceeding the discharge limitations of the SEWPCP were not specifically addressed in the Mission Bay FSEIR. However, while the cumulative effects of wastewater discharges containing radioactive and biohazardous materials could be potentially significant, the contribution of both the project and the Mission Bay Plan would not be cumulatively considerable (*less than significant*) with implementation of Mission Bay FSEIR Mitigation Measure K.2. Therefore, the proposed project would not result in any new significant impacts or substantially more severe impacts relative to those analyzed in the FSEIR.

Direct Discharges of Stormwater Runoff and Storm Drainage Capacity. The Mission Bay FSEIR determined that the Mission Bay Plan could contribute to a *potentially significant* cumulative impact on the quality of near-shore waters of the Bay and China Basin Channel (Mission Creek) as a result of direct stormwater discharges. However, the Plan's contribution would be reduced to *less than significant with mitigation*, assuming implementation of FSEIR Mitigation Measure K.4. The Mission Bay South storm drain infrastructure was constructed in accordance with Mitigation Scenario B described in the Mission Bay FSEIR Summary of Comments and Responses and conforms to the requirements of this mitigation measure. The proposed project would not result in any new significant impacts or substantially more severe impacts relative to those analyzed in the Mission Bay FSEIR regarding this topic.

Litter. Cumulative impacts related to littering were not considered in the Mission Bay FSEIR. Regardless, the proposed project would not result in any new significant cumulative impacts or substantially more severe cumulative impacts relative to those analyzed in the Mission Bay FSEIR.

Impact C-HY-3: The proposed project, in combination with past, present, and reasonably foreseeable future projects in the site vicinity, would not result in a significant impact related to exposing people or structures to a significant risk of loss, injury, or death involving flooding. (Less than Significant)

As described in Section 5.9.3.2, Flooding, the City's Bay shoreline will be subject to an increased risk of flooding in the future due to sea level rise. Accordingly, the geographic scope for impacts related to flood risk includes those areas in the project vicinity that could be subject to flooding by 2100. Past, present, and foreseeable future development in such areas could expose people or structures to a cumulatively significant risk of loss, injury or death due to flooding. However, as described above, the proposed project would be designed and constructed in accordance with flood resistant building standards and could feasibly be adapted as necessary to respond to future flood hazards. Therefore, the proposed project's contribution to cumulative impacts related to future flood hazard risks due to sea level rise would not be cumulatively considerable (i.e., *less than significant*).

Comparison to FSEIR Significance Determination

Cumulative impacts related to future flooding were not considered in the Mission Bay FSEIR. Regardless, the proposed project would not result in any new significant cumulative impacts or substantially more severe cumulative impacts on future flooding relative to those analyzed in the FSEIR.

CHAPTER 6
Other CEQA Issues

6.1 Growth-Inducing Impacts

Section 15126.2(d) of the California Environmental Quality Act (CEQA) Guidelines requires that an environmental impact report (EIR) discuss "the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth…. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment."

As discussed in the Initial Study (Appendix NOP-IS), Section 3, Population and Housing, the project would not directly provide new housing or directly increase San Francisco's population. The project would generate about 3,578 new jobs. The Association of Bay Area Governments (ABAG) forecasts that San Francisco's population will increase by about 238,700 people between 2015 and 2040 and that the City will gain about 142,080 new jobs over this period.[1] New jobs at Mission Bay Blocks 29–32 would represent about 2.5 percent of citywide job growth. In addition, as stated in Appendix NOP-IS, the new jobs would represent about 0.7 percent of San Francisco's current labor force and 0.2 percent of the labor force in the five-county region. Thus, while development of the project would represent growth, the generation of new jobs would not encourage substantial new growth that is not currently projected for San Francisco.

The proposed development of Mission Bay Blocks 29–32 would be located within the Mission Bay Priority Development Area (PDA), one of 10 designated PDAs in San Francisco. PDAs are locally identified areas located near transit and having infill development opportunities; they are part of a regional planning initiative led by the ABAG and the Metropolitan Transportation Commission (MTC). The initiative links land use and transportation planning and promotes a connected and more compact land use pattern. Under the initiative, future growth in the region would be focused in the community-identified PDAs. Growth proposed at the project site would be consistent with the City's identification of Mission Bay as an area of San Francisco where future growth will be focused.

PDAs are also important components of "Plan Bay Area," which is the regional planning effort undertaken in response to the Sustainable Communities Strategy (Senate Bill 375), a state law passed in 2008. ABAG and MTC, the agencies leading the Bay Area's regional planning for the

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1 Association of Bay Area Governments, Bay Area Plan Projections 2013, December 2013.

Sustainable Communities Strategy, released the final version of Plan Bay Area in December 2013. The plan focuses much of the region's projected growth within the PDAs. San Francisco elected officials and agency staff have participated in the Sustainable Communities Strategy development process since its inception, and in 2012 the San Francisco Planning Department updated the City's long-range land use allocation based on ABAG's forecast for the Sustainable Communities Strategy.

Based on this analysis, the project would not have a substantial growth-inducing impact, and no mitigation is required.

6.2 Significant and Unavoidable Impacts

In accordance with CEQA Section 21067 and Sections 15126(b) and 15126.2(b) of the CEQA Guidelines, the purpose of this section is to identify impacts that could not be eliminated or reduced to less-than-significant levels by mitigation measures included as part of the project, or by other mitigation measures that could be implemented, as identified in Chapter 5, Environmental Setting, Impacts, and Mitigation Measures. These findings are subject to final determination by the OCII Commission as part of the CEQA findings for the SEIR. If necessary, this chapter will be revised in the Final SEIR to reflect the findings of the Commission.

As described in Chapter 5, the impacts listed below would be considered significant and unavoidable, even with implementation of feasible mitigation measures. With the exception of the impacts listed below, all other project impacts would either be less than significant or reduced to less-than significant levels by implementation of the identified mitigation measures.

Transportation and Circulation

- The project would result in significant and unavoidable traffic impacts at multiple intersections in the project area that would operate at Level of Service (LOS) E or LOS F, under conditions without or with an overlapping SF Giants game at AT&T Park, and with or without implementation of the Muni Special Event Transit Service Plan, as well as under 2040 cumulative conditions, even with implementation of identified mitigation measures. Because the proposed project would result in significant traffic impacts at additional intersections, these would be new significant and unavoidable impacts not previously identified in the Mission Bay FSEIR. (Impacts TR-2, TR-11, TR-18, and C-TR-2)

- The project would result in significant and unavoidable traffic impacts at freeway ramps in the project area intersections that would operate at LOS E or LOS F, under conditions without or with an overlapping SF Giants game at AT&T Park, and with or without implementation of the Muni Special Event Transit Service Plan, as well as under 2040 cumulative conditions, even with implementation of identified mitigation measures. These would be new significant and unavoidable impacts not previously identified in the Mission Bay FSEIR. (Impacts TR-3, TR-12, TR-19, and C-TR-3)

- The project would result in a substantial increase in transit demand that could not be accommodated by adjacent Muni transit capacity such that significant adverse impacts to Muni transit service would occur, under conditions without implementation of the Muni

Special Event Transit Service Plan, even with implementation of identified mitigation measures. This would be a significant and unavoidable impact not previously identified in the Mission Bay FSEIR. (Impact TR-20)

- The project would result in a significant adverse increase in transit demand that could not be accommodated by regional transit capacity such that significant adverse impacts to regional transit service would occur, under conditions without or with an overlapping SF Giants game at AT&T Park, and with or without implementation of the Muni Special Event Transit Service Plan, as well as under 2040 cumulative conditions, even with implementation of identified mitigation measures. These would be new significant and unavoidable impacts not previously identified in the Mission Bay FSEIR. (Impacts TR-5, TR-14, TR-21, and C-TR-5)

Noise and Vibration

- Operation of the proposed project would cause a substantial permanent increase in ambient noise levels in the project site vicinity, due to increased roadway noise levels from increased traffic in the project area and due to crowd noise following events affecting nearby sensitive receptors, even with implementation of identified mitigation measures. This would be a significant and unavoidable impact not previously identified in the Mission Bay FSEIR. (Impact NO-5)

- Operation of the proposed project, when considered with other cumulative development, would cause a substantial permanent increase in ambient noise levels in the project site vicinity due to increased roadway noise levels from cumulative increases in traffic in the project area, even with implementation of identified mitigation measures. This would be a significant and unavoidable impact not previously identified in the Mission Bay FSEIR. (Impact C-NO-2)

Air Quality

- Construction of the proposed project would generate fugitive dust and criteria air pollutants, which would violate an air quality standard, contribute substantially to an existing or projected air quality violation, and result in a cumulatively considerable net increase in criteria air pollutants, even with implementation of identified mitigation measures. This would be a significant and unavoidable impact not previously identified in the Mission Bay FSEIR. (Impact AQ-1)

- During project operations, the proposed project would result in emissions of criteria air pollutants at levels that would violate an air quality standard, contribute to an existing or projected air quality violation, or result in a cumulatively considerable net increase in criteria air pollutants, even with implementation of identified mitigation measures. This would be a significant and unavoidable impact not previously identified in the Mission Bay FSEIR. (Impact AQ-2)

- The project, in combination with other past, present, and reasonably foreseeable future projects, would contribute to cumulative regional air quality impacts, even with implementation of identified mitigation measures. This would be a significant and unavoidable impact not previously identified in the Mission Bay FSEIR. (Impact C-AQ-1)

Wind

- The proposed project structures would alter wind in a manner that would substantially increase the number of wind hazard hours at off-site public areas, and while feasible mitigation measures have been identified, the design refinements required to reduce this impact to a less-than-significant level have not been finalized. This would be a significant and unavoidable impact not previously identified in the Mission Bay FSEIR. (Impact WS-1)

Utilities

- The project, in combination with past, present, and reasonably foreseeable future projects, would require the construction of new or upgraded wastewater facilities, the construction of which could cause significant environmental effects. This would be a significant and unavoidable impact with no feasible mitigation measures because mitigation is beyond the control of the project sponsor. This would be a significant and unavoidable impact not previously identified in the Mission Bay FSEIR. (Impact C-UT-2)

- The project, in combination with past, present, and reasonably foreseeable future developments in the Mission Bay South area, would result in the determination by the San Francisco Public Utilities Commission (SFPUC) that it has inadequate capacity to serve the project's projected wastewater demand in addition to the SFPUC's existing commitments, even with implementation of identified mitigation measures. This would be a significant and unavoidable impact not previously identified in the Mission Bay FSEIR. (Impact C-UT-4)

6.3 Effects Found Not to Be Significant

The NOP distributed for the proposed project included an Initial Study that analyzed resource topics that were determined either not to apply to the proposed project or to have no impact, a less-than-significant impact, or a less-than-significant impact with mitigation. These topics, listed below, are not analyzed in this SEIR:

- **Land Use and Land Use Planning—**The project would not physically divide an established community; conflict with land use plans, policies, or regulations adopted for the purpose of avoiding or mitigating an environmental effect; or have impacts on the existing character of the vicinity.

- **Population and Housing—** The project would not induce substantial population growth; displace a substantial amount of existing housing or create demand for additional housing; or displace substantial numbers of people, necessitating replacement housing elsewhere.

- **Cultural and Paleontological Resources—** The project would not cause an adverse change to historic architectural resources or archaeological resources; destruction of paleontological resources; or disturbance of remains.

- **Noise—** The project would not expose people to excessive noise levels in airport or airstrip areas; or be substantially affected by existing noise levels.

- **Air Quality—** The project would not create objectionable odors.

- **Recreation**— The project would not increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facilities would occur or be accelerated; include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment; physically degrade existing recreational resources.

- **Utilities and Service Systems**— The project would not require the construction of new water facilities; affect the availability of water supply; exceed landfill capacity; or fail to comply with solid waste regulations.

- **Public Services**— The project would not create impacts associated with the need for new or altered schools, parks, or other services.

- **Biological Resources**— The project would not cause effects on special-status species, riparian habitat, wetlands, migratory wildlife corridors or sites, or conflict with plans or policies protecting resources, including habitat conservation plans.

- **Geology and Soils**— The project would not expose people or structures to geologic hazards; cause soil erosion or loss of topsoil; be affected by the presence of unstable soils or geologic units; be affected by the presence of expansive soils or soils incapable of adequately supporting wastewater disposal systems; or cause a substantial change of topography.

- **Hydrology and Water Quality**— The project would not deplete groundwater supplies; alter drainage patterns, resulting in erosion; place housing and/or structures within a 100-year flood zone; expose people and structures to hazards associated with flooding, failure of a levee or dam, seiche, tsunami, or mudflow; or cause construction-related water quality impacts.

- **Hazards and Hazardous Materials**— The project would not cause risk of upset and accident conditions involving release of hazardous materials; emit hazardous materials within 0.25 mile of a school; be located on a site listed on a hazardous materials database; be located on airport or air strip land use areas; impair implementation of emergency response or evacuation plan; expose people or structures to fire risk; or create construction-related hazards and hazardous materials impacts.

- **Mineral and Energy Resources**— The project would not cause the loss of known valuable mineral resources of the state or locally important resources; encourage activities that result in wasteful use of energy resources.

- **Agriculture and Forest Resources**— The project would not convert resources identified by the Farmland Mapping and Monitoring Program to nonagricultural use; conflict with existing zoning for agricultural use or Williamson Act contract; or involve changes that could result in Farmland of Statewide Importance to nonagricultural use.

Other topics determined to result in less-than-significant impacts or less-than-significant impact with mitigation, in Chapter 5 of this SEIR include the following:

- **Transportation and Circulation** — With implementation of identified mitigation measures, the project would not cause: construction-related ground transportation impacts; a substantial increase in transit demand that could not be accommodated by adjacent Muni transit capacity such that significant adverse impacts to Muni transit service would occur under conditions without or with an overlapping SF Giants game at AT&T Park, or under cumulative conditions; substantial overcrowding on public sidewalks, hazardous conditions for pedestrians, or pedestrian accessibility under conditions without or with an overlapping SF Giants Game at AT&T Park, and with or without implementation of the Special Event Transit Service Plan, or under cumulative conditions; cause hazardous conditions for bicyclists or bicycle accessibility under conditions without or with an overlapping SF Giants Game at AT&T Park, and with or without implementation of the Special Event Transit Service Plan, or under cumulative conditions; result in a loading demand that would create potentially hazardous conditions or significant delays for traffic, transit, bicyclists, or pedestrians under conditions without or with an overlapping SF Giants Game at AT&T Park, and with or without implementation of the Special Event Transit Service Plan, or under cumulative conditions; cause significant impacts on emergency vehicle access under conditions without or with an overlapping SF Giants Game at AT&T Park, and with or without implementation of the Special Event Transit Service Plan, or under cumulative conditions; and would not adversely affect UCSF helipad operations.

- **Noise and Vibration** — With implementation of identified mitigation measures, the project would not cause a substantial increase in ambient noise levels during construction, including under cumulative conditions; expose people to or generate noise levels in excess of established standards during construction or operation; expose people and structures to or generate excessive groundborne vibration levels; or be substantially affected by noise from future operations at the helipad at the adjacent UCSF hospital.

- **Air Quality** — With implementation of identified mitigation measures, the project would generate toxic air contaminants, including diesel particulate matter but would not expose sensitive receptors to substantial air pollutant concentrations under project or cumulative conditions; and would not conflict with, or obstruct implementation of, the *2010 Clean Air Plan*.

- **Greenhouse Gas Emissions** — With purchase of voluntary carbon credits, the project would result in no net increase in greenhouse gas emissions, and would be consistent with plans or policies adopted for the purpose of reducing emissions of greenhouse gases.

- **Shadow** — The project would not create new shadow in a manner that substantially affects outdoor recreation facilities or other public areas.

- **Utilities and Service Systems** — The project would not in itself require or result in the construction of new wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects; or require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

- **Public Services**—The project would not create impacts associated with the need for new or altered fire protection, emergency medical services, or law enforcement facilities during construction or operation, either directly or cumulatively.

- **Hydrology and Water Quality**—With implementation of identified mitigation measures, the project would not exceed the wastewater treatment requirements of the NPDES permit for the Southeast Water Pollution Control Plan; violate any water quality standards or waste discharge requirements; otherwise substantially degrade water quality as a result of changes in discharges to the Bay; exceed the capacity of the separate stormwater system; provide substantial additional sources of polluted runoff; or expose people or structures to a significant risk of loss, injury or death involving flooding due to sea level rise.

6.4 Irreversible and Irretrievable Commitments of Resources

In accordance with Section 21100(b)(2)(B) of CEQA, and Section 15126.2(c) of the CEQA Guidelines, an EIR must identify any significant irreversible environmental changes that could result from implementation of the proposed project. This may include current or future uses of non-renewable resources, and secondary or growth-inducing impacts that commit future uses of non-renewable resources, and secondary or growth-inducing impacts that commit future generations to similar uses. According to the CEQA Guidelines, irretrievable commitments of resources should be evaluated to assure that such current consumption is justified.

In general, such irreversible commitments include resources such as energy consumed and construction materials used in construction of a proposed project, as well as the energy and natural resources (notably water) that would be required to sustain a project and its inhabitants or occupants over the usable life of the project.

The project would use fossil fuel during demolition of existing parking lots where new buildings would be located, and during construction of the proposed new buildings. Construction would also require the commitment of construction materials, such as steel, aluminum, and other metals, concrete, masonry, lumber, sand and gravel, and other such materials, as well as water. The proposed project would commit future generations to an irreversible commitment of energy, primarily in the form of fossil fuels for heating and cooling of buildings, for automobile and truck fuel, and for energy production. The project would require an ongoing commitment of potable water for building occupants and landscaping.

However, all development would comply with *California Code of Regulations* Title 24 and the City's Green Building Ordinance and the project would be built to Leadership in Energy and Environmental Design (LEED©) Gold standards. Furthermore, with purchase of voluntary carbon credits, the project would result in no net increase in greenhouse gas emissions. Thus, overall, this development would be expected to use less energy and water over the lifetime of the proposed buildings than comparable structures not built to these same standards.

6.5 Areas of Known Controversy and Issues to Be Resolved

On November 11, 2014, the Office of Community Infrastructure and Investment issued a Notice of Preparation (NOP) of a Subsequent Environmental Impact Report (SEIR). Individuals, groups, and agencies that received these notices included owners of properties within 300 feet of the project site and other potentially interested parties, including various regional, state, and local agencies. A scoping meeting was held on December 9, 2014, to solicit comments on the scope of the SEIR. The NOP and Initial Study are included in Appendix NOP-IS of this document.

Based on the number of comments received, controversial issues for the proposed project, as expressed by community members, are the following:

- Site should be reserved for potential future expansion of the UCSF campus;
- Effect of project construction and operations on UCSF helipad operations;
- Why the project is analyzed under a Subsequent Environmental Impact Report;
- Which City ordinances, regulations, and approval requirements are superseded or otherwise different in the Mission Bay area;
- Aesthetic effects of the proposed development, including views through the project site and view easements, light and glare effects from construction, building lighting, and outdoor events;
- The approach to the transportation impact analysis, reasons for the assumptions incorporated (specifically into mode share), times of day and week studied, and cumulative projects considered;
- Impacts on transportation and circulation (including highways, arterial streets, local streets, pinch points, transit stations and service, and emergency response), as well as mitigation measures—specifically a Transportation Management Plan—that would reduce such impacts;
- Provision of sufficient bicycle and pedestrian circulation facilities and impacts to bicyclists and pedestrians;
- Parking supply and demand under both existing conditions and with the project;
- Financing, monitoring, and responsibility for implementation of mitigation measures;
- Noise from construction, outdoor events, crowds, operational traffic and generators;
- Impact from exposure to air pollutants during construction and operation;
- Effects on nearby infrastructure and facilities, including the Mariposa pump station and Bayfront Park;
- Security and crowd management, provision of public restrooms, provision of trash receptacles, littering, vermin, graffiti, and public intoxication;
- Economic effects of the project on the surrounding neighborhood and City; and
- Cumulative impacts of development of the project combined with development of other projects, and development under other plans, in the vicinity.

CHAPTER 7
Alternatives

7.1 Introduction

This chapter presents the alternatives analysis as required by the California Environmental Quality Act (CEQA) for the proposed multi-purpose event center and mixed-use development on Blocks 29-32 in the Mission Bay South Redevelopment Plan Area of San Francisco. The discussion includes a review of the alternatives analyzed in the 1998 Mission Bay Final Subsequent Environmental Impact Report (Mission Bay FSEIR), followed by the methodology used to select alternatives to the proposed project for detailed CEQA analysis, with the intent of developing potentially feasible alternatives that could avoid or substantially lessen the significant impacts identified for the proposed project while still meeting most of the project objectives. The chapter identifies a reasonable range of alternatives that meet these criteria, and these alternatives are evaluated for their comparative merits with respect to minimizing adverse environmental effects. For the alternatives selected for detailed analysis, the chapter evaluates the alternatives' impacts against existing environmental conditions and compares the potential impacts of the alternatives with those of the proposed project. Based on this analysis, this chapter then identifies the environmentally superior alternative. Finally, it describes other alternative concepts that were considered but eliminated from detailed consideration and reasons for their elimination.

7.1.1 CEQA Requirements for Alternatives Analysis

The CEQA Guidelines, Section 15126.6(a), state that an environmental impact report (EIR) must describe and evaluate a reasonable range of alternatives to the proposed project that would feasibly attain most of the project's basic objectives, but that would avoid or substantially lessen any identified significant adverse environmental effects of the project. An EIR is not required to consider every conceivable alternative to a proposed project. Rather, it must consider a reasonable range of potentially feasible alternatives that will foster informed decision-making and public participation.

CEQA, the CEQA Guidelines, and the case law on the subject have found that feasibility can be based on a range of factors and influences. CEQA Guidelines, Section 15364, defines "feasibility" as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors." CEQA Guidelines Section 15126.6(f)(1) states that the factors that may be taken into account when addressing the feasibility of alternatives include site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries (projects with a regionally significant impact should consider the regional context), and whether the proponent can reasonably acquire, control, or otherwise have access to the alternative site (or the site is already owned by the proponent).

CEQA Guidelines Section 15126.6(e) states that, "The specific alternative of 'no project' shall also be evaluated along with its impact."

The EIR must evaluate the comparative merits of the alternatives and include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed project. Specifically, the CEQA Guidelines set forth the following criteria for selecting and evaluating alternatives:

- An EIR shall describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives. An EIR need not consider every conceivable alternative to a project. Rather it must consider a reasonable range of potentially feasible alternatives that will foster informed decisionmaking and public participation. An EIR is not required to consider alternatives which are infeasible. (Section 15126.6[a])

- [T]he discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly. (Section 15126.6[b])

- The range of potential alternatives shall include those that could feasibly accomplish most of the basic objectives of the project and could avoid or substantially lessen one or more of the significant effects. (Section 15126.6[c])

- The specific alternative of "no project" shall also be evaluated along with its impact. (Section 15126.6[e][1])

- The alternatives shall be limited to ones that would avoid or substantially lessen any of the significant effects of the project. Of those alternatives, the EIR need examine in detail only the ones that the lead agency determines could feasibly attain most of the basic objectives of the project. The range of feasible alternatives shall be selected and discussed in a manner to foster meaningful public participation and informed decision-making. (Section 15126.6[f])

7.1.2 Mission Bay FSEIR Alternatives Analysis

The Mission Bay FSEIR identified and analyzed alternatives to the Mission Bay North and Mission Bay South Redevelopment Plans (Plans). As required under CEQA, the selected alternatives would reduce or avoid identified significant impacts of the Plans as well as meet most of the Plans objectives. The Mission Bay FSEIR also analyzed the required No Project alternative. The three alternatives analyzed in the Mission Bay FSEIR included:

- **No Project/Expected Growth Alternative**—is a reasonable estimate of development within the Plan area that could occur through 2015 under 1998 zoning regulations. About half as much residential and non-residential development would occur compared to the proposed Plans.
- **Redevelopment North of Channel/Expected Growth South of Channel Alternative**—is a combination of the proposed North Plan and instead of the South Plan, the expected growth scenario for the South Plan area. About the same amount of residential but 80 percent less non-residential development would occur compared to the proposed Plans.
- **Residential/Open Space Alternative**—A new overall scenario with about 65 percent more housing and 80 percent less non-residential development compared to the proposed Plans.

The Mission Bay FSEIR determined that all of the alternatives would result in the same significant and unavoidable adverse impacts identified for the Plans (i.e., traffic, vehicular air pollution emissions, potential combined toxic air contaminants, cumulative hazardous waste generation and disposal, and cumulative water quality), but the severity of the impacts would be somewhat lessened though not to a less-than-significant level. The Residential/Open Space Alternative was identified as the environmentally superior alternative.

As a program-level EIR, the Mission Bay FSEIR analyzed program-level alternatives that addressed the overall objectives of the Plans for the entire Plan area, and thus, did not examine specific alternatives for individual blocks or parcels such as Blocks 29-32. This SEIR, as discussed below, addresses site-specific alternatives for Blocks 29-32.

7.1.3 Organization of this Chapter

Following this introductory section, Section 7.2 describes the basis for selecting the alternatives analyzed in this SEIR; it reviews the project objectives, summarizes the significant impacts of the project that were identified in Chapter 5, and describes the alternatives screening and selection process. Section 7.3 provides a detailed description of each of the selected alternatives, its ability to meet the project objectives, and an evaluation of its environmental impacts compared to those of the proposed project. Section 7.4 compares the impacts of the alternatives to the impacts of the proposed project and to one another, and it identifies the environmentally superior alternative. The alternative concepts considered but rejected from further study are then discussed in Section 7.5.

7.2 Alternatives Selection

This section describes the basis for determining the range of CEQA alternatives and identifies the specific alternatives that are analyzed in this SEIR.

7.2.1 Project Objectives

As presented in Chapter 3, the objectives of the project, reiterated below, are consistent with the objectives of the Mission Bay Redevelopment Plan (see Chapter 3, Section 3.2). These alternatives were used in the identification and selection of alternatives. As noted above, an EIR need only consider alternatives that would feasibly accomplish most of the project's basic objectives.

The project sponsor's objectives for the proposed project are to:

- Construct a state-of-the-art multi-purpose event center in San Francisco that meets NBA requirements for sports facilities, can be used year-round for sporting events and entertainment and convention purposes with events ranging in capacity from approximately 3,000-18,500, and expands opportunities for the City's tourist, hotel and convention business.
- Provide sufficient complementary mixed-use development, including office and retail uses, to create a lively local and regional visitor-serving destination that is active year-round, promotes visitor activity and interest during times when the event center is not in use, provides amenities to visitors of the event center as well as the surrounding neighborhood, and allows for a financially feasible project.
- Develop a project that meets high-quality urban design and high-level sustainability standards.
- Optimize public transit, pedestrian, and bicycle access to the site by locating the event center within walking distance to local and regional transit hubs, and adjacent to routes that provide safe and convenient access for pedestrians and bicycles.
- Provide adequate parking and vehicular access that meets NBA and project sponsor's reasonable needs for the event center and serves the needs of project visitors and employees, while encouraging the use of transit, bicycle, and other alternative modes of transportation.
- Provide the City with a world class performing arts venue of sufficient size to attract those events which currently bypass San Francisco due to lack of a world class 3,000-4,000 seat facility.
- Develop a project that promotes environmental sustainability, transportation efficiency, greenhouse gas reduction, stormwater management using green technology, and job creation consistent with the objectives of the California Jobs and Economic Improvement Through Environmental Leadership Act (AB 900), as amended.

7.2.2 Summary of Significant Impacts

As stated in the CEQA Guidelines, alternatives to a project must substantially lessen or avoid any of the significant environmental impacts associated with the project. The following summarizes the conclusions for potentially significant and significant impacts identified in Chapter 5 of this SEIR and in the Initial Study (see Appendix NOP-IS).

7.2.2.1 Significant and Unavoidable Impacts

The proposed project was determined to have the following significant and unavoidable impacts, as described in detail in Chapter 5 of this SEIR.

Transportation and Circulation

- The project would result in significant and unavoidable traffic impacts at multiple intersections in the project area that would operate at Level of Service (LOS) E or LOS F, under conditions without or with an overlapping SF Giants game at AT&T Park, and with or without implementation of the Muni Special Event Transit Service Plan, as well as under 2040 cumulative conditions, even with implementation of identified mitigation measures. (Impacts TR-2, TR-11, TR-18, and C-TR-2)

- The project would result in significant and unavoidable traffic impacts at freeway ramps in the project area intersections that would operate at LOS E or LOS F, under conditions without or with an overlapping SF Giants game at AT&T Park, and with or without implementation of the Muni Special Event Transit Service Plan, as well as under 2040 cumulative conditions, even with implementation of identified mitigation measures. (Impacts TR-3, TR-12, TR-19, and C-TR-3)

- The project would result in a substantial increase in transit demand that could not be accommodated by adjacent Muni transit capacity such that significant adverse impacts to Muni transit service would occur, under conditions without implementation of the Muni Special Event Transit Service Plan, even with implementation of identified mitigation measures. (Impact TR-20)

- The project would result in a significant adverse increase in transit demand that could not be accommodated by regional transit capacity such that significant adverse impacts to regional transit service would occur, under conditions without or with an overlapping SF Giants game at AT&T Park, and with or without implementation of the Muni Special Event Transit Service Plan, as well as under 2040 cumulative conditions, even with implementation of identified mitigation measures. (Impacts TR-5, TR-14, TR-21, and C-TR-5)

Noise and Vibration

- Operation of the proposed project would cause a substantial permanent increase in ambient noise levels in the project site vicinity, due to increased roadway noise levels from increased traffic in the project area and due to crowd noise following events affecting nearby sensitive receptors, even with implementation of identified mitigation measures. (Impact NO-5)

- Operation of the proposed project, when considered with other cumulative development, would cause a substantial permanent increase in ambient noise levels in the project site vicinity due to increased roadway noise levels from cumulative increases in traffic in the project area, even with implementation of identified mitigation measures. (Impact C-NO-2)

Air Quality

- Construction of the proposed project would generate fugitive dust and criteria air pollutants, which would violate an air quality standard, contribute substantially to an existing or projected air quality violation, and result in a cumulatively considerable net increase in criteria air pollutants, even with implementation of identified mitigation measures. (Impact AQ-1)

- During project operations, the proposed project would result in emissions of criteria air pollutants at levels that would violate an air quality standard, contribute to an existing or projected air quality violation, or result in a cumulatively considerable net increase in criteria air pollutants, even with implementation of identified mitigation measures. (Impact AQ-2)

- The project, in combination with other past, present, and reasonably foreseeable future projects, would contribute to cumulative regional air quality impacts, even with implementation of identified mitigation measures. (Impact C-AQ-1)

Wind

- The proposed project structures would alter wind in a manner that would substantially increase the number of wind hazard hours at off-site public areas, and while feasible mitigation measures have been identified, the design refinements required to reduce this impact to a less-than-significant level have not been finalized. (Impact WS-1)

Utilities

- The project, in combination with past, present, and reasonably foreseeable future projects, would require the construction of new or upgraded wastewater facilities, the construction of which could cause significant environmental effects. This would be a significant and unavoidable impact with no feasible mitigation measures because mitigation is beyond the control of the project sponsor. (Impact C-UT-2)

- The project, in combination with past, present, and reasonably foreseeable future developments in the Mission Bay South area, would result in the determination by the San Francisco Public Utilities Commission (SFPUC) that it has inadequate capacity to serve the project's projected wastewater demand in addition to the SFPUC's existing commitments, even with implementation of identified mitigation measures. (Impact C-UT-4)

7.2.2.2 Significant Impacts that can be Mitigated to Less than Significant

The proposed project was determined to have the following potentially significant impacts, all of which could be mitigated to a less-than-significant level with implementation of identified mitigation measures, as described in detail in Chapter 5 of this SEIR and in the Initial Study (see Appendix NOP-IS).

Transportation and Circulation

- The project could result in a significant adverse increase in transit demand that could not be accommodated by adjacent Muni transit capacity under the existing plus Muni Special Event Transit Service Plan, under conditions with an overlapping SF Giants game at AT&T Park and under 2040 cumulative conditions, but identified mitigation measures to provide supplemental Muni transit service during overlapping events would reduce these impacts to less than significant. (Impact TR-13 and Impact C-TR-4)

- The project could result in a substantial overcrowding on public sidewalks, create potentially hazardous conditions for pedestrians, or otherwise interfere with pedestrian accessibility on the site and adjoining areas, under conditions without or with an overlapping SF Giants game at AT&T Park and with or without implementation of the Muni Special Event Transit Service Plan, and under 2040 cumulative conditions, but identified mitigation measures to actively manage pedestrian flows at certain locations would reduce these impacts to less than significant. (Impacts TR-6, TR-15, TR-22, and C-TR-6)

- Construction of the project could temporarily obstruct helipad airspace surfaces under project or cumulative conditions, and operation of the project could affect helipad flight operations, but identified mitigation measures to prepare and implement a crane safety plan for project construction and an event center exterior lighting plan would reduce these impacts to less than significant. (Impact TR-9 and Impact C-TR-9)

Noise

- Operation of the project could result in exposure of persons to or generation of noise levels in excess of standards established in the San Francisco General Plan or San Francisco Noise Ordinance. Potentially significant operational noise impacts due to use of amplified sound in outdoor spaces at the project could be mitigated with implementation of a noise control plan for outdoor amplified sound, and potential noise impacts from interior event noise could be mitigated with implementation of a noise control plan for the San Francisco Entertainment Commissions' Place of Entertainment Permit. (Impact NO-4)

- Potentially significant construction noise impact due to the project's contribution to cumulative noise from construction of the project concurrent with other construction projects in the immediate vicinity could be mitigated to less than significant by implementing construction noise control measures. (Impact C-NO-1).

Air Quality

- Exposure of sensitive receptors to emissions of toxic air contaminants, including diesel particulate matter, from project construction and operation and under cumulative conditions, could result in a significant cancer risk but could be mitigated through implementation of construction emissions minimization measures. (Impact AQ-3 and C-AQ-2)

- The potential for the project to conflict with implementation of the *2010 Clean Air Plan* could be mitigated through implementation of construction minimization measures, reduction of operational emissions, transportation demand management measures, and purchase of emission offsets. (Impact AQ-4)

Hydrology and Water Quality

- Potentially significant impacts related to discharges of unusual chemicals such as radioactive materials and biohazardous materials to the Southeast Water Pollution Control Plant (SEWPCP) that could result in violation of the NPDES permit for the SEWPCP would be mitigated by providing sampling ports to facilitate sampling of wastewater discharges. (Impact HY-6)

Cultural Resources

- Project construction, both directly and cumulatively, could cause a substantial adverse change in the significance of archaeological resources, but implementation of archaeological testing, monitoring, data recovery, and accidental discovery measures would reduce this impact to less than significant. (Impact CP-2 and Impact C-CP-1, Initial Study)

Biological Resources

- Project construction could affect breeding birds which may nest within the project site, but implementation of preconstruction surveys for nesting birds would reduce this impact to less than significant. In addition, proposed structures could increase the risk of bird collisions with buildings, but implementation of bird safe building practices would reduce this impact to less than significant. (Impact BI-4, Initial Study)

Hazards and Hazardous Materials

- As identified in the Mission Bay FSEIR, site development could involve uses that handle biohazardous materials, but implementation of FSEIR mitigation measures providing guidelines for handling biohazardous materials would reduce this impact to less than significant. In addition, proposed construction could encounter naturally occurring asbestos, but implementation of geologic investigations and dust mitigation plans would reduce this impact to less than significant. (Impact HZ-1, Initial Study)

- As identified in the Mission Bay FSEIR, site development could include child care facilities that could be exposed to human health risks, but implementation of FSEIR mitigation measures providing risk management planning provisions for child care facilities would reduce this impact to less than significant. (Impact HZ-2, Initial Study)

7.2.3 Alternatives Screening and Selection

7.2.3.1 Alternatives Screening

In accordance with CEQA Guidelines Section 15126.6(a), this project-level SEIR examines a reasonable range of alternatives to the proposed project or to the location of the project. An alternative selected for analysis must meet three criteria: (1) the alternative would attain *most* of the project's basic objectives; (2) the alternative would *avoid or substantially lessen* the significant environmental impacts of the proposed project; and (3) the alternative must be potentially *feasible*.

An EIR need not consider an alternative whose impact cannot be reasonably ascertained and whose implementation is remote and speculative. Furthermore, an EIR need not consider every conceivable alternative, but must consider a reasonable range of alternatives that will foster informed decision-making and public participation.

Screening Process

The alternatives selection process for the proposed project was based on first identifying strategies that would avoid or lessen the significant and potentially significant impacts identified above, with particular focus on strategies that address significant and unavoidable impacts of the proposed project. In addition, potential alternatives, options, and strategies were identified from review of scoping comments received following issuance of the Notice of Preparation (see Chapter 2, Section 2.4.1, Notice of Preparation and Public Scoping, and Section 2.6, Summary of Scoping Comments). Mitigation measures identified for the proposed project were also considered in the context of the alternatives screening process as possible strategies to avoid or substantially lessen significant impacts. The alternative strategies were then screened for their feasibility, and the potentially feasible strategies were then screened for their ability to meet most of the project objectives. This process resulted in the final alternatives that were determined to represent a reasonable range of alternatives that are described and analyzed in this SEIR.

Identification of Strategies to Avoid or Lessen Significant Impacts

All of the significant and potentially significant impacts identified for the proposed project, as summarized above, can be broken down into the following categories with respect to strategies for avoiding or lessening impacts related to: traffic; wastewater treatment capacity impacts; crowd and amplified noise; UCSF hospital helipad safety; wind hazards; construction; water quality and hazardous materials; and bird collisions. These strategies were then used to formulate alternatives for analysis in this chapter.

Transportation-related Impacts

Increased traffic generated by the proposed project would result in multiple significant impacts on transportation, noise, and air quality, many of which would be significant and unavoidable. The proposed project already incorporates extensive transportation demand management strategies and a transportation management plan, and the Transportation analysis in Chapter 5, Section 5.2, identifies numerous mitigation measures to further reduce transportation impacts. However, beyond those already identified measures, potential alternative strategies to lessen transportation impacts could include further decreasing project-generated traffic through reducing the scale and intensity of the land uses proposed at the project site (either the mixed uses and/or the event center) or by relocating the project to an alternate site where fewer trips would occur by auto and/or where traffic generated from the proposed uses would result in less severe impacts. These strategies are discussed below.

Wastewater Treatment Capacity Impacts

As discussed further below, the only feasible approach to addressing the significant and unavoidable wastewater treatment capacity impact of the proposed project would be to re-locate the project to a different sewage drainage area where there is sufficient capacity for the projected wastewater demand.

Crowd and Amplified Sound Noise Impacts

As described in Chapter 3, Project Description, the event center would be designed as a year-round destination attraction for a wide variety of sports, entertainment, and convention purposes as well as to provide amenities to serve visitors and the surrounding neighborhood. Thus, by design, large numbers of people would congregate at the project site, resulting in crowd noise, which in turn would result in a significant, unavoidable impact on nearby sensitive receptors following evening events. Further, without appropriate mitigation, the event center could result in significant impacts related to amplified sound in outdoor spaces, noise leakage from the events within the event center, and overcrowding on public sidewalks. Beyond the mitigation measures identified in Chapter 5, alternative strategies to reduce or lessen these event-center related impacts would be either to reduce the size of the event center, thereby reducing the number of event attendees and associated crowding effects, or to relocate the event center away from sensitive receptors. These strategies are discussed below.

UCSF Hospital Helipad Safety Impacts

Chapter 5, Section 5.2, included an analysis of the impacts of the proposed project on the UCSF Hospital helipad. The analysis determined that operation of the proposed event center could affect helipad flight operations due to the potential for use of specialty exterior lighting. While the identified mitigation measure of preparing and implementing an event center exterior lighting plan would reduce this impact to less than significant, the only alternative strategy to avoid this impact would be to relocate the event center away from the UCSF Hospital helipad. This strategy is discussed below.

Wind Hazards Impacts at Off-site Public Areas

Chapter 5, Section 5.6, conservatively determined that the proposed project would result in significant and unavoidable wind hazard impacts, even with implementation of identified mitigation measures, because the wind effects of final design refinements have not yet been confirmed. The only feasible strategy to avoid or lessen wind hazards impacts, regardless of the location of the proposed project, would be to implement the identified mitigation measure, namely to develop and test design measures (using wind tunnel testing methodologies) to confirm site-specific changes in wind conditions attributable to the proposed project, as indicated in Mitigation Measure M-WS-1, Develop and Implement Design Measures to Reduce Off-site Wind Hazards. Thus, even though Impact WS-1 was identified as significant and unavoidable with mitigation, it is anticipated that during final project design and prior to construction, the project sponsor would implement Mitigation Measure M-WS-1 and develop appropriate project design refinements to reduce the wind hazard impact at off-site pubic areas to less than significant. Therefore, no specific alternative strategies are discussed in this alternatives analysis regarding avoiding or lessening wind hazard impacts. However, please see Chapter 8, Third Street Plaza Variant, which analyzes a variation of the proposed project that would result in less-than-significant wind hazards impacts without the need for mitigation.

Construction-related Impacts

Construction activities would result in a significant and unavoidable impact on air quality, as well as significant impacts that can be reduced to less than significant with identified mitigation measures related to the following: (1) UCSF helipad airspace surfaces, (2) cumulative noise in combination with other planned construction projects in the immediate vicinity, (3) exposure of sensitive receptors to toxic air contaminants, (4) archaeological resources, and (5) nesting birds.

Chapter 5, Section 5.4 identifies mitigation measures for construction air quality and toxic air contaminants, which include construction emissions minimization as well as emission offsets; these measure represent the only feasible strategies to lessen air quality impacts of a construction project of this magnitude within the San Francisco Bay Area Air Basin. However, reducing the scale of the project (either the event center and/or the mixed-use development) would represent a potential alternative strategy that could reduce these air quality impacts; this strategy is discussed below. With respect to construction-related cumulative noise and helipad impacts, Chapter 5 indicates that these impacts could be mitigated to a less-than-significant level with identified mitigation measures; however, alternative strategies to avoid or lessen these impacts would be either to reduce the size/scale of the project (to the extent that construction would not contribute substantially to cumulative construction noise) or to relocate the project to an alternate site where there is no adjacent private helipad and no other construction projects in the immediate vicinity. These strategies are discussed below.

Construction impacts related to the potential to encounter archaeological resources or nesting birds would be mitigated to less than significant with identified mitigation measures. These impacts would occur regardless of the size or scale of the project, and no on-site alternative strategies would reduce or lessen these mitigable effects. These impacts are associated with any project that involves grading or excavation activities. For this reason, off-site alternatives, depending on the location, would likely result in the same potential impacts and require the same mitigation measures if grading and excavation were required or if any vegetation is present on the site. Therefore, no alternative strategies are designed to specifically address these impacts.

Water Quality and Hazardous Materials Impacts

Potentially significant impacts associated with possible future uses at the project site include one water quality impact and two hazardous materials impacts; these impacts were all identified in the Mission Bay FSEIR with respect to the entire Plan area and would also apply to the proposed project at Blocks 29-32. The water quality impact is due to the possibility that proposed commercial uses, particularly research uses, could discharge unusual chemicals to the SEWPCP, and the hazardous materials impact is due to the possibility that certain future uses could involve handling of biohazardous materials. An additional hazardous materials impact is due to the potential for future child care facilities to be present in areas subject to a risk management plan for exposure to hazardous materials in soil and groundwater. The FSEIR identified feasible mitigation measures that would reduce these impacts to less than significant. All of these impacts apply to the proposed project and would apply to any proposed development at this site, because such potential uses are allowed under the Mission Bay South Plan. Therefore, no on-site alternative strategy would address these impacts, given that the identified mitigation measures would adequately mitigate this impact under any allowable development at this site. An off-site alternative strategy, which, depending on the location, could avoid these potentially significant impacts, is discussed below.

Bird Collisions Impact

The biological resources impact analysis in the Initial Study (see Appendix NOP-IS) identified the potential for the proposed project to result in increased risk for bird collisions with buildings due to the proximity of the site to the Bay and the fact that the proposed project is not subject to the City's *Standards for Bird-Safe Buildings* (Planning Code Section 139) because the site is within the Mission Bay Redevelopment Plan Area. However, the identified mitigation measure to implement bird safe building practices consistent with the City's *Standards for Bird-Safe Buildings* (Planning Code Section 139) would ensure that the project would result in a less-than-significant impact on birds. This mitigation measure would apply to any alternative development on the project site or elsewhere within the Plan area. For any off-site alternative located anywhere else in the City, the *Standards for Bird-Safe Buildings* (Planning Code Section 139) would apply and compliance with this regulation would result in no impact on bird collisions. Therefore, no alternative strategies are designed to address this impact.

Evaluation of Potential Strategies that Would Avoid or Lessen Significant Impacts

As described above, alternative strategies that could avoid or lessen the identified significant impacts of the proposed project include: (1) reducing the intensity of the mixed uses; (2) reducing the size/scale of the event center; and (3) relocating the project to an alternate site.

Alternative Strategy to Reduce the Intensity of the Mixed Uses

This strategy was determined to be potentially feasible and is the basis for one of the alternatives selected for detailed analysis, Alternative B, Reduced Intensity Alternative. Alternative B was developed with the intent of reducing transportation- and construction-related impacts, and Section 7.3, below, presents the assumptions and description of the Reduced Intensity Alternative, its ability to meet the project objectives, and a comparison of its environmental impacts compared to those of the proposed project.

Alternative Strategy to Reduce Size/Scale of the Event Center

As described above, this strategy could potentially reduce traffic-related and event-center impacts. The size and scale of the proposed event center is currently designed to meet the primary objective of meeting the NBA requirements for sports facilities, and specifically for use as the home court for the Golden State Warriors basketball team. The proposed capacity of 18,064 seats is nearly 1,600 fewer seats than the average capacity of all current NBA facilities (19,662 average capacity, 19,862 median capacity). The proposed 18,064-seat capacity is also well below the capacity of the Warriors' current home court at the Oracle Arena in Oakland (capacity 19, 956). However, while the event center is designed to meet the specific needs for NBA basketball games, it is also designed on balance to achieve the overall project objectives (see Section 7.2.1, above) of providing a year-round venue for a variety of sporting events, entertainment, and convention purposes that promotes environmental sustainability, transportation efficiency, greenhouse gas reduction, and job creation.

If the proposed event center were to open in 2015, the proposed 18,064-seat capacity would be the fourth lowest capacity in the NBA, despite the high current market demand for season tickets. Currently, the Warriors have 14,500 season ticket holders and there are over 13,000 people on the waiting list for season tickets. Therefore, the project sponsor has indicated that reducing the capacity of the event center below 18,064 is not feasible due to its already small size relative to other NBA facilities and the overwhelming market demand for season tickets.

Furthermore, as described above, most of the event center-related impacts could be mitigated with identified mitigation measures, and it is unlikely that reducing the size/scale of the event center could effectively or substantially lessen the project's significant transportation-related impacts.

Detailed traffic modeling of a smaller event center has not been performed. For this reason, it is not possible to determine exactly how small the event center would need to be in order to avoid some or all of the project’s significant and unavoidable traffic impacts. Based on the modeling that has been performed, however, it would be expected that a smaller event center would result in significant impacts at fewer intersections, but as indicated by the modeling conducted for the No Event scenario, an arena of any size would result in a significant impact at the intersection of 16th/Seventh/Mississippi. Thus, even a substantially smaller event center than the proposed 18,064-seat event center would still have a significant and unavoidable impact, would not meet NBA standards for an arena, and would not meet the basic project objectives.

Furthermore, reducing the scale of operations at the proposed event center—such as reducing the number or size of events—would reduce the frequency of the significant transportation-related impacts but would not lessen or avoid the magnitude of the impact of any individual event; the same transportation impacts would remain significant and unavoidable. Therefore, this alternative strategy would not effectively avoid or lessen transportation-related impacts. Thus, reducing the size and scale of the event center was screened from further consideration for detailed alternatives analysis. It should be noted, however, that reducing the size of project features other than the event center is included under Alternative B, Reduced Intensity Alternative, which is analyzed in this chapter of the SEIR.

Alternative Strategy to Relocate the Project to an Alternate Site

Relocating the project to an alternate site could potentially avoid or lessen significant transportation-related impacts, wastewater capacity impacts, operational noise impacts, UCSF Hospital helipad safety impacts, construction-related impacts, and/or future use-related impacts that were identified for the proposed project at Blocks 29-32. However, the feasibility of an alternate location is highly site-specific and dependent on numerous factors, including among other factors, site suitability, economic viability, availability of infrastructure, general plan consistency, and whether or not the project sponsor can reasonably acquire, control, or otherwise have access to the alternate site, per CEQA Guidelines Section 15126.6(f)(1). Furthermore, relocating the project to an alternate site could result in the same, greater, or different significant impacts than those identified for the proposed project. For the purposes of this SEIR, twelve alternate sites in San Francisco were examined as potential candidates for an off-site alternative based in part on scoping comments received, as described in more detail in Section 7.5 below. One site was selected to represent the alternative strategy of relocating the project.

Given the history of the proposed project and known objectives of the project sponsor, Alternative C, Off-site Alternative at Piers 30-32 and Seawall Lot 330, was identified as a potentially feasible option for an off-site alternative for analysis in this SEIR. As described in Chapter 2 of this SEIR, in 2012, the project sponsor submitted an application to the San Francisco Planning Department for a proposed event center and mixed-use development on Piers 30-32 and Seawall Lot 330. The project sponsor conducted a number of studies and investigations for a project at this site, including preparation of detailed site-specific plans and programming and conducting discussions and negotiations with responsible and approving agencies. Thus, Piers 30-32 and Seawall Lot 330 is considered to be a feasible location for an off-site alternative for the purposes of this SEIR due to its site suitability (based on the existing studies that have been conducted for this site), proximity to the downtown and local/regional transit services its previous history of potential economic viability, and the potential ability of the project sponsor to reasonably acquire, control, or otherwise have access to this site (based on previous negotiations and discussions with the Port of San Francisco).

Since the issuance of the Notice of Preparation for this previous proposal in November of 2012, a number of changes in circumstances have occurred, leading in part to the project sponsor's decision to withdraw its application for development of the previously proposed project at Piers 30-32 and Seawall Lot 330. The proposed project at Piers 30-32 and Seawall Lot 330 generated extensive public controversy. In addition, the voters of San Francisco approved Proposition B in June 2014, which requires voter approval for any increase in existing zoning heights along the waterfront. While there is currently a lawsuit challenging the validity of this proposition, if upheld in court, the ballot measure would require the Off-site Alternative at Piers 30-32 and Seawall Lot 330 to obtain approval of a zoning height change from the San Francisco voters. Many individuals credit this ballot measure along with increased project costs, lengthy regulatory approvals, and opposition to the project location as the basis for the project sponsor to relocate the project to Mission Bay. Yet, in November 2014, the San Francisco voters approved Proposition F to allow a height increase for a development project at Pier 70. The Seawall Lot 337 LLC, an affiliate of the San Francisco Giants, is currently collecting signatures to qualify for a ballot measure for the November 2015 election to approve height increases for a proposed development at Seawall Lot 337 (which incidentally is one of the off-site locations considered and eliminated from further consideration, as discussed in Section 7.5, below). These efforts indicate that while it is difficult to obtain approval at the ballot for height increases on waterfront property and may extend the project approval time horizon, it is not unreasonable to expect that public support for a ballot measure to approve a GSW project at this alternative location is possible and would represent a viable project. In addition, the San Francisco voters have historically approved certain aspects of a professional sports franchise at the ballot;

there have been successful prior ballot measures involving projects related to facilities for professional sports franchises: "Ballpark" (Proposition B) in March 1996 and "Candlestick Point Stadium Land Use" (Proposition F) in June 1997. Consequently, relocating the proposed project to its previously proposed location with many of the project elements as originally proposed constitutes a potentially feasible off-site alternative despite the abovementioned hurdles necessary for project approval.

Therefore, the Off-site Alternative at Piers 30-32 and Seawall Lot 330 was selected for detailed analysis in this SEIR, with the intent of reducing transportation-related impacts, wastewater capacity impacts, operational noise impacts, UCSF hospital helipad safety impacts, construction-related impacts, and water quality and hazardous materials impacts that were identified for the proposed project. Section 7.3, below, presents the assumptions and description of the Off-site Alternative at Piers 30-32 and Seawall Lot 330, its ability to meet the project objectives, and a comparison of its environmental impacts compared to those of the proposed project.

7.2.3.2 Alternatives Selected for Detailed Analysis

The following alternatives are analyzed in this chapter:

- Alternative A: No Project Alternative
- Alternative B: Reduced Intensity Alternative
- Alternative C: Off-site Alternative at Piers 30-32 and Seawall Lot 330

These three alternatives were determined to adequately represent the range of feasible alternatives required under CEQA for this project. These alternatives would lessen, and in some cases avoid, significant and potentially significant adverse impacts related to transportation, air quality, noise, utilities, water quality, and hazardous materials that were identified for the proposed project. Alternative A is included as required by CEQA Guidelines Section 15126.6(e), even though it would not meet the basic project objectives, but Alternatives B and C are potentially feasible options that would likely meet most of the project objectives. **Table 7-1** summarizes and compares the characteristics of the proposed project with those of Alternatives A, B, and C. Detailed descriptions of each alternative are presented in Section 7.3, below, along with an evaluation of their environmental impacts. **Table 7-2** summarizes the ability of the three alternatives to meet the project objectives. In addition, as noted in Chapter 8 of this SEIR, a project variant is analyzed in equal level of detail as the proposed project, and this variant incidentally reduces one of the significant impacts of the proposed project while meeting all of the project objectives. Thus, this variant represents a fourth alternative considered in detail in this alternatives analysis. Please refer to Chapter 8 for the description and analysis of the Third Street Plaza Variant (and the fourth project alternative).

TABLE 7-1
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES

Characteristic	Proposed Project	Alternative A: No Project	Alternative B: Reduced Intensity	Alternative C: Off-Site at Piers 30-32/SWL 330
Summary				
Size, gross square feet (gsf)	750,000 event center 25,000 GSW offices 580,000 other office uses 125,000 retail use 475,000 parking and loading 1,955,000 Total	1,056,000 commercial/industrial 31,700 retail 1,087,700 Total	750,000 event center 25,000 GSW offices 348,000 other office uses 75,000 retail use 350,000 parking and loading 1,548,000 Total	694,944 event center, including GSW offices 25,946 event hall 90,000 retail at Piers 30-32 13,172 services 252,554 parking and loading 1,820 Red's Java House 1,078,436 Total at Piers 30-32 208,844 residential at SWL 330 178,406 hotel at SWL 330 29,854 retail at SWL 330 106,339 parking at SWL 330 11,447 support at SWL 330 534,890 Total at SWL 330
Parking, number of spaces	950 spaces onsite, plus 132 spaces off-site	1,050 spaces onsite plus 132 spaces off-site	750 spaces onsite, plus 132 spaces off-site	500 at Piers 30-32 259 at SWL 330
Public Open Space	3.2 acres	Not defined	3.2 acres	7.26 acres on Piers 30-32
Event Center				
Location	Mission Bay South Redevelopment Area, Blocks 29-32	Oracle Arena, Oakland (rebuilt, or possibly re-located)	Same as Project	Piers 30-32
Basketball Seating Capacity, number of seats	18,064	19,596 (current capacity)	Same as Project	Same as Project
Size of Event Center, gsf	750,000	~ 500,000 (current size)	Same as Project	694,944
GSW Management Offices and Practice Facilities, gsf	25,000	~ 16,000 sq. ft. in downtown Oakland (current location)	Same as Project	Approx. same as Project
Operations	Approx. 225 events per year (see Chapter 3, Project Description)	Same as existing, in Oakland (see Chapter 3, Project Description)	Same as Project	Same as Project

TABLE 7-1 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES

Characteristic	Proposed Project	Alternative A: No Project	Alternative B: Reduced Intensity	Alternative C: Off-Site at Piers 30-32
Mixed-Use Development				
Total Mixed Uses (non-event center), gsf	580,000, office use 125,000, retail use	1,056,000 commercial/industrial 31,700 retail	373,000 office use 75,000 retail use	90,000 retail at Piers 30-32 29,854 retail at SWL 330 208,844 residential at SWL 330 178,406 hotel at SWL 330
Maximum Height, feet (Building heights are measured from finished grade to top of building, consistent with the South Design for Development. Heights of proposed office and retail buildings excludes unoccupied top floor level with mechanical equipment.)	Blocks 29-32, Event Center: 135 feet Block 29, South St. Tower: 160 feet Block 29, Podium: 90 feet Block 31, 16th St. Tower: 160 feet Block 31, Podium: 90 feet	Block 29, Third St. Tower: 160 feet Blocks 31 and 32: Max. 90 feet (7 stories) Block 30: Approx. 75 feet (5 stories)	Blocks 29-32, Event Center: 135 feet Block 29, South St. Tower: 160 feet Block 29, Podium: 90 feet Block 31: 55 feet	Event Center at Piers 30-32: 128 feet Residential Uses at SWL 330: 175 feet Hotel Uses at SWL 330: 105 feet
Operations	Year-round operations, 7 days a week (see Chapter 3, Project Description)	Typical year-round schedule expected for commercial/industrial/retail uses	Same as Project	Event Center, same as Project Typical year-round schedule expected for retail/residential/ hotel uses
Construction				
Duration	26 months	Approx. same as Project	Approx. same as Project	Approx. 32 months
Construction Hours	Monday through Friday, 7:00 a.m. to 6:00 p.m., plus some nights and weekends	Approx. same as Project	Approx. same as Project	Approx. same as Project
Permits and Approvals				
Project approvals	See Chapter 3	• Approval by the OCII Commission of a new Major Phase for Blocks 29-32 • Approval by the OCII Commission of individual Combined Basic Concept and Schematic Designs for the project	Same as Project	• United States Army Corps of Engineers • United States Fish and Wildlife Service • National Marine Fisheries Service • State Lands Commission (public trust determination for Piers 30-32) • San Francisco Bay Conservation and Development Commission

TABLE 7-1 (Continued)
COMPARISON OF PROPOSED PROJECT AND ALTERNATIVES

Characteristic	Proposed Project	Alternative A: No Project	Alternative B: Reduced Intensity	Alternative C: Off-Site at Piers 30-32
Permits and Approvals				
		• San Francisco Department of Public Works and Board of Supervisors approval of subdivision maps, including acceptance of public improvements, and right-of-way dedications • Termination or relocation of existing City-reserved easements by applicable City departments to the extent required • San Francisco Department of Building Inspection approval of a building/site permit, and related approvals from other City departments include the SFPUC for utility connections	Same as Project	• California Department of Fish and Wildlife • San Francisco Regional Water Quality Control Board (RWQCB) • San Francisco Planning Commission • San Francisco Port Commission • San Francisco Board of Supervisors • Voter approval under Proposition B (June 2014)

TABLE 7-2
SUMMARY OF ABILITY OF ALTERNATIVES TO MEET PROJECT OBJECTIVES

Project Objective	Alternative A: No Project	Alternative B: Reduced Intensity	Alternative C: Off-site at Piers 30-32/SWL 330
	Would the alternative meet this objective?		
1. Construct a state-of-the-art multi-purpose event center in San Francisco that meets NBA requirements for sports facilities, can be used year-round for sporting events and entertainment and convention purposes with events ranging in capacity from approximately 3,000-18,500, and expands opportunities for the City's tourist, hotel and convention business.	No	Yes	Yes
2. Provide sufficient complementary mixed-use development, including office and retail uses, to create a lively local and regional visitor-serving destination that is active year-round, promotes visitor activity and interest during times when the event center is not in use, provides amenities to visitors of the event center as well as the surrounding neighborhood, and allows for a financially feasible project.	Potentially	Financial feasibility unknown	Financial feasibility unknown
3. Develop a project that meets high-quality urban design and high-level sustainability standards.	Yes	Yes	Yes
4. Optimize public transit, pedestrian, and bicycle access to the site by locating the event center within walking distance to local and regional transit hubs, and adjacent to routes that provide safe and convenient access for pedestrians and bicycles.	No	Yes	Yes
5. Provide adequate parking and vehicular access that meets NBA and project sponsor's reasonable needs for the event center and serves the needs of project visitors and employees, while encouraging the use of transit, bicycle, and other alternative modes of transportation.	No	Yes	Yes
6. Provide the City with a world class performing arts venue of sufficient size to attract those events which currently bypass San Francisco due to lack of world class 3,000 to 4,000 seat facility	No	Yes	Yes
7. Develop a project that promotes environmental sustainability, transportation efficiency, greenhouse gas reduction, stormwater management using green technology, and job creation consistent with the objectives of the California Jobs and Economic Improvement Through Environmental Leadership Act (AB 900), as amended.	Potentially	Yes	Yes

7.3 Alternatives Analysis

This section presents the detailed analysis of the impacts of the selected alternatives compared to the proposed project. For each of the three alternatives, this section presents a description of the alternative and assumptions used in analyzing that alternative, assesses the ability of the alternative to meet each of the project objectives, and analyzes the impacts of the alternative compared to those of the proposed project. The impact analysis is based on the same environmental setting and significance thresholds as presented for each resource topic in Chapter 5 and uses the same approach to analysis. Except as noted, the impact analysis of the alternatives is qualitative, relative to the identified impacts of the project, and the reader is referred to Chapter 5 and the Initial Study for the more detailed analysis. For transportation, noise, and air quality, however, the analyses are quantitative in order to provide a more refined comparison of the severity of impacts associated with the alternatives relative to those of the proposed project.

7.3.1 Alternative A: No Project

As required by CEQA Guidelines Section 15126.6(e), the No Project Alternative is evaluated to allow decision-makers to compare the environmental effects of approving the proposed project with the effects of not approving the project. The No Project Alternative represents what would reasonably be expected to occur in the foreseeable future if the project is not approved.

7.3.1.1 Description of the No Project Alternative

Under the No Project Alternative, the Golden State Warriors organization would not relocate to San Francisco, and Blocks 29-32 in the Mission Bay South Plan area would not be developed with the proposed event center and mixed-use development described in Chapter 3 of this SEIR. Instead, it is assumed that in the short term, the Warriors organization would exercise its option to stay in Oakland, and accordingly, the team would continue to play its home games at Oracle Arena and lease their management offices and practice facility at the Oakland Convention Center in Oakland. Oracle Arena, built in 1966 and remodeled in 1996, is the oldest facility still in use by the NBA. Therefore, under this alternative, it is likely that the Warriors organization would either build a new arena at its current location or relocate and build a new facility in the long term in the Bay Area or elsewhere.

Currently, there are no other development proposals pending at Blocks 29-32, but given its prime location, existing entitlement, and ongoing development on similar sites adjacent to or near to Blocks 29-32, it is reasonable to expect that development at Blocks 29-32 would occur in the foreseeable future. Thus, the No Project Alternative does not assume that Blocks 29-32 would remain under their current vacant conditions, but rather that the site would be developed as was proposed in the Mission Bay FSEIR. Consistent with CEQA Guidelines Section 15126.6(e)(2), this scenario represents what is reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans, available infrastructure, and community services. Specifically, the No Project Alternative assumes that Blocks 29-32 would be developed consistent with the restrictions and controls established in the Mission Bay South Redevelopment Plan (South Plan) and the South Design for Development.[1]

For the purposes of this SEIR, a hypothetical development scenario was developed that conforms to the South Plan and associated Design for Development, which allows all building to be a maximum of 90 feet in height, except for one 160-foot high tower on Block 29. As depicted in **Figure 7-1**, the No Project Alternative assumes that approximately 1,056,000 gross square feet (gsf) of commercial/industrial plus 31,700 gsf of retail uses would be developed at Blocks 29-32, for a total of 1,087,700 gsf. There would be no event center. The commercial/industrial uses would presumably consist of office and research/development uses, with a 13-story, 160-foot tall office tower located on Block 29 along Third Street and varying heights of office mid-rise buildings, all less than 90 feet in height, throughout Blocks 29, 30, 31, and 32. One- to two-story retail uses would be located at the corner of Third and South Streets on Block 29 and along the re-aligned Terry A. Francois Boulevard on Block 30. There would be two, above-grade, five- to five-and-a-half-story parking structures, one on South Street and one on 16th Street, with 1,050 parking stalls on-site, plus 132 spaces off-site at the South Street garage, for a total of 1,182 spaces.[2] It is assumed that publically accessible open spaces would be provided amidst the office buildings. Possible future uses for this hypothetical development scenario could include biotech uses, UCSF-related uses, or a wide variety of private or public uses that are allowed as primary uses under the Mission Bay South Redevelopment Plan.

This scenario assumes that no further CEQA environmental review would be required beyond the Mission Bay FSEIR and that no amendments to the South Plan or Design for Development would be needed, although OCII would make a final determination as to the need for supplemental CEQA environmental review or minor changes to Mission Bay planning documents on a project-specific basis.

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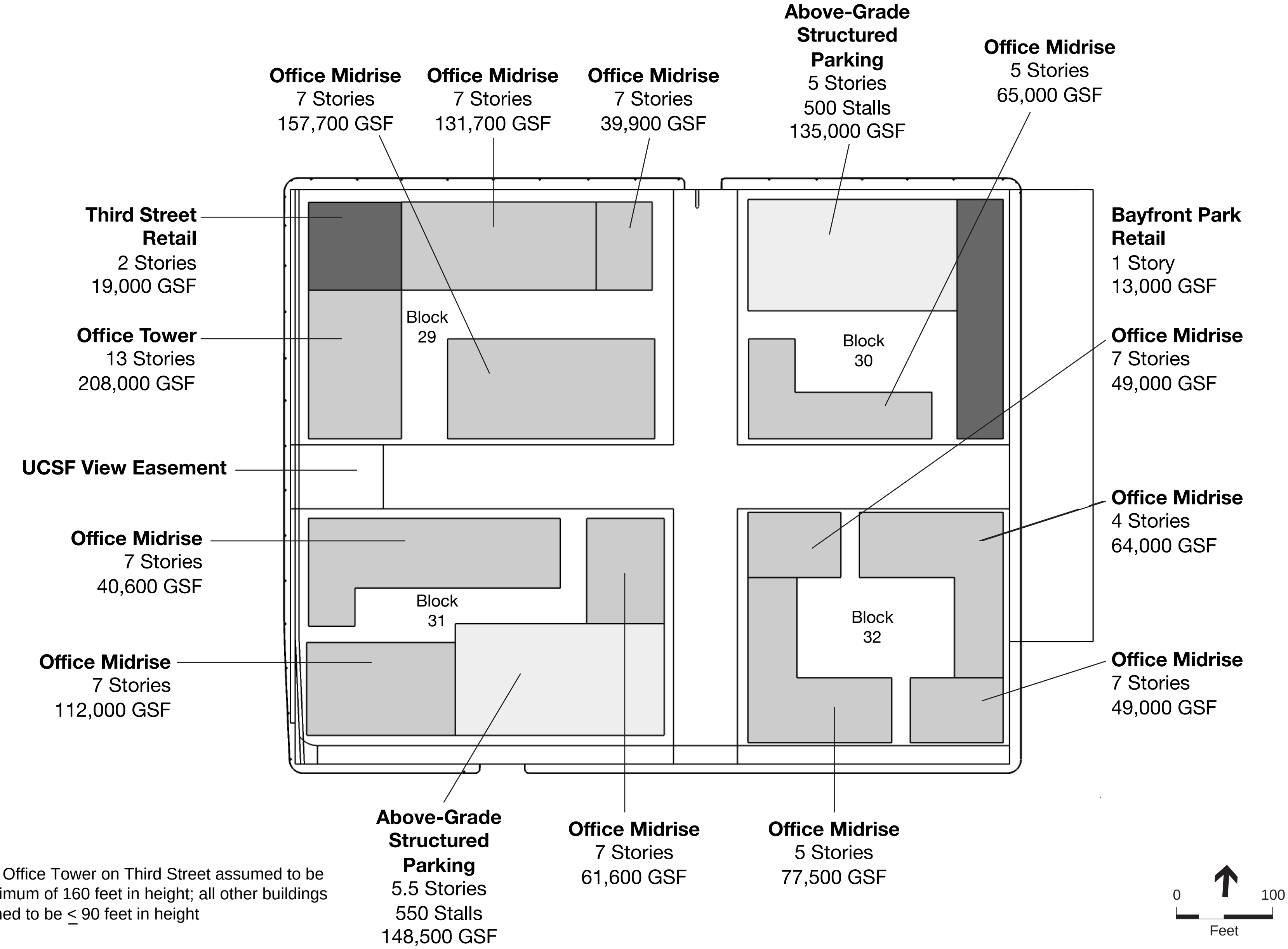
[1] There have been two previously approved projects, or Major Phase approvals for Blocks 29-32. Similar to those projects, the No Project Alternative would be subject to the established protocols in the Mission Bay South Owner Participation Agreement (OPA), through the Design Review and Document Approval Procedure (DRDAP), and the Interagency Cooperation Agreement (ICA) between the OCII and City departments. Under these agreements, the sponsor of the No Project Alternative development would be required to submit its overall plans for development in "Major Phases" and in combined Basic Concept and Schematic Design (Schematic Design) applications. If each Major Phase and Schematic Design submission is consistent with the South Plan, the Design for Development, the Mission Bay South Infrastructure Plan, and other Plan documents, then the OCII Commission approves each Major Phase and Schematic Design. The OPA vests the rights of an applicant or project sponsor to develop a program of the number of square feet and intensity of uses described in the No Project Alternative.

[2] Based on the requirements of the South Plan and the Design for Development, a minimum of 1,061 and maximum of 1,081 spaces would be needed for a proposed development of this size. With the inclusion of the 132 spaces at the South Street garage, the requirements for on-site parking would range from 929 to 949 spaces. Thus, the parking estimates used for the No Project Alternative exceed the requirements, though would likely be adjusted should an actual development proposal be submitted.



Note: Office Tower on Third Street assumed to be a maximum of 160 feet in height; all other buildings assumed to be ≤ 90 feet in height

SOURCE: Manica Architecture, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 7-1
No Project Alternative, Conceptual Site Plan

7.3.1.2 Ability of the No Project Alternative to Meet Project Objectives

As shown in Table 7-2, the No Project Alternative could potentially meet three of the seven project objectives, depending on the proposed program. However, the No Project Alternative would fail to achieve the primary objective of the project sponsor of constructing a new event center and home court for the Golden State Warriors NBA basketball team. Consequently, this alternative would not optimize or provide public transit, pedestrian, parking, and vehicular and bicycle access to an event center, nor would it provide the City with a 3,000 to 4,000 seat performing arts venue. However, given that there is currently no specific design or proposal for the hypothetical No Project development scenario, it is reasonable to assume that the development could be designed to create a lively, year-round visitor-serving destination that meets high quality urban design and high-level sustainability standards. Furthermore, it can be assumed that the No Project Alternative could promote environmental sustainability, transportation efficiency, greenhouse gas reduction, and other green building technologies, though it would be unlikely that the project sponsor for the No Project Alternative would pursue AB 900 certification.

7.3.1.3 Impacts of the No Project Alternative

The No Project Alternative would result in similar impacts to those disclosed in the Mission Bay FSEIR and would be subject to all mitigation measures identified in the Mission Bay FSEIR applicable to Blocks 29-32. Impacts of the No Project Alternative would also be similar to those of the proposed project. This is because many of the impacts would result from the conversion of a vacant parcel at this same location to a fully developed City block, regardless of the size of the development, and the same or similar mitigation or improvement measures identified for the proposed project would apply to the No Project Alternative. The impacts of the No Project Alternative as compared to those of the proposed project are summarized below by resource topic. The reader is referred to Initial Study (Appendix NOP-IS) and Chapter 5 of this SEIR for the full analysis of impacts similar to those of the proposed project.

The environmental impact analysis of the No Project Alternative considers only the hypothetical development scenario on Blocks 29-32 described above and does not consider any effects associated with building a new arena for the Warriors basketball team at another location. However, it should noted that in March 2015, the City of Oakland certified a Final EIR on the Coliseum Area Specific Plan,[3] which discloses the environmental impacts of a new sports venue at the current location of Oracle Arena and the surrounding area.

Land Use

Like the proposed project, the No Project Alternative would not physically divide an established community, conflict with applicable land use plans, or have a substantial impact upon the existing character of the vicinity. The commercial/industrial/retail uses would occur within the boundary

[3] City of Oakland, 2015. Coliseum Area Specific Plan, Final Environmental Impact Report. State Clearing House #2013042066, City Case #ER13-0004, published February 20, 2015. Certified March 31, 2015.

of existing lot lines, would be consistent with the South Plan and associated Design for Development, and would be comparable in character to surrounding land uses. All land use impacts would be *less than significant* and no mitigation would be required.

Aesthetics

Like the proposed project, the No Project Alternative would be on an infill site, within a transit priority area, and an employment center, therefore under Public Resources Code Section 21099, aesthetics are not to be considered in determining significant environmental effects.

Population and Housing

Like the proposed project, the No Project Alternative would not induce substantial population growth, displace housing units, create substantial demand for additional housing, or displace substantial numbers of people. Employment projections for both construction and operation would be similar to or less than that for the proposed project, based on the reduced gross square footage of development, and could be met by the local and regional labor force. As described for the proposed project in the Initial Study, no housing would be displaced, and housing needs would be met by residents already living in the region. All population and housing impacts would be *less than significant* and no mitigation would be required.

Cultural and Paleontological Resources

Like the proposed project, the No Project Alternative would not affect the significance of a historical resource, not destroy a unique paleontological resource, and not disturb any human remains, assuming compliance with applicable regulations; these impacts would be *less than significant* and no mitigation would be required. Also, because construction of the No Project Alternative would be comparable to that of the proposed project, although excavation requirements would be less because parking would be above rather than below grade, this alternative, like the proposed project, could cause a substantial adverse change in the significance of an archaeological resource that could be mitigated to less than significant. Ground disturbance associated with grading and foundation work could affect unidentified archaeological resources, and the same mitigation measures, Mitigation Measure M-CP-2a, Archaeological Testing, Monitoring and/or Data Recovery Program, and Mitigation Measure M-CP-2b, Accidental Discovery of Archaeological Resource, would be applicable to the No Project Alternative and would make this impact *less than significant with mitigation*.

Transportation and Circulation

The No Project Alternative would include a greater amount of office uses than the proposed project (an additional 451,000 gsf), but 93,300 gsf less retail space, and no event center uses. Under the No Project Alternative, about 1,050 on-site vehicle parking spaces plus 132 spaces off-site at the South Street garage would be provided, compared to 1,082 vehicle parking spaces for the proposed project; vehicular ingress and egress from the proposed parking garage would be from South and 16th Streets, similar to the proposed project. Also similar to the proposed project, on-site loading spaces would be provided within the garage, and, it is anticipated that some additional on-street parking spaces adjacent to the project site would be designated as commercial loading spaces. However, because the No Project Alternative would not include an event center or restaurant uses, taxi and paratransit zones would not be provided on the curb adjacent to the project site. Under this alternative, 16th Street would be extended between Illinois Street and Terry A. Francois Boulevard with a configuration consistent with the Mission Bay South Infrastructure Plan, and Terry A. Francois Boulevard would be realigned to the west, adjacent to the project site.

Table 7-3 presents the travel demand for weekday p.m. and Saturday evening peak hours for the proposed project and the three alternatives. As indicated in **Table 7-3**, the number of weekday p.m. and Saturday evening person trips and vehicle trips generated by the No Project Alternative would be less than with the proposed project. The No Project Alternative would generate 1,917 person trips by all modes, compared to 2,796 person trips for the proposed project (i.e., 879 fewer person trips) during the weekday p.m. peak hour, and 199 person trips for the No Project Alternative compared to 3,130 person trips for the proposed project (i.e., 2,931 fewer person trips) during the Saturday evening peak hour. Because the No Project Alternative would not include an event center, the comparison of travel demand and transportation impacts are presented for the proposed project's No Event scenario. (See Chapter 5, Section 5.2, Table 5.2-24, which presents the travel demand for the proposed project for the Basketball Game and Convention Event scenarios.)

Construction Impacts. Construction-related ground transportation impacts would be similar to the proposed project and would be less than significant. Improvement Measure I-TR-1: Construction Management Plan and Public Updates, identified for the proposed project, would also be applicable to this alternative.

Traffic Impacts. The No Project Alternative would generate fewer vehicle trips than the proposed project. During the weekday p.m. peak hour, the No Project Alternative would generate about 445 vehicle trips compared to 702 vehicle trips for the proposed project, while during the Saturday evening peak hour the No Project Alternative would generate 60 vehicle trips compared to 785 vehicles for the proposed project (see **Table 7-3**, below). The intersection LOS for the proposed project and No Project Alternative are shown in **Table 7-4** and **Table 7-5** for the weekday p.m. and Saturday evening peak hours, respectively. With a reduction in the number of vehicles added to the study intersections, the increase in average vehicle delay during the peak hours compared to the existing conditions would be less than would occur under the proposed project. During the weekday p.m. peak hour, four study intersections would operate at LOS E or LOS F conditions, similar to the proposed project for both the No Event and Basketball Game scenarios, however the LOS at the intersection of Seventh/Mississippi/16th would remain at the existing LOS E, as compared to LOS F for the proposed project. Similar to the proposed project for the No Event and Basketball Game scenarios, the No Project Alternative's contribution to the existing LOS E and LOS F conditions at the intersections of King/Third, King/Fifth/I-280 ramps, and Fifth/Bryant/I-80 westbound off-ramp would not be considerable, and traffic impacts at these three intersections would therefore, be less than significant. The No Project Alternative's contribution to the existing LOS E conditions at the intersection of Seventh/Mississippi/16th would be considerable, and would

TABLE 7-3
PROPOSED PROJECT AND PROJECT ALTERNATIVES TRIP GENERATION BY MODE, LAND USE – WEEKDAY PM AND SATURDAY EVENING PEAK HOURS

	Proposed Project – No Event[a]				Alternative A No Project Alternative[b]				Alternative B Reduced Intensity Alternative – No Event[c]				Alternative C Off-Site Alternative at Piers 30-32 and SWL 330 – No Event[d]			
Project Land Use	**Auto**	**Transit**	**Walk/ Other[e]**	**Total**	**Auto**	**Transit**	**Walk/ Other**	**Total**	**Auto**	**Transit**	**Walk/ Other**	**Total**	**Auto**	**Transit**	**Walk/ Other**	**Total**
Weekday PM																
Event Center	6	14	3	22	0	0	0	0	6	14	3	22	8	11	2	21
Office	298	506	127	931	520	884	221	1,625	183	312	79	574	21	26	8	55
Retail/Restaurant	1,041	360	441	1,843	180	43	69	292	624	217	264	1,105	468	353	469	1,290
Residential and Hotel	0	0	0	0	0	0	0	0	0	0	0	0	157	124	140	421
Total person trips	1,344	881	570	2,796	700	927	290	1,917	813	543	346	1,702	654	514	619	1,787
Vehicle trips	702	--	--	--	445	--	--	--	427	--	--	--	355	--	--	--
- Inbound	255	--	--	--	80	--	--	--	154	--	--	--	149	--	--	--
- Outbound	447	--	--	--	365	--	--	--	273	--	--	--	206	--	--	--
Transit trips	--	881	--	--	--	927	--	--	--	543	--	--	--	514	--	--
- Inbound	--	157	--	--	--	42	--	--	--	94	--	--	--	177	--	--
- Outbound	--	724	--	--	--	885	--	--	--	448	--	--	--	337	--	--
Saturday Evening																
Event Center	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Office	7	17	3	27	13	29	5	47	4	11	2	17	0	0	0	0
Retail/Restaurant	1,700	656	747	3,103	94	22	36	152	1,020	393	449	1,862	843	678	804	2,324
Residential and Hotel	0	0	0	0	0	0	0	0	0	0	0	0	134	115	107	357
Total person trips	1,707	673	750	3,130	107	51	41	199	1,024	404	451	1,879	976	792	911	2,680
Vehicle trips	785	--	--	--	60	--	--	--	471	--	--	--	435	--	--	--
- Inbound	367	--	--	--	24	--	--	--	220	--	--	--	192	--	--	--
- Outbound	418	--	--	--	36	--	--	--	251	--	--	--	293	--	--	--
Transit trips	--	673	--	--	--	51	--	--	--	404	--	--	--	792	--	--
- Inbound	--	261	--	--	--	8	--	--	--	156	--	--	--	279	--	--
- Outbound	--	413	--	--	--	43	--	--	--	248	--	--	--	513	--	--

NOTES:

[a] Proposed Project includes 605,000 gsf of office use, 62,500 gsf of retail use, 11,000 gsf of quick service restaurant use, 51,500 gsf of sit-down restaurant use, and a 750,000 gsf event center.
[b] The No Project Alternative includes 1,056,000 gsf of office use, and 31,700 gsf of retail use.
[c] The Reduced Development Alt includes 373,000 gsf of office use, 37,500 gsf of retail use, 6,600 gsf of quick service restaurant use, 30,900 gsf of sit-down restaurant use, and a 750,000 gsf event center.
[d] The Off-site Alternative at Piers 30-32 and SWL 330 includes 35,600 gsf of office, 40,390 gsf of retail, 36,000 gsf of quick service and 43,464 gsf of sit-down restaurant, 176 residential units, 227-room hotel, and a 695,000 gsf event center.
[e] “Other” includes walk, bicycle, motorcycle, taxis, limousines, etc.

TABLE 7-4
INTERSECTION LEVEL OF SERVICE - EXISTING PLUS PROJECT ALTERNATIVE CONDITIONS – WITHOUT A SF GIANTS GAME - WEEKDAY PM PEAK HOUR

			Existing		Proposed Project – No Event		Proposed Project – Basketball Game		No Project Alternative		Reduced Intensity Alternative – No Event	
#	Intersection Location		Delay[a]	LOS[b]	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	King St	Third Street	**72.7**	**E**	**73.2**	**E**	**72.7**	**E**	**73.0**	**E**	**72.9**	**E**
2	King St	Fourth Street	51.9	D	52.5	D	**60.2**	**E**	52.6	D	52.7	D
3	King St/Fifth St	I-280 ramps	**59.2**	**E**	**59.2**	**E**	**59.2**	**E**	**59.2**	**E**	**59.2**	**E**
4	Fifth St/Harrison	I-80 WB off-ramp	48.4	D	48.5	D	49.8	D	48.4	D	48.5	D
5	Fifth St/Bryant St	I-80 EB on-ramp	**>80**	**F**	**>80**	**F**	**>80**	**F**	**>80**	**F**	**>80**	**F**
6	Third Street	Channel Street	38.0	D	38.3	D	46.0	D	35.5	D	33.0	C
7	Fourth Street	Channel Street	< 10	A	< 10	A	11.3	B	< 10	A	< 10	A
8	Seventh Street	Mission Bay Dr	23.1	C	30.2	C	52.3	D	27.0	C	27.0	C
9	TA Francois Blvd	South Street[c]	11.1(eb)	B	< 10	A	< 10	A	< 10	A	< 10	A
10	Third Street	South Street	24.9	C	28.5	C	27.4	C	26.9	C	27.7	C
11	TA Francois Blvd	16th Street[c]	--	--	17.2	B	16.8	A	17.2	B	17.2	B
12	Illinois Street	16th Street[c]	12.6(nb)	B	12.8 (nb)	B	11.5(nb)	B	10.9 (nb)	B	11.3 (nb)	B
13	Third Street	16th Street[e]	29.3	C	32.2	C	33.6	C	31.3	C	31.2	C
14	Fourth Street	16th Street[e]	21.5	B	32.7	C	28.0	C	26.3	C	25.7	C
15	Owens Street	16th Street[e]	35.5	C	41.2	D	44.2	C	37.3	D	37.8	D
16	7th/Mississippi	16th Street[e]	**68.6**	**E**	**> 80**	**F**	**> 80**	**F**	**67.9**	**E**	**73.4**	**E**
17	Illinois Street	Mariposa Street[c]	10.6(eb)	B	16.1	B	17.0	B	14.8 (sb)	B	15.8	B
18	Third Street	Mariposa Street	36.2	D	42.5	D	42.0	D	37.3	D	39.4	D
19	Fourth Street	Mariposa Street	13.2	B	15.3	B	14.3	B	14.5	B	14.0	B
20	Mariposa Street	I-280 NB off-ramp	25.8	C	26.4	C	25.8	C	26.6	C	26.1	C
21	Mariposa Street	I-280 SB on-ramp[d]	11.9	B	12.9	B	12.8	B	12.9	B	12.5	B
22	Third Street	Cesar Chavez St	43.0	D	49.7	D	47.6	D	46.4	D	48.5	D

NOTES:

a Delay presented in seconds per vehicle. For unsignalized intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
b Intersections operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.
c All-way stop-controlled intersection. The intersections of Terry A. Francois/South and Illinois/Mariposa would be signalized as part of the proposed project.
d The traffic signal at the intersection of Mariposa/I-280 southbound on-ramp is part of the roadway improvements on Mariposa Street between the I-280 northbound off-ramp and I-280 southbound on-ramp and the extension of Owens Street between 16th and Mariposa Streets, and is currently planned to be operational by fall 2015.
e Includes implementation of the 22 Fillmore Transit Priority Project, which includes converting one mixed-flow lane in each direction to a side-running transit-only lane.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015.

TABLE 7-5
INTERSECTION LEVEL OF SERVICE - EXISTING PLUS PROJECT ALTERNATIVE CONDITIONS – WITHOUT A SF GIANTS GAME – SATURDAY EVENING PEAK HOUR

#	Intersection Location		Existing		Proposed Project – No Event		Proposed Project – Basketball Game		No Project Alternative		Reduced Intensity Alternative – No Event	
			Delay[a]	LOS[b]	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	King St	Third Street	26.6	C	28.4	C	29.0	C	26.7	C	27.7	C
2	King St	Fourth Street	22.6	C	23.0	C	31.8	C	22.7	C	22.9	C
3	King St/Fifth St	I-280 ramps	< 10	A	< 10	A	<10	A	< 10	A	< 10	A
4	Fifth St/Harrison	I-80 WB off-ramp	29.2	C	29.5	C	**64.9**	**E**	29.5	C	29.4	C
5	Fifth St/Bryant St	I-80 EB on-ramp	27.0	C	27.6	C	32.8	C	27.1	C	27.3	C
6	Third Street	Channel Street	< 10	A	< 10	A	**78.9**	**E**	< 10	A	< 10	A
7	Fourth Street	Channel Street	13.6	B	13.0	B	45.7	D	13.6	B	13.4	B
8	Seventh Street	Mission Bay Dr	12.4	B	12.5	B	**>80**	**F**	11.6	B	12.1	B
9	TA Francois Blvd	South Street[c]	< 10(eb)	A	< 10	A	<10	A	< 10	A	< 10	A
10	Third Street	South Street	< 10	A	10.1	B	15.3	B	< 10	A	< 10	B
11	TA Francois Blvd	16th Street[c]	--	--	17.4	B	18.2	B	17.4	B	17.4	B
12	Illinois Street	16th Street[c]	< 10(nb)	A	12.3(eb)	B	11.8(nb)	B	< 10 (nb)	A	<10(nb)	A
13	Third Street	16th Street[e]	10.7	B	13.8	B	14.0	B	10.7	B	12.6	B
14	Fourth Street	16th Street[e]	14.3	B	12.9	B	16.2	B	14.1	B	13.1	B
15	Owens Street	16th Street[e]	< 10	A	13.6	B	20.4	C	< 10	A	11.0	B
16	7th/Mississippi	16th Street[e]	18.4	B	29.3	C	40.7	D	18.8	B	22.8	C
17	Illinois Street	Mariposa Street[c]	< 10(eb)	A	15.8	B	44.6	D	< 10 (eb)	A	15.2	B
18	Third Street	Mariposa Street	16.6	B	19.4	B	21.1	C	16.8	B	19.0	B
19	Fourth Street	Mariposa Street	< 10	A	< 10	A	<10	A	< 10	A	< 10	A
20	Mariposa Street	I-280 NB off-ramp	16.1	B	16.3	B	24.8	C	16.1	B	16.2	B
21	Mariposa Street	I-280 SB on-ramp[d]	< 10	A	< 10	A	<10	A	< 10	A	< 10	A
22	Third Street	Cesar Chavez St	18.4	B	17.5	B	18.2	B	18.4	B	17.3	B

NOTES:

a Delay presented in seconds per vehicle. For unsignalized intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
b Intersections operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.
c All-way stop-controlled intersection. The intersections of Terry A. Francois/South and Illinois/Mariposa would be signalized as part of the proposed project.
d The traffic signal at the intersection of Mariposa/I-280 southbound on-ramp is part of the roadway improvements on Mariposa Street between the I-280 northbound off-ramp and I-280 southbound on-ramp and the extension of Owens Street between 16th and Mariposa Streets, and is currently planned to be operational by fall 2015.
e Includes implementation of the 22 Fillmore Transit Priority Project, which includes converting one mixed-flow lane in each direction to a side-running transit-only lane.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015.

be a significant impact. Therefore, similar to the proposed project for the No Event and Basketball Game scenarios, the No Project Alternative would result in *significant and unavoidable* impacts at one study intersection (i.e., at Seventh/Mississippi/16th) during the weekday p.m. peak hour, although the magnitude of the additional vehicle delay would be less than for conditions with the proposed project.

During the Saturday evening peak hour for the No Event scenario, under the No Project Alternative, all study intersections would operate at LOS D or better, and therefore, traffic impacts would be *less than significant*, similar to the proposed project for the No Event and Basketball Game scenarios. The freeway ramp LOS for the proposed project and No Project Alternative are shown in **Table 7-6** and **Table 7-7** for the weekday p.m. and Saturday evening peak hours, respectively. The No Project Alternative would add fewer vehicle trips to the I-280 and I-80 freeway mainline and ramps than the proposed project, and, similar to the proposed project for the No Event and Basketball Game scenarios, would not result in project-specific impacts or contribute considerably to existing LOS E or LOS F conditions during the weekday p.m. or Saturday evening peak hours. Because the No Project Alternative would not include an event center, the significant and unavoidable traffic impacts associated with events, including overlapping evening events at AT&T Park, at the study intersections and I-80 and I-280 freeway ramps would not occur.

Transit Impacts. During the weekday p.m. peak hour, the No Project Alternative would generate 927 transit trips compared to 881 transit trips for the proposed project under the No Event scenario (i.e., 46 more transit trips), while during the Saturday evening peak hour the No Project Alternative would generate 51 transit trips compared to 673 transit trips for the proposed project under the No Event scenario (i.e., 662 fewer transit trips). The additional 46 transit trips generated by the No Project Alternative during the weekday p.m. peak hour would be accommodated on the T Third light rail line and 22 Fillmore bus route serving the project site, and on the regional transit providers, and transit impacts would be *less than significant*. Because the No Project Alternative would not include an event center, the significant and unavoidable impacts on Muni and regional transit associated with events, including overlapping events at AT&T Park would not occur.

Bicycle and Pedestrian Impacts. The No Project Alternative would result in fewer person-trips and bicycle trips compared to the proposed project. Similar to the proposed project, the No Project Alternative would result in an increase in the number of vehicles, pedestrians, and bicycles in the vicinity of the project site, however, this increase would be less than for the proposed project, and, similar to the proposed project, would not be substantial enough to impede pedestrian travel on adjacent sidewalks and crosswalks, or affect bicycle travel or facilities in the area. Therefore, similar to the proposed project, the No Project Alternative's impacts on pedestrians and bicycles would be *less than significant*.

Loading Impacts. Similar to the proposed project, the No Project Alternative would include on-site and on-street commercial loading spaces to accommodate the loading demand, although the number of loading spaces provided on site would be less than for the proposed project (i.e., five on-site loading spaces based on the Mission Bay South Design for Development

TABLE 7-6
FREEWAY RAMP LEVEL OF SERVICE - EXISTING PLUS PROJECT ALTERNATIVE CONDITIONS – WITHOUT A SF GIANTS GAME - WEEKDAY PM PEAK HOUR

		Existing		Proposed Project – No Event		Proposed Project-Basketball Game		No Project Alternative		Reduced Intensity Alternative – No Event	
#	Ramp Location	Density[a]	LOS[b]	Density	LOS	Density	LOS	Density	LOS	Density	LOS
1	I-80 EB on-ramp at Sterling	**35**	**E**	**36**	**E**	**36**	**E**	**36**	**E**	**36**	**E**
2	I-80 EB on-ramp at Fifth/Bryant	**--**	**F**	**--**	**F**	**--**	**F**	**--**	**F**	**--**	**F**
3	I-80 WB off-ramp at Fifth/Harrison	30	D	30	D	31	D	30	D	30	D
4	I-280 SB on-ramp at Pennsylvania	**35**	**E**	**35**	**E**	**35**	**E**	**35**	**E**	**35**	**E**
5	I-280 NB off-ramp at Mariposa	26	C	26	C	28	C	26	C	26	C
6	I-280 SB on-ramp at Mariposa	31	D	32	D	32	D	32	D	32	D

NOTES:
[a] Density of vehicles in merge and diverge influence area for on-ramp and off-ramp analysis, respectively. Measured in passenger cars per mile per lane. Density value is not presented for ramp analyses where the demand volume exceeds the capacity.
[b] Ramps operating at LOS E or LOS F conditions highlighted in bold. Significant project impacts shaded.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015.

TABLE 7-7
FREEWAY RAMP LEVEL OF SERVICE - EXISTING PLUS PROJECT ALTERNATIVE CONDITIONS – WITHOUT A SF GIANTS GAME – SATURDAY EVENING PEAK HOUR

		Existing		Proposed Project – No Event		Proposed Project – Basketball Game		No Project Alternative		Reduced Intensity Alternative - No Event	
#	Ramp Location	Density[a]	LOS[b]	Density	LOS	Density	LOS	Density	LOS	Density	LOS
1	I-80 EB on-ramp at Sterling	22	C	22	C	22	C	22	C	22	C
2	I-80 EB on-ramp at Fifth/Bryant	**35**	**E**	**36**	**E**	**36**	**E**	**35**	E	**36**	**E**
3	I-80 WB off-ramp at Fifth/Harrison	25	C	26	C	34	D	25	C	25	C
4	I-280 SB on-ramp at Pennsylvania	13	B	13	B	13	B	13	B	13	B
5	I-280 NB off-ramp at Mariposa	16	B	17	B	25	C	16	B	17	B
6	I-280 SB on-ramp at Mariposa	12	B	13	B	12	B	12	B	13	B

NOTES:
[a] Density of vehicles in merge and diverge influence area for on-ramp and off-ramp analysis, respectively. Measured in passenger cars per mile per lane. Density value is not presented for ramp analyses where the demand volume exceeds the capacity.
[b] Ramps operating at LOS E or LOS F conditions highlighted in bold. Significant project impacts shaded.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015.

requirements, compared to 13 spaces provided as part of the proposed project). The No Project Alternative would generate 229 daily truck and service vehicle trips compared to 396 for the proposed project. Because the No Project Alternative would provide commercial loading spaces, the loading demand would be accommodated, and loading impacts under this alternative, similar to the proposed project, would be *less than significant*. Improvement Measure I-TR-8: Truck and Service Vehicle Loading Operations Plan, identified for the proposed project, would also be applicable to the No Project Alternative.

Emergency Vehicle Access Impacts. As part of the No Project Alternative, the roadway network adjacent to the project site on 16th Street and Terry A. Francois Boulevard would be built out in accordance with the Mission Bay South Infrastructure Plan, which would facilitate emergency vehicle access to the site. Similar to the proposed project, the impacts of the No Project Alternative on emergency vehicle access would be *less than significant*.

Cumulative Impacts. Similar to the proposed project, the No Project Alternative would not contribute considerably to significant cumulative construction-related ground transportation impacts, and the No Project Alternative's cumulative impacts related to bicycle, loading, and emergency vehicle access would be less than significant. The No Project Alternative's cumulative transit and pedestrian impacts would be less than significant, compared to less than significant with mitigation for the proposed project. The No Project Alternative would contribute considerably to significant 2040 cumulative traffic impacts at two intersections (i.e., Owens/16th and Seventh/Mississippi/16th), compared to 16 study intersections for the proposed project, and would not significantly contribute to any freeway ramps (compared to three for the proposed project).

Helipad Safety. Like the proposed project, construction of the No Project Alternative could result in temporary obstruction of the UCSF helipad airspace surfaces, although given the absence of a tower at Third and 16th Street, the impacts could be less severe. Regardless, implementation of the same mitigation measure (Mitigation Measures M-TR-9a, Crane Safety Plan for Project Construction) would reduce this impact to less than significant. Unlike the proposed project, the No Project Alternative would not involve specialized outdoor lighting associated with the event center, so the operational lighting impacts would be *no impact*.

Noise

Construction Impacts. Like the proposed project, construction of the No Project Alternative would not cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity; expose people to or generate noise levels in excess of applicable standards; or expose people and structures to excessive groundborne vibration levels. Under the No Project Alternative, the same or similar construction equipment would be used, construction duration would likely be shorter due to the reduced amount of excavation, and compliance with the San Francisco Noise Ordinance would be required. Construction noise impacts would be the same or less than the proposed project, and all impacts would be *less than significant* with no mitigation required. However, similar to the proposed project, the No Project Alternative could contribute considerably to cumulative construction noise impacts depending on the extent of other construction activities occurring concurrently in the immediate vicinity. While there is no defined construction schedule for this alternative, there is the potential for the planned construction elsewhere in Mission Bay, including multiple elements of the University of California, San Francisco (UCSF) Long Range Development Plan (LRDP) at the Mission Bay Campus, to overlap with construction activities at this site. Regardless, like the proposed project, implementation of Mitigation Measure M-C-NO-1 (Construction Noise Control Measures) would reduce this alternative's contribution to cumulative construction noise impacts to *less than significant with mitigation*.

Operational Impacts. With respect to operations, the No Project Alternative would have less severe noise impacts than the proposed project. This alternative would introduce fewer noise sources to the project area, both stationary and mobile noise sources. Under the No Project Alternative, noise impacts related to amplification equipment for interior or outdoor performances or with operation of public address systems would be *no impact*, and this alternative would avoid this operational noise impact. Mitigation Measures M-NO-4a (Noise Control Plan for Outdoor Amplified Sound) and M-NO-4b (Noise Control Plan for Place of Entertainment Permit), which were identified for the proposed project, would not be required.

Similarly, while the No Project Alternative would increase the vehicular traffic in the project vicinity, the increased weekday and weekend traffic noise levels would be less severe than those under the proposed project, and unlike the proposed project, would not exceed significance thresholds at any of the six modeled roadway segments, as shown in **Table 7-8**.

Under the proposed project, as shown in Table 5.3-9 in Chapter 5, roadside noise levels at multi-family receptors adjacent to Illinois Street and Terry A. Francois Boulevard would exceed significance thresholds under several scenarios: weekday late night 9 to 11 p.m. period due to post-basketball game traffic at Illinois Street and at Terry Francois Boulevard; and on Saturday evening 6 to 8 p.m. period due to basketball game traffic at Illinois Street. As described in Chapter 5, Section 5.3, Noise, these impacts are considered a significant and unavoidable permanent increase in noise levels, even with mitigation. Under the No Project Alternative, modeled noise levels at none of the roadway segments in the project vicinity would exceed significance thresholds, and specifically no exceedances would occur on weekday 9 to 11 p.m. due to post-basketball game traffic or on Saturdays 6 to 8 p.m. Therefore, operational noise impacts would be *less than significant*, and this alternative would *avoid* the significant and unavoidable operational noise impacts identified for the proposed project.

Similarly, unlike the proposed project, under cumulative conditions, the No Project Alternative's contribution to roadway noise increases would be *less than significant*, including during the weekday p.m. peak hour. In contrast, the proposed project would result in a significant and unavoidable contribution to cumulative roadway noise impacts along Illinois Street between Mariposa and 20th Streets (during weekday p.m. peak hour and during Saturday evening 6 to 8 p.m.) and on Mariposa Street between Third Street and I-280 (during Saturday evening 6 to 8 p.m.). Therefore, the No Project Alternative would *substantially lessen* the significant and unavoidable cumulative roadway noise impacts of the proposed project.

TABLE 7-8
MODELED TRAFFIC NOISE LEVELS, NO PROJECT ALTERNATIVE[a]

Roadway Segment	Existing (2015)	Existing plus No Project Alternative	dBA Difference	Significant Increase?
Weekday Peak Hour Noise Levels (4PM – 6PM)				
Third Street between South Street and China Basin Street	69.1	69.3	0.2	No
Third Street between 16th Street and Mariposa Street[b]	69.9	69.9	0.0	No
Illinois Street between Mariposa Street and 20th Street	60.3	62.8	2.5	No
Terry Francois Boulevard between South Street and China Basin Street	59.8	59.8	0.0	No
16th Street between Third Street and I-280	66.4	67.0	0.6	No
Mariposa Street between Third Street and I-280	65.5	66.2	0.7	No
Roadway Segment	**Existing (2015)**	**Existing plus No Project Alternative**	**dBA Difference**	**Significant Increase?**
Saturday Evening Noise Levels (6PM – 8PM)				
Third Street between South Street and China Basin Street	64.7	64.8	0.1	No
Third Street between 16th Street and Mariposa Street	65.1	65.2	0.1	No
Illinois Street between Mariposa Street and 20th Street	54.7	55.8	1.1	No
Terry Francois Boulevard between South Street and China Basin Street	54.0	54.0	0.0	No
16th Street between Third Street and I-280	61.4	61.7	0.3	No
Mariposa Street between Third Street and I-280	60.4	60.6	0.2	No

NOTES:

a Road center to receptor distance is assumed to be 50 feet for values shown in this table. Noise levels were determined using the Federal Highway Administration (FHWA) traffic noise model. The average speed on these segments is assumed to be 25 or 30 miles per hour, depending on the roadway. For all other assumptions, refer to Appendix NO. In an existing ambient noise environment of 65 dBA or greater, an incremental increase is considered significant if the noise increase is equal to or greater than 3.0 dBA. In an existing ambient noise environment below 65 dBA, an incremental increase is considered significant if the noise increase is equal to or greater than 5.0 dBA.

b This portion of Third Street would not see meaningful increases in traffic volumes during events due to project access limitations and egress routing during events.

SOURCE: ESA 2015

Furthermore, as described in Chapter 5, Section 5.3, Noise, the proposed project would have a significant and unavoidable impact associated with the increased noise levels due to crowds gathering at the Muni T-Line platform near the UCSF Hearst Tower housing building during quieter nighttime periods, when event patrons would be departing the project site. Under the No Project Alternative, there would be *no impact* related to crowd noise, and this alternative would *avoid* this significant and unavoidable impact.

Like the proposed project, under the No Project Alternative, the cumulative noise impacts of future operations of the UCSF Medical Center helipad would be *less than significant* because office and research/development uses are not considered noise sensitive land uses.

Air Quality

Construction Impacts. Unlike the proposed project, construction impacts of the No Project Alternative would be less than significant, compared to a significant and unavoidable impact for the project. As described in Chapter 5, Section 5.4, Air Quality, estimated construction-related emissions of ROG and NOx for the proposed project would be 59 and 226 pounds per day, respectively, which would exceed the applicable significance thresholds. Even with mitigation, NOx levels would exceed the significance threshold, at 144 pounds per day, assuming the minimum level of compliance (Tier 2 with NOx VDECS) with Mitigation Measure M-AQ-1 (Construction Emissions Minimization). However, while construction activities for the No Project Alternative would be similar to those of the proposed project, the construction duration would likely be shortened as the amount of excavation would be reduced. Although similar equipment would be used in construction of the No Project Alternative, resultant emissions would be less because the scale of construction and the intensity of construction are assumed to be reduced. **Table 7-9** presents the construction-related criteria air pollutant emissions for the No Project Alternative. Construction of the No Project Alternative would result in emissions of ROG, NOx, PM_{10}, and $PM_{2.5}$ that would be below the thresholds of significance. Consequently, construction-related criteria pollutant emissions under the No Project Alternative would be *less than significant*.

TABLE 7-9
AVERAGE DAILY CONSTRUCTION-RELATED EMISSIONS
FOR THE NO PROJECT ALTERNATIVE

	Average Daily Construction Emissions (pounds/day)			
	ROG	**NOx**	**PM_{10}**	**$PM_{2.5}$**
Off-road Equipment Emissions	3.6	32	2.1	2.0
Truck and Vehicle emissions	3.3	17	0.26	0.24
Architectural Coating Emissions	30	0	0	0
Total[a]	37	49	2.3	2.2
Significance Threshold	54	54	82	54
Above Threshold?	No	No	No	No

NOTES:

[a] The total emissions may not sum precisely due to rounding of subtotals.

SOURCE: Ramboll Environ, 2015

Operational Impacts. Unlike the proposed project, operational impacts of the No Project Alternative would be less than significant, compared to a significant and unavoidable impact for the project. As described in Chapter 5, Section 5.4, Air Quality, estimated operational emissions of ROG and NOx under the proposed project would be 79 and 124 pounds per day, respectively, exceeding significance thresholds. However, under the No Project Alternative, operational emissions would be less than those of the proposed project because of reduced trip lengths associated with worker commutes versus the regional trip lengths generated by events at the arena under the proposed project. **Table 7-10** presents the operational criteria air pollutant emissions for the No Project Alternative. Operation of the No Project Alternative would result in emissions of

ROG, NOx, PM_{10}, and $PM_{2.5}$ that would be below the thresholds of significance. Consequently, operational criteria pollutant emissions under the No Project Alternative would be *less than significant*.

TABLE 7-10
AVERAGE DAILY AND MAXIMUM ANNUAL OPERATIONAL EMISSIONS FOR THE NO PROJECT ALTERNATIVE

	Average Daily Emissions (pounds/day)			
	ROG	**NOx**	**PM10**	**PM2.5**
Emission Source				
Mobile Sources	14	31	22	6.3
Standby Diesel Generators (assumes 5)	0.30	1.0	0.04	0.04
Boilers	0.54	4.9	0.37	0.37
Area Sources	20	<0.01	<0.01	<0.01
Total[a]	35	36	23	6.7
Significance Threshold	54	54	82	54
Above Threshold?	No	No	No	No
	Maximum Annual Emissions (short tons/year)			
	ROG	**NOx**	**PM10**	**PM2.5**
Emission Source				
Mobile Sources	2.6	5.6	4.0	1.2
Standby Diesel Generators (assumes 5)	0.06	0.18	<0.01	<0.01
Boilers	0.10	0.89	0.07	0.07
Area Sources	3.6	<0.01	<0.01	<0.01
Total[a]	**6.4**	**6.7**	4.1	1.2
Significance Threshold	10	10	15	10
Above Threshold?	No	No	No	No

NOTES:
[a] The total emissions may not sum precisely due to rounding of subtotals.

SOURCE: Ramboll Environ, 2015

Toxic Air Contaminants. Similar to the proposed project, construction and operation of the No Project Alternative would generate toxic air contaminants, including diesel particulate matter. However, given the reduced level of construction and the reduced mobile sources, the No Project Alternative would have somewhat less severe impacts than the proposed project. Thus, like the project (see Table 5.4-10 in Section 5.4, Air Quality), $PM_{2.5}$ concentrations at off-site receptor locations would be below significance thresholds for construction and operation, as shown in **Table 7-11**. Cumulative (background plus No Project Alternative) $PM_{2.5}$ concentrations during project operations would be 9.0 $\mu g/m^3$. Furthermore, at no off-site location, during construction or operations, would cumulative $PM_{2.5}$ concentrations exceed the 10 $\mu g/m^3$ threshold. Therefore, the No Project Alternative would not result in sensitive receptor locations meeting the Air Pollutant Exposure Zone criteria for $PM_{2.5}$, and impacts related to construction and operational $PM_{2.5}$ concentrations would be *less than significant.*

TABLE 7-11
ANNUAL AVERAGE $PM_{2.5}$ CONCENTRATIONS AT OFF-SITE RECEPTORS FOR THE NO PROJECT ALTERNATIVE

Source	$PM_{2.5}$ Concentration ($\mu g/m^3$, Annual Average)	
	UCSF Hearst Tower Receptor	**UCSF Hospital Receptor**
Construction		
Background at the maximally impacted receptor	8.5	8.6
Unmitigated Construction Contribution	0.10	0.10
Cumulative Total (Unmitigated)[a]	8.6	8.7
Significance Threshold	10	10
Above Threshold?	No	No
Operation		
Background at the maximally impacted receptor	8.5	8.6
Project Operations – Generators	0.06	0.06
Project Operations – Mobile	0.32	0.32
Cumulative Total (Unmitigated)[a]	8.9	9.0
Significance Threshold	10	10
Above Threshold?	No	No

NOTES:
a The total concentrations may not sum precisely due to rounding of subtotals.

SOURCE: Ramboll Environ, 2015

Similarly, the lifetime cancer risk at off-site receptors under the No Project Alternative would also be less than significant, which would be less severe than the comparable impact under the proposed project. For the proposed project (see Table 5.4-11 in Section 5.4, Air Quality), the unmitigated risk would exceed the significance threshold but implementation of Mitigation Measure M-AQ-1 (Construction Emissions Minimization) would reduce the risk to less than significant. As shown in **Table 7-12**, under the No Project Alternative, the cumulative excess cancer risk at all receptor locations would be below the significance threshold of 100 per one million persons exposed. Therefore, the No Project Alternative would not result in sensitive receptor locations meeting the Air Pollutant Exposure Zone criteria for excess cancer risk, and construction and operational cancer risk would be *less than significant* and no mitigation is required.

Consistency with Clean Air Plan. The No Project Alternative would be consistent with the 2010 Clean Air Plan (CAP) by resulting in non-attainment criteria air pollutant and precursor emissions that would be less than the quantity considered to represent a cumulatively considerable contribution to regional air quality. The No Project Alternative would be consistent with the 2010 CAP by virtue of incorporation of control measures of the CAP, including land use/local impact measures and energy/climate measures now required through the various components of the City's Greenhouse Gas Reduction Strategy and the numerous transportation

TABLE 7-12
LIFETIME EXCESS CANCER RISK AT OFF-SITE RECEPTORS
FOR THE NO PROJECT ALTERNATIVE

	Excess Cancer Risk (in one million)		
	UCSF Hearst Tower Receptor		UCSF Hospital Receptor
Source	**Child Resident**	**Adult Resident**	**(Child Resident)**
Background at the maximally impacted receptor	26	26	44
Unmitigated Construction Contribution	12	0.6	8
Project Operations – Generators	30	30	30
Project Operations – Mobile	7.2	7.2	7.2
Cumulative Total[a]	75	64	90
Significance Threshold	100	100	100
Above Threshold?	No	No	No

NOTES:
[a] The total concentrations may not sum precisely due to rounding of subtotals.

SOURCE: Ramboll Environ, 2015

demand management measures are included as part of the overall Mission Bay Redevelopment Plan, with which this alternative would be consistent. The No Project Alternative would also not hinder implementation of the 2010 CAP. Therefore, the No Project Alternative would not conflict with, or obstruct implementation of the *2010 Clean Air Plan*, and this impact would be *less than significant* and no mitigation would be required. In comparison, the proposed project would be consistent with the Clean Air Plan for reasons described in Section 5.4, Air Quality, with implementation of Mitigation Measure M-AQ-1 (Construction Emissions Minimization), Mitigation Measure M-AQ-2a (Reduce Operational Emissions), Mitigation Measure M-AQ-2b (Emission Offsets), and FSEIR Mitigation Measure F.1 (Measures to Reduce Vehicle Trips).

Odors. Like the proposed project, this alternative would not create objectionable odors that would affect a substantial number of people.

Cumulative Air Quality Impacts. The No Project Alternative would not result in significant and unavoidable air quality impacts, and consequently, would not result in a cumulatively considerable contribution to regional or local air quality impacts. Therefore, unlike the proposed project, the cumulative air quality impacts of the No Project Alternative would be *less than significant*. This is in contrast to the proposed project, for which the project's contribution to cumulative air quality impacts is considered significant and unavoidable, even with mitigation, because the proposed project would result in both construction and operational emissions of ROG and NOx exceeding their respective significance thresholds.

The No Project Alternative would also not result in a considerable contribution to cumulative health risk impacts for existing or future sensitive receptors, and cumulative impacts would be *less than significant*. This is because unmitigated construction and operational emissions would not exceed the significance thresholds of 10 μg/m³ for $PM_{2.5}$ or an excess cancer risk greater than 100 per one million persons exposed. Although the Uber/ARE project could locate childcare facilities on Blocks 26/27, these sensitive receptors would be exposed to at most eight months of construction period emissions and these receptors' health risk exposure would not exceed significance thresholds. This is in contrast to the proposed project, for which the project's cumulative health risk impact is considered less than significant with mitigation, requiring implementation of Mitigation Measure M-AQ-1.

Greenhouse Gas Emissions

Similar to the proposed project, the No Project Alternative would generate greenhouse gas (GHG) emissions, but not at levels that would result in a significant impact on the environment or conflict with any policy, plan, or regulation adopted for the purpose of reducing GHG emissions. As described in Chapter 5, Section 5.5, the proposed project is a certified environmental leadership project under AB 900 and the California Air Resources Board (CARB) has determined that the proposed project would result in no net increase in GHG emissions based on the AB 900 application which includes voluntary acquisition of carbon credits by the project sponsor. However, even though the development under the No Project Alternative is only a hypothetical scenario at this time, it can be expected that this alternative would include strategies to reduce GHG emissions that would be consistent with the City's GHG Reduction Strategy, including compliance with San Francisco Green Building Requirements, San Francisco Stormwater Management Ordinance, San Francisco Water Efficient Irrigation Ordinance, Mandatory Recycling and Composting Ordinance, and San Francisco Construction and Demolition Debris Recovery Ordinance to name a few. Furthermore, consistent with the Mission Bay South Redevelopment Plan, the alternative would include transportation management programs. Given the reduced size of the No Project Alternative compared to the proposed project, overall GHG emissions during construction and operations would be expected to be the same or less than those calculated for the proposed project. However, since the proposed project would purchase carbon offset credits to result in no net increase in GHG emissions, the GHG emissions of the No Project Alternative would be greater than those of the proposed project, but not at levels that would result in a significant impact on the environment or conflict with any policy, plan, or regulation adopted for the purpose of reducing GHG emissions. Therefore, impacts related to GHG emissions for the No Project Alternative would be *less than significant* assuming compliance with applicable policies and regulations, and no mitigation is required.

Wind and Shadow

Wind. As described in Chapter 5, Section 5.6, the proposed project would result in significant and unavoidable wind hazard impacts at off-site public areas based results on wind tunnel testing. Under the hypothetical development scenario for the No Project Alternative, the 135-foot tall event center proposed in the east and central part of the project site under the project would be replaced with a variety of buildings 7 stories high or less, and on the west side of the project site there would be only one 160-foot tall office tower instead of the two towers proposed by the project. The different building massing, configuration and heights on the project site under the No Project Alternative would result in different wind conditions, including at pedestrian use areas, than that described for the proposed project. However, in the absence of wind tunnel testing for the No Project Alternative, the specific change in wind conditions of the No Project Alternative compared to proposed project cannot be quantified. Consequently, the effect of the change in wind conditions on the conclusion of the significance of off-site wind hazards for the No Project Alternative under existing plus project and cumulative conditions is not known

However, like the proposed project, the No Project Alternative would be subject to the Mission Bay South Design for Development wind analysis standards and design guidelines, which were prepared with the objective to use all feasible means to eliminate wind hazards and to reduce adverse wind impacts. Since the No Project Alternative hypothetical scenario would contain buildings over 100 feet in height, it would be also subject to wind review, including potential wind tunnel testing, under the Mission Bay South Design for Development.

Shadow. Since it is assumed that the No Project Alternative would comply with the design standards of the South Design for Development, it is therefore determined to reasonably limit areas of shadow on public open spaces during the active months of the year (March to September) and during the most active times of the day (10:00 a.m. to 4:00 p.m.), and would not be subject to a shadow analysis. Similar to the proposed project, the No Project Alternative shadow impact and its contribution to cumulative shadow impacts, on publicly accessible open space or outdoor recreation facilities or other public areas within the Mission Bay plan area (i.e., Bayfront Park), and outside the plan area (i.e., Agua Vista Park), would be *less than significant* and no mitigation would be required.

Recreation

Like the proposed project, the No Project Alternative would not substantially increase the use of existing recreational facilities or require the construction or expansion of recreational facilities. Employment under this scenario would be the same or less than that for the proposed project, based on the reduced gross square footage, and recreational demands would be met by existing and planned parks and open space provided for as part of the overall Mission Bay Plan. All recreation impacts would be *less than significant* and no mitigation would be required.

Utilities and Service Systems

Water Supply Resources, Water Treatment Facilities, and Solid Waste. Like the proposed project, the No Project Alternative would not require new or expanded water supply resources, require construction of new water treatment facilities, and would be served by existing landfills for solid waste disposal. Given the reduced gross square footage of uses, projected demands for water supply resources, water treatment facilities, and solid waste disposal would be less than that of the proposed project. These impacts would be *less than significant* and no mitigation would be required.

Wastewater Treatment Capacity. Like the proposed project, the No Project Alternative in combination with past, present, and foreseeable future development in the Mission Bay South area, would require the construction of new or expanded wastewater treatment facilities, the construction of which could cause significant environmental effects; this would be a *significant and unavoidable* impact, with no mitigation available to the project sponsor. As described in

Chapter 5, Section 5.7, the wastewater pump stations serving the project site are currently at capacity, and new development at Blocks 29-32, regardless of the intensity of land uses, in combination with other planned development in the Mission Bay South area, would trigger the need for new or expanded wastewater treatment facilities, the construction of which could result in significant environmental impacts. However, given the reduced gross square footage of development, the wastewater demand from the No Project Alternative would be less than that identified for the proposed project, and the amount of additional wastewater treatment capacity required would accordingly be less.

Stormwater Drainage Facilities. With respect to demand for stormwater facilities, the No Project Alternative would have the same demand as the proposed project and would be subject to the same stormwater management regulations. Stormwater drainage would be accommodated by the same stormwater facilities as the proposed project, as planned and provided for under the Mission Bay Infrastructure Plan. Like the proposed project, impacts related to stormwater drainage facilities for the proposed project would be *less than significant* and no mitigation would be required.

Wastewater Demand. Like the proposed project, development of the No Project Alternative would likely result in a determination by the San Francisco Public Utilities Commission (SFPUC) that it has inadequate capacity to serve the project's projected wastewater demand in addition to its existing commitments. Even though the No Project Alternative would have a reduced gross square footage of uses and therefore a reduced wastewater demand compared to the proposed project, the existing shortfall in capacity at the Mariposa Pump Station and/or the Mission Bay Sanitary Pump Station would indicated that an increase in capacity and associated improvements to these facilities would still be required. Therefore, it would be expected that the SFPUC would make the same determination for the No Project Alternative as they did for the proposed project, and Mitigation Measure M-C-UT-4 (Fair Share Contribution for Pump Station Upgrades) would apply. As for the proposed project, this impact would be *significant and unavoidable with mitigation*.

Public Services

Schools, Public Health, Childcare, Library, and Street Maintenance Services. Like the proposed project, the No Project Alternative would not result in increased demand for schools because it would not include residential uses. Other public services, such as demand for public health, childcare, library, street maintenance, and emergency medical would be within the assumptions provided for in the overall Mission Bay Redevelopment Plan and analyzed in the Mission Bay FSEIR. These impacts would be *less than significant* and no mitigation would be required.

Fire Protection and Emergency Medical Services. Like the proposed project, construction and operation of the No Project Alternative would not result in the need for new or physically altered governmental facilities for fire protection and emergency medical services. Construction of this alternative would require the same or fewer employees and have the same or shorter duration. Similarly, given the reduced gross square footage of proposed uses under this alternative, population increases at the site —and consequently demand for fire protection and emergency medical services—during construction and operation would be the same or less than that of the proposed project, as described in Chapter 5, Section 5.8. This impact would be *less than significant* and no mitigation would be required.

Law Enforcement Services. Like the proposed project, construction and operation of the No Project Alternative would not result in the need for new or physically altered governmental facilities for law enforcement services. Construction of this alternative would require the same or fewer employees and have the same or shorter duration. Similarly, given the reduced gross square footage of proposed uses under this alternative, population increases at the site —and consequently demand for law enforcement services—during construction and operation would be the same or less than that of the proposed project, as described in Chapter 5, Section 5.8. This impact would be *less than significant* and no mitigation would be required.

Biological Resources

Like the proposed project, the No Project Alternative would not have an effect on any special status species, federally protected wetlands, riparian habitat or other sensitive natural community, or conflict with any local policies protecting biological resources; these impacts would be *less than significant* and no mitigation would be required. Similar to the proposed project, under the No Project Alternative, potential impacts on breeding birds which may be nesting within the project site could be mitigated to less than significant with implementation of Mitigation Measure M-BI-4a (Preconstruction Surveys for Nesting Birds), and potential impacts related to avian collisions with buildings or night lighting could be mitigated to less than significant with implementation of Mitigation Measure M-BI-4b (Bird Safe Building Practices); these impacts would be *less than significant with mitigation*.

Geology and Soils

Like the proposed project, the No Project Alternative would not expose people or structures to substantial earthquake or landslide hazards, result in erosion or loss of top soil, be located on a geologic unit that could become unstable, be located on corrosive or expansive soils, substantially change the topography, or affect any unique geologic features. These impacts would be *less than significant* with implementation of protective measures required by applicable regulations, and no mitigation would be required.

Hydrology and Water Quality

Construction Impacts. Like the proposed project, the No Project Alternative's construction-related water quality impacts would be *less than significant* and no mitigation would be required. Management of stormwater and groundwater discharges during construction would be required to comply with local and state regulations designed to protect water quality.

Operational Impacts—Groundwater, Drainage, Flooding, and Inundation by Seiche or Tsunami. Like the proposed project, the No Project Alternative would not deplete groundwater supplies or interfere with groundwater recharge; would not alter existing drainage pattern that would result in erosion, siltation, or flooding; expose people, housing, or structures to substantial risk of loss due to flooding risks; redirect or impede flood flows; or expose people or structures to significant risk involving inundation by seiche or tsunami. These impacts would be *less than significant* with compliance with applicable regulations, and no mitigation would be required.

Operational Impacts—Water Quality. The No Project Alternative would have the same or less severe operational water quality impacts as the proposed project. Both the proposed project and the No Project Alternative would have the potential to affect water quality due to dry weather flows (sanitary sewage only), wet weather flows (sanitary sewage and stormwater), discharges from the Southeast Water Pollution Control Plant (SEWPCP), stormwater runoff and drainage discharges, and litter. However, in all cases, given the reduced gross square footage of the development under the No Project Alternative compared to that of the proposed project (which would be expected to result in a reduced volume of sanitary sewage), all water quality impacts would be the same or less severe than those described in Chapter 5, Section 5.9. All discharges to the Bay, whether sanitary sewage, stormwater, or a combination of both, would be treated as required by the San Francisco Regional Water Quality Control Board (RWQCB), and all discharges would be in compliance with applicable National Pollutant Discharge Elimination System (NPDES) permits that have been issued by the RWQCB for the express purpose of protecting water quality. Potential impacts related to effluent discharges from the SEWPCP would *be less than significant with mitigation*, assuming implementation of FSEIR Mitigation Measure K.2 which requires implementation of measures to ensure that businesses that discharge pollutants that are not typically associated with most wastewater discharges to the City's combined sewer system do not cause a violation of the NDPES permit for the SEWPCP.

Operational Impacts—Sea Level Rise. Like the proposed project, it would be expected that operation of the No Project Alternative would not expose people or structures to a significant risk of loss, injury, or death involving flooding associated with sea level rise. As described in Chapter 5, Section 5.9, the project site could be temporarily flooded at depths of up to 2.5 feet with 36 inches of sea level rise in combination with 100-year storm surge by 2100. The proposed project would be designed and constructed to resist flood damage and provide for the safety of occupants and visitors in the event of flooding. Although there is no specific design for the hypothetical No Project Alternative, it is assumed that this alternative would be designed consistent with San Francisco's Floodplain Management requirements and would include appropriate provisions to resist flood damage and provide for the safety of occupants and visitors in the event of flooding. Therefore, like the proposed project, this impact would be *less than significant* and no mitigation would be required.

Hazards and Hazardous Materials

All impacts related to hazards and hazardous materials would be identical for the No Project Alternative to those identified for the proposed project, since all impacts would result from the conversion of a vacant parcel to a mixed-use development on Blocks 29-32, regardless of the design or size of the development. Like the proposed project, the No Project Alternative would not impair implementation or physically interfere with an adopted emergency response plan or expose people or structures to a significant risk involving fires; these impacts would be *less than significant* and no mitigation would be required.

The No Project Alternative would be required to implement all required measures in compliance with applicable hazardous materials and hazardous waste regulations such that impacts related to routine use, transport, and disposal of hazardous materials would be less than significant; however, like the proposed project, because the future uses are currently unknown, there is a potential that future uses could involve handling of biohazardous materials, but implementation of mitigation measures identified in the Mission Bay FSEIR would reduce potential health and safety impacts to less than significant. Similarly, potential impacts related to encountering naturally occurring asbestos during construction could be reduced to less than significant with implementation of Mitigation Measure M-HZ-1b (Geologic Investigation and Dust Mitigation Plan for Naturally Occurring Asbestos). Furthermore, impacts related to excavation and construction on a site with identified hazardous waste contamination would be reduced to *less than significant with mitigation* measures previously identified in the Mission Bay FSEIR.

Mineral and Energy Resources

Like the proposed project, the No Project Alternative would not result in the use of large amounts of fuel, water, or energy, or use of these materials in a wasteful manner. These impacts would be *less than significant* with compliance with applicable regulations, including the San Francisco Green Building Code, and no mitigation would be required.

Agricultural and Forest Resources

As described for the proposed project, Blocks 29-32 does not contain agricultural or forest resources, and development under the No Project Alternative would have *no impact* on these resources.

7.3.1.4 No Project Alternative – Conclusions

The No Project Alternative would fail to meet the basic objective of building an event center that can be used for NBA basketball games, although depending on the specific design proposal, it could potentially meet four of the seven project objectives. The No Project Alternative would have many of the same or similar environmental impacts as those of the proposed project identified in Chapter 5 of this SEIR and in Appendix NOP-IS, although key differences in the impact conclusions for the No Project Alternative compared to the impact conclusions of the proposed project are summarized below. As defined in Chapter 5, Section 5.1, the following abbreviations are used for the impact significance determinations: SU = significant and unavoidable; SUM = significant and unavoidable with mitigation; LSM = less than significant with mitigation; LS = less than significant; and NI = no impact.

The No Project Alternative would ***avoid*** or ***substantially lessen*** the significant and unavoidable impacts that were identified for the proposed project (i.e., the significance determination would change from SU or SUM to LS or NI) with respect to:

- Traffic impacts at study intersections and at I-80 and I-280 freeway ramps associated with events at the proposed event center, including overlapping events with evening events at AT&T Park (Impact would change from SUM to LS.)

- Transit impacts on regional transit capacity associated with events at the proposed event center, including overlapping events with evening events at AT&T Park (Impact would change from SUM to LS.)
- Contribution to cumulative traffic impacts at freeway ramps (Impact would change from SUM to LS.)
- All transportation impacts under the "With an Overlapping SF Giants Game at AT&T Park" scenario (Impacts would change from SUM to NI.)
- Noise impacts from crowd noise at the Muni platform following events (Impact would change from SU to LS.)
- Permanent increases in noise levels on local roadway exceeding thresholds during the weekday late night 9 to 11 p.m. period and the Saturday evening 6 to 8 p.m. period (Impact would change from SUM to LS.)
- Cumulative traffic noise levels on local roadways (Impact would change from SUM to LS.)
- Air quality impacts due to construction emissions (Impact would change from SUM to LS.)
- Air quality impacts due to operational emissions (Impact would change from SUM to LS.)
- Cumulative air quality impacts (Impact would change from SUM to LS.)

The No Project Alternative would have ***less severe*** significant impacts than the proposed project (i.e., the significance determination would change from LSM to LS or NI) with respect to:

- Transit impacts on Muni service under conditions with overlapping events at AT&T Park and under cumulative conditions (Impacts would change from LSM to LS.)
- Cumulative pedestrian impact (Impact would change from LSM to LS.)
- Noise associated with amplified sound equipment and leakage of interior concert or other event noise (Impact would change from LSM to NI.)
- Helipad impacts associated with specialized outdoor lighting for the event center (Impact would change from LSM to NI.)
- Cancer risk associated with emissions of toxic air contaminants (Impact would change from LSM to LS.)
- Cumulative cancer risk associated with emissions of toxic air contaminants (Impact would change from LSM to LS).
- Consistency with the Clean Air Plan (Impact would change from LSM to LS.)

The No Project Alternative would have ***similar but slightly less severe*** significant impacts than the proposed project (i.e., the significance determination would be the same but the severity, magnitude and/or frequency of the impact would be notably less) with respect to:

- Traffic impacts during the weekday p.m. peak hour at the intersection of Seventh/Mississippi/16th (Impact remains SU, but the magnitude of the delay would be less and the intersection would remain at LOS E, compared to LOS F for the project.)

- Cumulative traffic impact (Impact would remain SUM, but only at two intersections for the No Project Alternative compared to 16 study intersections for the proposed project.)
- Wastewater demand requiring construction or expansion of wastewater treatment facilities (Impact would remain SU, but there would be reduced wastewater demand.)
- Wastewater demand resulting in the determination by the SFPUC that it has inadequate capacity to serve the project (Impact would remain SUM, but there would be reduced wastewater demand.)

Overall, the No Project Alternative would result in substantially less severe environmental impacts than the proposed project but would fail to meet the basic objectives of the project.

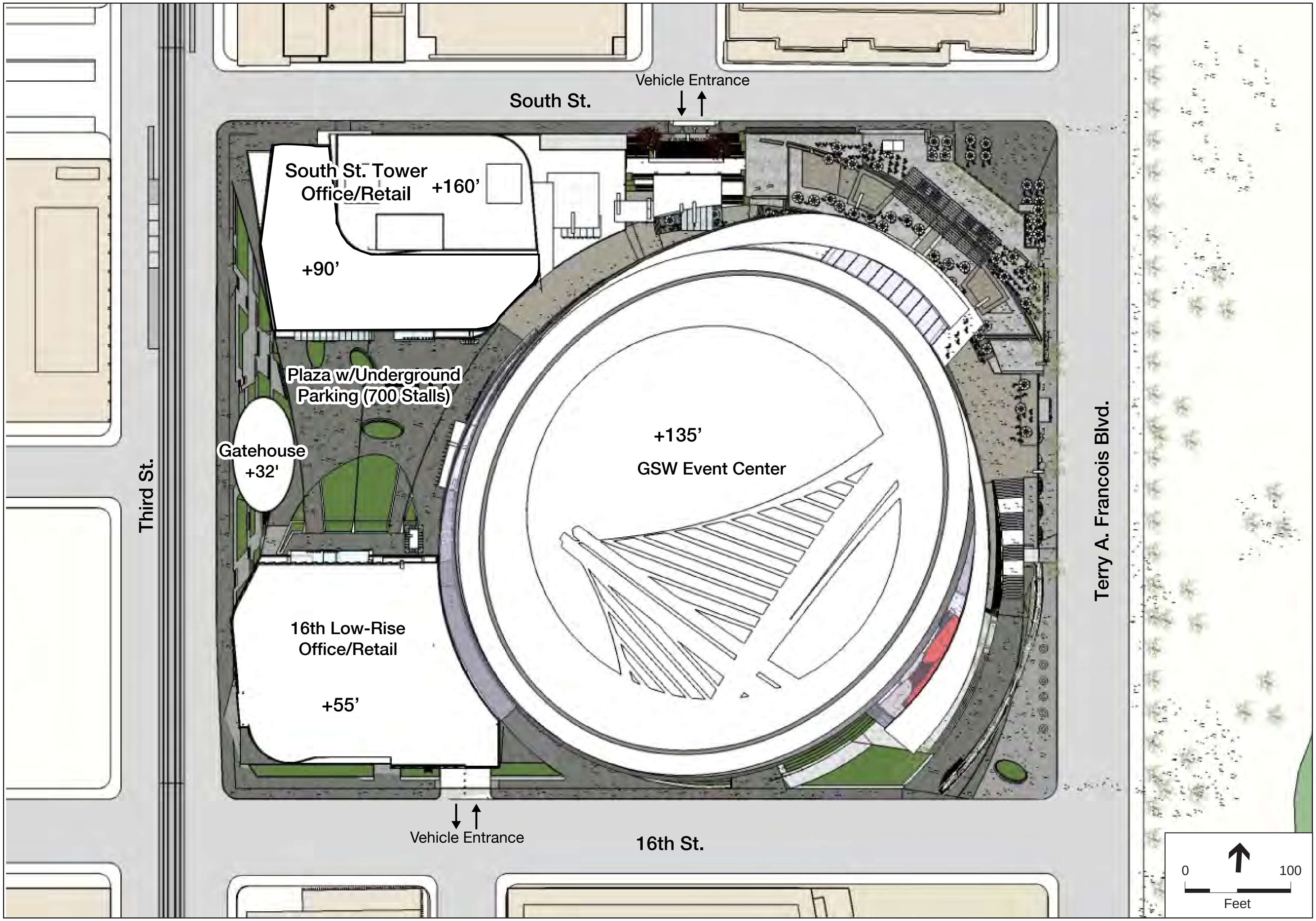
7.3.2 Alternative B: Reduced Intensity Alternative

This alternative was designed to address significant impacts associated with the proposed intensity of development at Blocks 29-32, while still meeting most of the project objectives. For the purposes of the CEQA alternatives analysis, Alternative B was designed to reduce significant impacts in the areas of transportation, noise, and air quality that were identified in Chapter 5 for the proposed project and summarized in Section 7.2 above.

7.3.2.1 Description of Reduced Intensity Alternative

The Reduced Intensity Alternative, developed as a hypothetical scenario for the purposes of this SEIR, is designed to reduce transportation and construction-related impacts that were identified for the proposed project. This alternative would be identical to the proposed project with respect to the event center's design and siting on Blocks 29-32, but the mixed use development of commercial-industrial-retail uses throughout the rest of the site would be reduced in scale by 40 percent. The office uses would be reduced from 580,000 to 373,000 gsf, retail uses would be reduced from 125,000 to 75,000 gsf, and on-site, subgrade parking reduced from 950 to 750 stalls. The total development would be reduced from 1,955,000 to 1,673,000 gsf, or a reduction of 282,000 gsf. As described above in Section 7.2.3, reducing the size of the event center was determined not to be feasible due to the current standards of the NBA for professional basketball games, the current market demand for season tickets, and the likelihood that reducing the size or scale of the event center would not avoid or lessen the significant and unavoidable transportation-related impacts.

In addition, there would be only one instead of two 160-foot-tall office towers; the tower at Third and 16th Streets would be lowered by seven floors, such that the height of this structure would be 55 feet instead of 160 feet. Retail uses would be reduced across the project site, with 5,000 gsf less at the South Street podium, 5,000 gsf less at the Gatehouse, 11,000 gsf less at the 16th Street podium, and 29,000 gsf less at the Market Hall complex at South Street and Terry A. Francois Boulevard. Like the proposed project, the same gatehouse would be located mid-block along Third Street, and vehicle access would be from South and 16th Streets. The area of open space would be the same as that for the proposed project, or 3.2 acres. A schematic of the Reduced Intensity Alternative site plan is presented in **Figure 7-2**.



SOURCE: Manica Architecture, 2015

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 7-2

Reduced Intensity Alternative, Conceptual Site Plan

Operations under the Reduced Intensity Alternative would be essentially the same as that for the proposed project. The event center operations would be identical, as described in Chapter 3, Table 3-3. Operations of the office and retail uses would be expected to be the same as for the proposed project, though reduced in scale commensurate with the reduced gross square footage of uses. For the purposes of this alternatives analysis, it is assumed that the Reduced Intensity Alternative would incorporate the same design standards, infrastructure improvements, and transportation management planning assumptions as those under the proposed project.

7.3.2.2 Ability of the Reduced Intensity Alternative to Meet Project Objectives

As shown in Table 7-2, the Reduced Intensity Alternative would meet most of the project objectives and potentially all of the project objectives. Because the Reduced Intensity Alternative would include an event center identical to the proposed project, this alternative would meet all of the project objectives related to providing a venue for sporting events, entertainment, and convention purposes. Specific design of the mixed-use portion of the development has not yet been defined, so it is unknown if the Reduced Intensity Alternative would meet the objectives related to the financial feasibility of the mixed use development. However, all other aspects of this alternative would be essentially equivalent to the proposed project with respect to meeting the objectives related to optimizing public transit, pedestrian, and bicycle access, provision of adequate parking, developing a year-round visitor-serving destination; and promoting environmental sustainability.

7.3.2.3 Impacts of the Reduced Intensity Alternative

Impacts of the Reduced Intensity Alternative would be similar to those of the proposed project with respect to nearly all resource areas. This is because many of the impacts would result from the development of a vacant parcel with an event center and mixed-use development, regardless of the size of the mixed-use development. And in all cases, the same mitigation or improvement measures identified for the proposed project would apply to the Reduced Intensity Alternative. The impacts of the Reduced Intensity Alternative as compared to those of the proposed project are summarized below by resource topic. The reader is referred to Initial Study (Appendix NOP-IS) and Chapter 5 of this SEIR for the full analysis of impacts similar to those of the proposed project.

Land Use

Like the proposed project, the Reduced Intensity Alternative would not physically divide an established community, conflict with applicable land use plans, or have a substantial impact upon the existing character of the vicinity. The event center and commercial/industrial/retail uses would occur within the boundary of existing lot lines, would be consistent with the South Plan and associated Design for Development, as amended for this alternative, and would be comparable in character to surrounding land uses. All land use impacts would be *less than significant* and no mitigation would be required.

Aesthetics

Like the proposed project, the Reduced Intensity Alternative would be on an infill site, within a transit priority area, and an employment center, therefore under CEQA Public Resources Code Section 21099, aesthetics are not to be considered in determining significant environmental effects.

Population and Housing

Like the proposed project, the Reduced Intensity Alternative would not induce substantial population growth, displace housing units, create substantial demand for additional housing, or displace substantial numbers of people. Employment projections for both construction and operation would be similar to or less than that for the proposed project, based on the reduced gross square footage of development, and could be met by the local and regional labor force. No housing would be displaced, and housing needs would be met by residents already living in the region. All population and housing impacts would be *less than significant* and no mitigation would be required.

Cultural and Paleontological Resources

Like the proposed project, the Reduced Intensity Alternative would not affect the significance of a historical resource, not destroy a unique paleontological resource, not disturb any human remains, assuming compliance with applicable regulations; these impacts would be *less than significant* and no mitigation would be required. Also like the proposed project, this alternative could cause a substantial adverse change in the significance of an archaeological resource that could be mitigated to less than significant. Construction of the Reduced Intensity Alternative would be comparable to that of the proposed project, and ground disturbance associated with grading and foundation work could affect unidentified archaeological resources. The same mitigation measures, Mitigation Measure M-CP-2a, Archaeological Testing, Monitoring and/or Data Recovery Program, and Mitigation Measure M-CP-2b, Accidental Discovery of Archaeological Resource, would be applicable to the Reduced Intensity Alternative and would make this impact *less than significant with mitigation*.

Transportation and Circulation

Under the Reduced Intensity Alternative, the amount of office, restaurant and retail uses would be about 60 percent of the proposed project, however, the event center would be the same as for the proposed project (i.e., 750,000 gsf and 18,064 seats). Under this alternative, 882 vehicle parking spaces (750 on-site and 132 at the 450 South Street garage) would be provided (compared to 1,082 vehicle parking spaces for the proposed project), and vehicular ingress and egress from the proposed parking garage would be from South and 16th Streets, similar to the proposed project. The Reduced Intensity Alternative would provide transportation improvements similar to those included as part of the proposed project, as described in Section 5.2.5.2, Project Transportation Improvements Assumptions, including roadway, transit, pedestrian and bicycle improvements, as well as an event center Transportation Management Plan (TMP) and a Muni Special Event Transit Service Plan.

As indicated in **Table 7-3**, above, for conditions without an event at the site, the number of weekday p.m. and Saturday evening person trips and vehicle trips generated by the Reduced Intensity Alternative would be less than with the proposed project. The Reduced Intensity Alternative would generate 1,702 person trips by all modes, compared to 2,796 person trips for the proposed project (i.e., 1,094 fewer person trips) during the weekday p.m. peak hour, and 1,879 person trips for the Reduced Intensity Alternative compared to 3,130 person trips for the proposed project (i.e., 1,251 fewer person trips) during the Saturday evening peak hour. For conditions with an event at the project site, the number of person and vehicle trips would be similar to those reported for the proposed project for the Convention Event and Basketball Game scenarios (see Chapter 5, Table 5.2-24).

Construction Impacts. Construction-related ground transportation impacts associated with the Reduced Intensity Alternative would be similar to the proposed project, and would be *less than significant*. Improvement Measure I-TR-1: Construction Management Plan and Public Updates, identified for the proposed project, would also be applicable to this alternative.

Traffic Impacts. Because the Reduced Intensity Alternative would include less retail, restaurant and office uses, it would generate fewer vehicle trips than the proposed project. For the No Event scenario, the Reduced Intensity Alternative would generate about 427 vehicle trips compared to 702 vehicle trips for the proposed project during the weekday p.m. peak hour, and would generate 435 vehicle trips compared to 785 vehicles for the proposed project during the Saturday evening peak hour (see **Table 7-3**, above). With a reduction in the number of vehicles added to the study intersections, the increase in average vehicle delay during the peak hours would be less than for the proposed project. During the weekday p.m. peak hour, four study intersections would operate at LOS E or LOS F conditions, similar to the proposed project; however, the LOS at the intersection of Seventh/Mississippi/16th would remain at LOS E, as compared to LOS F for the proposed project for the No Event and Basketball Game scenarios. Similar to the proposed project for the No Event and Basketball Game scenarios, the Reduced Intensity Alternative's contribution to the existing LOS E and LOS F conditions for the weekday p.m. peak hour at the intersections of King/Third, King/Fifth/I-280 ramps, and Fifth/Bryant/I-80 westbound off-ramp would not be considerable, and traffic impacts at these intersections would therefore, be less than significant. During the weekday p.m. peak hour, the LOS at the intersection of Seventh/Mississippi/16th would remain the same as under existing conditions (i.e., LOS E), compared to LOS F for the proposed project for the No Event and Basketball Game scenarios, however, the Reduced Intensity Alternative contribution to the existing LOS E conditions would be considerable, which would be considered a significant impact. Therefore, similar to the proposed project, the Reduced Intensity Alternative would result in *significant and unavoidable* impacts at one study intersection (i.e., at Seventh/Mississippi/16th) during the weekday p.m. peak hour, although the magnitude of the additional vehicle delay would be less than for conditions with the proposed project. During the Saturday evening peak hour, all study intersections would operate at LOS D or better, and therefore, traffic impacts at all study intersections would be less than significant, similar to the proposed project for the No Event and Basketball Game scenarios. **Table 7-6** and **Table 7-7**, above, present the freeway ramp LOS for the proposed project and the Reduced Intensity Alternative for the weekday p.m. and Saturday evening peak hours for the No Event scenario, respectively. The Reduced Intensity Alternative would add fewer vehicle trips to the I-280 and I-80 freeway mainline and ramps than the proposed project, and, similar to the proposed project for the No Event and Basketball Game scenarios, would not result in project-specific impacts or contribute considerably to existing LOS E or LOS F conditions during the weekday p.m. or Saturday evening peak hours.

Because the Reduced Intensity Alternative would include an event center, the proposed project's significant and unavoidable traffic impacts associated with events at seven study intersections (King/Fourth, Fifth/Harrison/I-80 westbound off-ramp, Fifth/Bryant I-80 eastbound on-ramp, Third/Channel, Fourth/Channel, Seventh/Mission Bay Drive, and Seventh/Mississippi/16th) and one I-80 freeway ramp (I-80 westbound off-ramp at Fifth/Harrison) would also occur under the Reduced Intensity Alternative, and these traffic impacts would be *significant and unavoidable with mitigation*. Mitigation Measure M-TR-2a: Additional PCOs during Events and Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts, identified for the proposed project, would also be applicable to the Reduced Intensity Alternative.

On days when a basketball game at the project site overlaps with a SF Giants evening game, the Reduced Intensity Alternative, similar to the proposed project, would result in *significant and unavoidable* impacts at six additional intersections (i.e., King/Fifth/I-280 ramps, Third/South, Fourth/16th, Owens/16th, Illinois/Mariposa, and Mariposa/I-280 northbound off-ramp). Proposed project Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts, Mitigation Measure M-TR-11a: Additional PCOs during Overlapping Events, Mitigation Measure M-TR-11b: Participation in the Ballpark/Mission Bay Transportation Coordinating Committee, and Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events, would also be applicable to the Reduced Intensity Alternative.

Transit Impacts. Under the No Event scenario, the Reduced Intensity Alternative would generate 543 transit trips compared to 881 transit trips for the proposed project (i.e., 130 fewer transit trips) during the weekday p.m. peak hour, and 404 transit trips compared to 673 transit trips for the proposed project (i.e., 269 fewer transit trips) during the Saturday evening peak hour. Thus, similar to the proposed project, the new transit trips would be accommodated on the T Third light rail line and 22 Fillmore bus route serving the project site, and on the regional transit service providers during the weekday p.m. and Saturday evening peak hours, and impacts on transit would be *less than significant*.

Because the number of transit trips traveling to and from the project site during an event under the Reduced Intensity Alternative would be similar to that for the proposed project, the significant and unavoidable impact on regional transit (i.e., Caltrain and North Bay Ferry and Bus Service) would occur, and this regional transit impact, similar to the proposed project, would be *significant and unavoidable with mitigation*. Mitigation Measure M-TR-5a: Additional Caltrain Service and Mitigation Measure M-TR-5b: Additional North Bay Ferry and Bus Service would also be applicable to Alternative B. Improvement Measure I-TR-4: Operational Study of the Southbound Platform at the T Third UCSF/Mission Bay Station, which would study the feasibility of physical improvements to the existing light rail platform would also be applicable to the Reduced Intensity Alternative.

On days when a basketball game overlaps with a SF Giants evening game, the Reduced Intensity Alternative, similar to the proposed project, would result in *less-than-significant impacts with mitigation* on Muni transit, and Mitigation Measure M-TR-13: Additional Muni Transit Service during Overlapping Events would be applicable to the Reduced Intensity Alternative. In addition, similar to the proposed project, on days with overlapping evening events, additional capacity would be required to accommodate the combined BART East Bay transit demand. Therefore, similar to the proposed project, on days when a basketball game overlaps with a SF Giants evening game, the Reduced Intensity Alternative would result in a significant impact on one additional regional transit service provider (i.e., BART). Implementation of Mitigation Measure M-TR-14: Additional BART Service to the East Bay during Overlapping Events would reduce or minimize the severity of the regional transit impact, however, since the provision of additional East Bay, South Bay, and North Bay transit service is uncertain and full funding for the service has not been identified, the Reduced Intensity Alternative's significant impacts to BART, Caltrain, Golden Gate Transit and WETA would, similar to the proposed project, be *significant and unavoidable with mitigation*.

Pedestrian Impacts. Under the No Event scenario, the Reduced Intensity Alternative would result in fewer person-trips and bicycle trips compared to the proposed project, and therefore, similar to the proposed project, impacts on pedestrians and bicycles would be *less than significant*. Because the Reduced Intensity Alternative would include an event center, the proposed project's significant impacts at the intersection of Third/South for the Basketball Game scenario during the weekday evening, weekday late evening, and Saturday evening peak hours would also occur under the Reduced Intensity Alternative. Proposed project Mitigation Measure M-TR-6: Active Management of Pedestrian Flows at the Intersection of Third/South would also be applicable to the Reduced Intensity Alternative, and with implementation of this measure, the Reduced Intensity Alternative impacts on pedestrians, similar to the proposed project, would be *less than significant with mitigation*.

Bicycle Impacts. Under the Reduced Intensity Alternative, similar to the proposed project, it is anticipated that the existing, planned, and proposed bicycle facilities in the project vicinity would be well utilized, and it is not expected that the vehicle, bicycle or pedestrian trips associated with the Reduced Intensity Alternative would result in significant impacts on bicyclists. Because the Reduced Intensity Alternative includes the event center, similar to the proposed project, it is possible that increased congestion associated with the proposed project, particularly during post-event conditions, could result in an increased potential for vehicular-bicycle and pedestrian-bicycle conflicts, however, it would not increase to a level that would adversely affect bicycle facilities in the area. Therefore, similar to the proposed project, the impacts of the Reduced Intensity Alternative on bicycle facilities and circulation would be *less than significant.*

Loading Impacts. Similar to the proposed project, the Reduced Intensity Alternative would include on-site and on-street commercial loading spaces to accommodate the loading demand, however, because the Reduced Intensity Alternative would provide less office and retail/restaurant uses, the number of loading spaces provided on site would be less than for the proposed project (i.e., 11 on-site loading spaces based on the Mission Bay South Design for

Development requirements, compared to 13 for the proposed project). The Reduced Intensity Alternative would generate 252 daily truck and service vehicle trips compared to 396 for the proposed project. Because the Reduced Intensity Alternative would provide commercial loading spaces, the loading demand would be accommodated, and loading impacts under this alternative, similar to the proposed project, would be less than significant. Improvement Measure I-TR-8: Truck and Service Vehicle Loading Operations Plan, identified for the proposed project, would also be applicable to the Reduced Intensity Alternative.

Emergency Vehicle Access Impacts. As part of the Reduced Intensity Alternative, the roadway network adjacent to the project site on 16th Street and Terry A. Francois Boulevard would be built out, which would facilitate emergency vehicle access to the site. Emergency vehicle access to the project site and nearby hospital uses would be maintained before and after events, as would emergency access for persons traveling to the emergency room and urgent care center in their personal vehicles. Similar to the proposed project, the Reduced Intensity Alternative would not inhibit emergency vehicles access to the project site and nearby vicinity, and impacts would be *less than significant*. Improvement Measure I-TR-10a: UCSF Emergency Vehicle Access and Garage Signage Plan and Improvement Measure I-TR-10b: Mariposa Street Restriping Study, identified for the proposed project, would also be applicable to the Reduced Intensity Alternative.

Cumulative Impacts. The Reduced Intensity Alternative's contribution to 2040 cumulative impacts would be similar to the proposed project. Similar to the proposed project, the Reduced Intensity Alternative would not contribute considerably to significant cumulative construction-related ground transportation impacts, and the Reduced Intensity Alternative's cumulative impacts related to bicycle, loading, and emergency vehicle access would be less than significant. Similar the proposed project, the Reduced Intensity Alternative's cumulative Muni transit and pedestrian impacts would be less than significant with mitigation, and cumulative regional transit impacts would be significant and unavoidable with mitigation. The Reduced Intensity Alternative would result in the same significant and unavoidable with mitigation cumulative traffic impacts as the proposed project (i.e., at 16 study intersections and at three freeway ramp locations).

Helipad Safety. Like the proposed project, construction of the Reduced Intensity Alternative could result in temporary obstruction of the UCSF helipad airspace surfaces, despite the reduced height of the building at Third and 16th Street from 160 to 90 feet, the impact could be potentially significant. In addition, like the proposed project, use of specialized outdoor lighting associated with event center operations could affect helipad flight operations. However, implementation of the same mitigation measures (Mitigation Measures M-TR-9a, Crane Safety Plan for Project Construction, and M-TR-9d, Event Center Exterior Light Plan) would reduce these potential impacts to *less than significant with mitigation*.

Noise

Construction Impacts. Like the proposed project, construction of the Reduced Intensity Alternative would not cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity; expose people to or generate noise levels in excess of applicable standards; or expose people and structures to excessive groundborne vibration levels. Under the Reduced

Intensity Alternative, the same construction equipment would likely be used, construction duration would likely be about the same, and compliance with the San Francisco Noise Ordinance would be required. Construction noise impacts would be therefore be the same or similar to those of the proposed project, and all impacts would be *less than significant* with no mitigation required. However, similar to the proposed project, the Reduced Intensity Alternative could contribute considerably to cumulative construction noise impacts depending on the extent of other construction activities occurring concurrently in the immediate vicinity. Like the proposed project, it would be assumed that planned construction elsewhere in Mission Bay, including multiple elements of the UCSF LRDP at the Mission Bay Campus, would likely overlap with construction activities at this site. Regardless, like the proposed project, implementation of Mitigation Measure M-C-NO-1 (Construction Noise Control Measures) would reduce this alternative's contribution to cumulative construction noise impacts to *less than significant*.

Operational Impacts. With respect to operations, the Reduced Intensity Alternative would introduce the same noise sources to the project area, both stationary and mobile noise sources, and operations under the Reduced Intensity Alternative would have the same noise impacts associated with extensive amplification equipment for interior or outdoor performances and with operation of public address systems, as the proposed project. Similar to the proposed project, implementation of Mitigation Measures M-NO-4a (Noise Control Plan for Outdoor Amplified Sound) and M-NO-4b (Noise Control Plan for Place of Entertainment Permit) would reduce this impact to less than significant.

Similarly, the Reduced Intensity Alternative would have essentially the same, though slightly less severe noise impacts associated with vehicular traffic than the proposed project. The Reduced Intensity Alternative would have less of an increase in the vehicular traffic in the project vicinity than the proposed project, and increased traffic noise levels would generally be less severe compared to those under the proposed project (see **Table 7-13** as compared to Table 5.3-9 in Chapter 5). For both the proposed project and the Reduced Intensity Alternative, the increased noise levels at all modeled roadway segments during the weekday 4 to 6 p.m. peak hour would be *less than significant*.

Under the proposed project, as shown in Table 5.3-9 in Chapter 5, roadside noise levels at multi-family receptors adjacent to Illinois Street and Terry A. Francois Boulevard would exceed significance thresholds under several scenarios: weekday late night 9 to 11 p.m. period due to post-basketball game traffic at Illinois Street and at Terry Francois Boulevard; and on Saturday evening 6 to 8 p.m. period due to basketball game traffic at Illinois Street. As described in Chapter 5, Section 5.3, Noise, these impacts are considered a significant and unavoidable permanent increase in noise levels, even with mitigation. Similarly, under the Reduced Intensity Alternative, increases in roadway noise levels during the weekday 9 to 11 p.m. period due to post-basketball game traffic at Illinois Street and at Terry Francois Boulevard would be expected to exceed significance thresholds, since the reduction in commercial and retail uses would likely not change traffic patterns during this period (which is why this scenario was not modeled for this alternative and is not shown in Table 7-13); this impact would be *significant and unavoidable*. Also, like the proposed project, noise increases during the Saturday 6 to 8 p.m. period on

TABLE 7-13
MODELED TRAFFIC NOISE LEVELS, REDUCED INTENSITY ALTERNATIVE[a]

Roadway Segment	Existing (2015)	Existing plus Reduced Intensity Alternative	dBA Difference	Significant Increase?
Weekday Peak Hour Noise Levels (4PM – 6PM)				
Third Street between South Street and China Basin Street	69.1	69.7	0.6	No
Third Street between 16th Street and Mariposa Street	69.9	69.9	0.0	No
Illinois Street between Mariposa Street and 20th Street	60.3	63.3	3.0	No
Terry Francois Boulevard between South Street and China Basin Street	59.8	59.8	0.0	No
16th Street between Third Street and I-280	66.4	67.2	0.8	No
Mariposa Street between Third Street and I-280	65.5	66.5	1.0	No
Roadway Segment	**Existing (2015)**	**Existing plus Reduced Intensity Alternative**	**dBA Difference**	**Significant Increase?**
Saturday Evening Noise Levels (6PM – 8PM)				
Third Street between South Street and China Basin Street	64.7	66.9	2.2	No
Third Street between 16th Street and Mariposa Street	65.1	65.3	0.4	No
Illinois Street between Mariposa Street and 20th Street	54.7	61.1	**6.4**	**Yes**
Terry Francois Boulevard between South Street and China Basin Street	54.0	54.9	0.9	No
16th Street between Third Street and I-280	61.4	63.8	2.4	No
Mariposa Street between Third Street and I-280	60.4	64.7	4.3	No

NOTES:

[a] Road center to receptor distance is assumed to be 50 feet for values shown in this table. Noise levels were determined using the Federal Highway Administration (FHWA) traffic noise model. The average speed on these segments is assumed to be 25 or 30 miles per hour, depending on the roadway. For all other assumptions, refer to Appendix NO. In an existing ambient noise environment of 65 dBA or greater, an incremental increase is considered significant if the noise increase is equal to or greater than 3.0 dBA. In an existing ambient noise environment below 65 dBA, an incremental increase is considered significant if the noise increase is equal to or greater than 5.0 dBA.

SOURCE: ESA 2015

Illinois Street due to basketball game traffic would be *significant and unavoidable*, as shown in Table 7-13. Therefore, noise impacts due to increased traffic on local roadways would be essentially the same under this alternative as for the proposed project.

Similarly, under cumulative conditions, the Reduced Intensity Alternative's contribution to significant roadway noise increases along Illinois Street between Mariposa and 20th Street during the Saturday evening period would be *significant and unavoidable*, similar to the proposed project, although the proposed project would also result in a significant and unavoidable contribution to cumulative roadway noise impacts along this same roadway segment during the weekday p.m. peak hour. Therefore, the Reduced Intensity Alternative would have somewhat less severe, cumulative roadway noise impacts than the proposed project because there would be less frequent occurrences of significant roadway noise increases along Illinois Street between Mariposa and 20th Street.

Like the proposed project, the Reduced Intensity Alternative would have a *significant and unavoidable* impact associated with the increased noise levels due to crowds gathering at the Muni T-Line platform near the UCSF Hearst Tower housing building during quieter nighttime periods, when event patrons would be departing the project site.

Like the proposed project, under the Reduced Intensity Alternative, the cumulative noise impacts of future operations of the UCSF Medical Center helipad would be less than significant because office and research/development uses are not considered noise sensitive land uses.

Air Quality

Construction Impacts. Like the proposed project, construction impacts of the Reduced Intensity Alternative would be significant and unavoidable with mitigation. As described in Chapter 5, Section 5.4, Air Quality, estimated construction-related emissions of ROG and NOx for the project would be 59 and 226 pounds per day, respectively, which would exceed the applicable significance thresholds. Even with implementation of Mitigation Measure M-AQ-1 (Construction Emissions Minimization), NOx levels would exceed the significance threshold, at 144 pounds per day, assuming the minimum level of compliance (Tier 2 with NOx VDECS). Similarly, as shown in **Table 7-14**, the construction-related criteria air pollutant emissions for the Reduced Intensity Alternative would exceed the thresholds for emissions of NOx, and as shown in **Table 7-15**, emissions of NOx under the Reduced Intensity Alternative would still be significant even with implementation of Mitigation Measure M-AQ-1. Thus, similar to the proposed project, an offset emissions mitigation measure would be required to provide for reduction of levels of ozone precursors exceeding the significance thresholds through implementation of pollution reduction programs elsewhere in the air basin. Consequently, construction-related criteria pollutant emissions under the Reduced Intensity Alternative would be *significant and unavoidable with mitigation*.

TABLE 7-14
AVERAGE DAILY CONSTRUCTION-RELATED EMISSIONS
FOR THE REDUCED INTENSITY ALTERNATIVE

	Average Daily Construction Emissions (pounds/day)			
	ROG	NOx	PM_{10}	$PM_{2.5}$
Off-road Equipment Emissions	11	154	6.2	6.2
Truck and Vehicle Emissions	6.7	48	0.80	0.73
Architectural Coating Emissions	31	0	0	0
Total[a]	**49**	**203**	7.0	7.0
Significance Threshold	54	54	82	54
Above Threshold?	No	**Yes**	No	No

NOTES:

[a] The total emissions may not sum precisely due to rounding of subtotals.

SOURCE: Ramboll Environ, 2015

TABLE 7-15
MITIGATED AVERAGE DAILY CONSTRUCTION-RELATED EMISSIONS FOR THE REDUCED INTENSITY ALTERNATIVE

	Average Daily Construction Emissions (pounds/day)			
	ROG	**NOx**	**PM10**	**PM2.5**
With Tier 2 + NOx VDECS Off-road Equipment				
Off-road Equipment Emissions	0.46	82	0.51	0.51
Truck and Vehicle Emissions	6.7	48	0.80	0.73
Architectural Coating Emissions	31	0	0	0
Total[a]	**39**	**130**	**1.3**	**1.2**
Significance Threshold	54	54	82	54
Above Threshold?	No	**Yes**	No	No

NOTES:
[a] The total emissions may not sum precisely due to rounding of subtotals.
SOURCE: Ramboll Environ, 2015

Operational Impacts. Like the proposed project, operational impacts of the Reduced Intensity Alternative would be significant and unavoidable even with mitigation. As described in Chapter 5, Section 5.4, Air Quality, estimated operational emissions of ROG and NOx under the proposed project would be 79 and 124 pounds per day, respectively, exceeding significance thresholds. As shown in **Table 7-16**, the Reduced Intensity Alternative would result in operational criteria air pollutant emissions of ROG and NOx slightly lower than those for the proposed project, but still at levels that would exceed the applicable significance thresholds. The same mitigation measures identified for the proposed project would apply to the Reduced Intensity Alternative, although the amount of emissions offset would need to be adjusted to the emissions calculated for this alternative. Therefore, the operational air quality impacts of the Reduced Intensity Alternative would be *significant and unavoidable with mitigation.*

Toxic Air Contaminants. Similar to the proposed project, construction and operation of the Reduced Intensity Alternative would generate toxic air contaminants, including diesel particulate matter. Like the project (see Table 5.4-10 in Section 5.4, Air Quality), $PM_{2.5}$ concentrations at off-site receptor locations would be below significance thresholds for construction and operation of the Reduced Intensity Alternative, as shown in **Table 7-17**. Cumulative (background plus Reduced Intensity Alternative) $PM_{2.5}$ levels at the maximally impacted sensitive receptor during construction would be 8.9 μg/m^3, and would not exceed the 10 μg/m^3 threshold. Following completion of construction activities, the Reduced Intensity Alternative's operational sources would also generate $PM_{2.5}$ emissions, which are also quantified in Table 7-17. As shown in this table, cumulative (background plus Reduced Intensity Alternative) $PM_{2.5}$ concentrations during project operations would be 9.0 μg/m^3. Furthermore, at no off-site location, during construction or operations, would cumulative $PM_{2.5}$ concentrations exceed the 10 μg/m^3 threshold. Therefore, the Reduced Intensity Alternative would not result in sensitive receptor locations meeting the Air Pollutant Exposure Zone criteria for $PM_{2.5}$, and impacts related to construction and operational $PM_{2.5}$ concentrations would be *less than significant*.

TABLE 7-16
AVERAGE DAILY AND MAXIMUM ANNUAL OPERATIONAL EMISSIONS FOR THE REDUCED INTENSITY ALTERNATIVE

	Average Daily Emissions (pounds/day)			
	ROG	**NOx**	**PM10**	**PM2.5**
Emission Source				
Mobile (Alternative–GSW Trips)	34	90	64	18
Standby Diesel Generators (assumes 5, same as project)	0.30	0.97	0.04	0.04
Boilers (assumes 4, same as project)	2.1	14	2.9	2.9
Area Sources	28	<0.01	<0.01	<0.01
Total[a]	**64**	**105**	**67**	**21**
Significance Threshold	54	54	82	54
Above Threshold?	**Yes**	**Yes**	No	No
	Maximum Annual Emissions (short tons/year)			
	ROG	**NOx**	**PM10**	**PM2.5**
Emission Source				
Mobile (Alternative–GSW Trips)	6.2	16	12	3.3
Standby Diesel Generators (assumes 5)	0.055	0.18	<0.01	<0.01
Boilers (assumes 4)	0.38	2.6	0.52	0.52
Area Sources	5.2	<0.01	<0.01	<0.01
Total[a]	**12**	**19**	12	3.8
Significance Threshold	10	10	15	10
Above Threshold?	**Yes**	**Yes**	No	No
Estimated Emissions Reduction Required by Offsets	1.77	9.25	0	0

NOTES:
[a] The total emissions may not sum precisely due to rounding of subtotals.

SOURCE: Ramboll Environ, 2015

Similarly, the lifetime cancer risk at off-site receptors under the Reduced Intensity Alternative would be less than significant with mitigation, the same as that identified for the proposed project, and the same mitigation measure would apply to this alternative. For the proposed project (see Table 5.4-11 in Section 5.4, Air Quality), the unmitigated risk would exceed the significance threshold but implementation of Mitigation Measure M-AQ-1 (Construction Emissions Minimization) would reduce the risk to less than significant. For the Reduced Intensity Alternative, as shown in **Table 7-18**, under unmitigated conditions, the excess cancer risk for a child resident at the UCSF Hearst Tower and Hospital would exceed the significance threshold of 100 per one million persons exposed. More specifically, a resident child at the UCSF Hearst Tower could be exposed to an excess cancer risk of up to 111 per one million under unmitigated conditions, a significant impact. The Reduced Intensity Alternative ’s unmitigated construction emissions would account for an excess cancer risk of 48 in one million and unmitigated operational emissions would account for an excess cancer risk of 37.2 in one million at this receptor location. Implementation of Mitigation Measure M-AQ-1 (Construction Vehicle Emissions Minimization) would reduce the impacts from standardized construction equipment for which “tiered”

TABLE 7-17
ANNUAL AVERAGE PM2.5 CONCENTRATIONS AT OFF-SITE RECEPTORS FOR THE REDUCED INTENSITY ALTERNATIVE

Source	PM2.5 Concentration (μg/m³, Annual Average)	
	UCSF Hearst Tower Receptor	**UCSF Hospital Receptor**
Construction		
Background at the maximally impacted receptor	8.5	8.6
Unmitigated Construction Contribution	0.27	0.27
Mitigated (Tier 2 + NOx VDECS) Construction Contribution	0.049	0.048
Cumulative Total (Unmitigated/with Mitigation)	8.8/8.5	8.9/8.7
Significance Threshold	10	10
Above Threshold?	No	No
Operation		
Background at the maximally impacted receptor	8.5	8.6
Project Operations – Generators	0.055	0.055
Project Operations – Mobile	0.32	0.32
Cumulative Total (Unmitigated)	8.9	9.0
Significance Threshold	10	10
Above Threshold?	No	No

NOTES:
[a] The total emissions may not sum precisely due to rounding of subtotals.

SOURCE: Ramboll Environ, 2015

TABLE 7-18
LIFETIME EXCESS CANCER RISK AT OFF-SITE RECEPTORS FOR THE REDUCED INTENSITY ALTERNATIVE

Source	Excess Cancer Risk (in one million)		
	UCSF Hearst Tower Receptor		**UCSF Hospital Receptor**
	Child Resident	**Adult Resident**	**Child Resident**
Background at the maximally impacted receptor	26	26	44
Unmitigated Construction Contribution	48	2.5	25
Mitigated (Tier 2 + NOx VDECS) Construction Contribution	8.5	0.44	4.4
Project Operations – Generators	30	30	30
Project Operations – Mobile	7.2	7.2	7.2
Cumulative Total (Unmitigated/ Mitigated)[a]	111 / 72	66 / 64	106 / 86
Significance Threshold	100	100	100
Above Threshold? (Unmitigated/ Mitigated)	**Yes**/No	No/No	**Yes**/No

NOTES:
[a] The total risks may not sum precisely due to rounding of subtotals.

SOURCE: Ramboll Environ, 2015

equipment is available, as shown in Table 5.4-11. With the minimum level of compliance with this mitigation measure (Tier 2 plus NOX VDECS), increased cancer risk as a result of project construction activities at the maximally impacted receptor would be approximately 8.5 in one million and cumulative excess cancer risk at all receptor locations would be reduced to below the significance threshold of 100 per one million.

While unmitigated increased cancer risk at the maximally impacted receptors would exceed the threshold of 100 in one million, with implementation of Mitigation Measure M-AQ-1 (Construction Emissions Minimization), increased cancer risk at the maximally impacted receptors would be below the threshold of 100 in one million. Furthermore, at no off-site location, would cumulative excess cancer risk exceed 100 per one million persons exposed with implementation of Mitigation Measure M-AQ-1. Therefore, the Reduced Intensity Alternative would not result in sensitive receptor locations meeting the Air Pollutant Exposure Zone criteria for excess cancer risk, and construction and operational cancer risk *would be less than significant with mitigation*.

Consistency with Clean Air Plan. Like the proposed project, impacts related to consistency with the 2010 Clean Air Plan (CAP) for the Reduced Intensity Alternative would be less than significant with mitigation. The Reduced Intensity Alternative would be consistent with the 2010 CAP by virtue of incorporation of mitigation measures that include offsetting emissions to below significance thresholds. Additionally, the Reduced Intensity Alternative would be consistent with the 2010 CAP by virtue of incorporation of control measures of the CAP, including land use/local impact measures and energy/climate measures now required through the various components of the City's Greenhouse Gas Reduction Strategy as well as the transportation demand management measures that would be assumed to part of this alternative, similar to those for the proposed project. The Reduced Intensity Alternative would also not hinder implementation of the 2010 CAP. Therefore, the Reduced Intensity Alternative would not conflict with, or obstruct implementation of the 2010 CAP, and this impact would be *less than significant with mitigation*.

Odors. Like the proposed project, this alternative would not create objectionable odors that would affect a substantial number of people.

Cumulative Air Quality Impacts. Like the proposed project, the cumulative air quality impacts of the Reduced Intensity Alternative would be significant and unavoidable with mitigation. Because the proposed project would result in both construction and operational emissions of ROG and NOx exceeding their respective significance thresholds, the project's contribution to cumulative air quality impacts is considered significant and unavoidable, even with mitigation. Similarly, the Reduced Intensity Alternative would result in significant and unavoidable air quality impacts after implementation of feasible mitigation measures, and consequently, would result in a cumulatively considerable contribution to regional and local air quality impacts. Therefore, this impact would be *significant and unavoidable with mitigation*.

The Reduced Intensity Alternative would result in a similar cumulative health risk impact as the proposed project, which was determined to be *less than significant* with implementation of Mitigation Measure M-AQ-1 (Construction Emissions Minimization). The planned Uber/ARE project could locate childcare facilities on Blocks 26/27, directly north of the project site. However, these sensitive receptors would be exposed to at most eight months of construction period emissions and these receptors' health risk exposure would not exceed significance thresholds with implementation of Mitigation Measure M-AQ-1.

Greenhouse Gas Emissions

Similar to the proposed project, construction and operation of the Reduced Intensity Alternative would generate GHG emissions, but also similar to the proposed project, it can be assumed that the Reduced Intensity Alternative would qualify as an environmental leadership project under AB 900. As described in Chapter 5, Section 5.5, the proposed project is a certified environmental leadership project under AB 900 and the CARB has determined that the proposed project would result in no net increase in GHG emissions based on the AB 900 application which includes voluntary acquisition of carbon credits by the project sponsor. Therefore, it is assumed that the Reduced Intensity Alternative would be designed and constructed to the same green building and sustainability standards as the proposed project, and would include strategies to reduce GHG emissions that would be consistent with the City's GHG Reduction Strategy and the AB 900 application submitted for the proposed project. Given the reduced size of the Reduced Intensity Alternative compared to the proposed project, overall GHG emissions during construction and operations would be expected to be somewhat less than that of the project, but given the assumption that this alternative would also qualify as an environmental leadership project under AB 900 and purchase carbon offset credits, the Reduced Intensity Alternative would result in no net increase in GHG emissions, like the proposed project. Therefore, impacts related to GHG emissions would be *less than significant* and no mitigation is required.

Wind and Shadow

Wind. As described in Chapter 5, Section 5.6, the proposed project would result in significant and unavoidable wind hazard impacts at off-site public areas based on results of wind tunnel testing. Under the Reduced Intensity Alternative, the 135-foot tall event center in the east and central part of the project site would be the same as under the proposed project, but instead of two 160-foot tall office towers on the west side of the site, there would be one 160-foot-tall tower (along South Street) and a 55-foot tall building (along 16th Street). The different building heights on the project site under the Reduced Intensity Alternative would result in different wind conditions, including at pedestrian use areas, than that described for the proposed project. However, in the absence of wind tunnel testing for the Reduced Intensity Alternative, the specific change in wind conditions of the Reduced Intensity Alternative compared to proposed project cannot be quantified. Consequently, the effect of the change in wind conditions on the conclusion of the significance of off-site wind hazards for the Reduced Intensity Alternative under existing plus project and cumulative conditions is not known.

However, like the proposed project, the Reduced Intensity Alternative would be subject to the Mission Bay South Design for Development wind analysis standards and design guidelines, which were prepared with the objective to use all feasible means to eliminate wind hazards and to reduce adverse wind impacts. Since the Reduced Intensity Alternative would contain buildings over 100 feet in height, it would be also subject to wind review, including potential wind tunnel testing, under the Mission Bay South Design for Development. Therefore, the severity of the wind impacts of the Reduced Intensity Alternative is unknown at this time, although if wind testing were to determine that the impacts would exceed significance thresholds, the same mitigation measure identified for the proposed project would apply to this alternative.

Shadow. Like the proposed project, the Reduced Intensity Alternative, in combination with cumulative development, would create new shadow but not in a manner that would substantially affect the use of publicly accessible open space or outdoor recreational facilities or other public areas within the Mission Bay South Plan area. The only difference between the Reduced Intensity Alternative and the proposed project design is associated with the height of the South Street office and retail building, located on the west side of the site. Similar to the proposed project, the shadow effect of the Reduced Intensity Alternative and its contribution to cumulative shadow impacts, on publicly accessible open space or outdoor recreation facilities or other public areas within the Mission Bay plan area (i.e., Bayfront Park), and outside the plan area (i.e., Agua Vista Park), would be *less than significant* and no mitigation would be required.

Recreation

Like the proposed project, the Reduced Intensity Alternative would not substantially increase the use of existing recreational facilities or require the construction or expansion of recreational facilities. Employment under this scenario would be the same or less than that for the proposed project, based on the reduced gross square footage, and recreational demands would be met by existing and planned parks and open space provided for as part of the overall Mission Bay Plan. All recreation impacts would be *less than significant* and no mitigation would be required.

Utilities and Service Systems

Water Supply Resources, Water Treatment Facilities, and Solid Waste. Like the proposed project, the Reduced Intensity Alternative would not require new or expanded water supply resources, require construction of new water treatment facilities, and would be served by existing landfills for solid waste disposal. Given the reduced gross square footage of uses, projected demands for water supply resources, water treatment facilities, and solid waste disposal would be less than that of the proposed project. These impacts would be *less than significant* and no mitigation would be required.

Wastewater Treatment Capacity. Like the proposed project, the Reduced Intensity Alternative in combination with past, present, and foreseeable future development in the Mission Bay South area, would require the construction of new or expanded wastewater treatment facilities, the construction of which could cause significant environmental effects; this would be a *significant and unavoidable* impact, with no mitigation available to the project sponsor. As described in Chapter 5, Section 5.7, the wastewater pump stations serving the project site are currently at capacity, and new development at Blocks 29-32, regardless of the intensity of land uses, in combination with other planned development in the Mission Bay South area, would trigger the need for new or expanded wastewater treatment facilities, the construction of which could result in significant environmental impacts. However, given the reduced gross square footage of development, the wastewater demand from the Reduced Intensity Alternative would likely be less than that identified for the proposed project, and the amount of additional wastewater treatment capacity required would accordingly be reduced.

Stormwater Drainage Facilities. With respect to demand for stormwater facilities, Reduced Intensity Alternative would have the same demand as the proposed project and would be subject to the same stormwater management regulations. Stormwater drainage would be accommodated by the same stormwater facilities as the proposed project, as planned and provided for under the Mission Bay Infrastructure Plan. Like the proposed project, impacts related to stormwater drainage facilities for the proposed project would be *less than significant* and no mitigation would be required.

Wastewater Demand. Like the proposed project, development of the Reduced Intensity Alternative would likely result in a determination by the San Francisco Public Utilities Commission (SFPUC) that it has inadequate capacity to serve the project's projected wastewater demand in addition to its existing commitments. Even though the Reduced Intensity Alternative would have a reduced gross square footage of uses and therefore a reduced wastewater demand compared to the proposed project, the existing shortfall in capacity at the Mariposa Pump Station and/or the Mission Bay Sanitary Pump Station indicate that an increase in capacity and associated improvements to these facilities would still be required. Therefore, it would be expected that the SFPUC would make the same determination for the Reduced Intensity Alternative as it did for the proposed project, and Mitigation Measure M-C-UT-4 (Fair Share Contribution for Pump Station Upgrades) would apply. As for the proposed project, this impact would be *significant and unavoidable with mitigation*.

Public Services

Schools, Public Health, Childcare, Library, and Street Maintenance Services. Like the proposed project, the Reduced Intensity Alternative would not result in increased demand for schools because it would not include residential uses. Other public services, such as demand for public health, childcare, library, street maintenance, and emergency medical would be within the assumptions provided for in the overall Mission Bay Redevelopment Plan and analyzed in the Mission Bay FSEIR. These impacts would *be less than significant* and no mitigation would be required.

Fire Protection and Emergency Medical Services. Like the proposed project, construction and operation of the Reduced Intensity Alternative would not result in the need for new or physically altered governmental facilities for fire protection and emergency medical services. Construction of this alternative would require about the same number of employees and have about the same duration. Similarly, given the reduced gross square footage of proposed uses under this alternative, population increases at the site —and consequently demand for fire protection and emergency medical services—during construction and operation would be the same or less than that of the proposed project, as described in Chapter 5, Section 5.8. This impact would be *less than significant* and no mitigation would be required.

Law Enforcement Services. Like the proposed project, construction and operation of the Reduced Intensity Alternative would not result in the need for new or physically altered governmental facilities for law enforcement services. Construction of this alternative would require about the same number of employees and have about the same duration. Similarly, given the reduced gross square footage of proposed uses under this alternative, population increases at the site —and consequently demand for law enforcement services—during construction and operation would be the same or less than that of the proposed project, as described in Chapter 5, Section 5.8. This impact would be *less than significant* and no mitigation would be required.

Biological Resources

Like the proposed project, the Reduced Intensity Alternative would not have an effect on any special status species, riparian habitat or other sensitive natural community, or conflict with any local policies protecting biological resources; these impacts would be *less than significant* and no mitigation would be required. Similar to the proposed project, under the Reduced Intensity Alternative, potential impacts on breeding birds which may be nesting within the project site could be mitigated to less than significant with implementation of Mitigation Measure M-BI-4a (Preconstruction Surveys for Nesting Birds), and potential impacts related to avian collisions with buildings or night lighting could be mitigated to less than significant with implementation of Mitigation Measure M-BI-4b (Bird Safe Building Practices); these impacts would be *less than significant with mitigation*.

Geology and Soils

Like the proposed project, the Reduced Intensity Alternative would not expose people or structures to substantial earthquake or landslide hazards, result in erosion or loss of top soil, be located on a geologic unit that could become unstable, be located on corrosive or expansive soils, substantially change the topography, or affect any unique geologic features. These impacts would be *less than significant* with implementation of protective measures required by applicable regulations, and no mitigation would be required.

Hydrology and Water Quality

Construction Impacts. Like the proposed project, the Reduced Intensity Alternative's construction-related water quality impacts would be *less than significant* and no mitigation would be required. Management of stormwater and groundwater discharges during construction would be required to comply with local and state regulations designed to protect water quality.

Operational Impacts—Groundwater, Drainage, Flooding, and Inundation by Seiche or Tsunami. Like the proposed project, the Reduced Intensity Alternative would not deplete groundwater supplies or interfere with groundwater recharge; would not alter existing drainage pattern that would result in erosion, siltation, or flooding; expose people, housing, or structures to substantial risk of loss due to flooding risks; redirect or impede flood flows; or expose people or structures to significant risk involving inundation by seiche or tsunami. These impacts would be *less than significant* with compliance with applicable regulations, and no mitigation would be required.

Operational Impacts—Water Quality. The Reduced Intensity Alternative would have the same operational water quality impacts as the proposed project. Both the proposed project and the

Reduced Intensity Alternative would have the potential to affect water quality due to dry weather flows (sanitary sewage only), wet weather flows (sanitary sewage and stormwater), discharges from the Southeast Water Pollution Control Plant (SEWPCP), stormwater runoff and drainage discharges, and litter. However, in all cases, given the reduced gross square footage of the development under the No Project Alternative compared to that of the proposed project (which would be expected to result in a reduced volume of sanitary sewage), all water quality impacts would be essentially the same as those described in Chapter 5, Section 5.9. All discharges to the Bay, whether sanitary sewage, stormwater, or a combination of both, would be treated as required by the San Francisco Regional Water Quality Control Board (RWQCB), and all discharges would be in compliance with applicable National Pollutant Discharge Elimination System (NPDES) permits that have been issued by the RWQCB for the express purpose of protecting water quality. Potential impacts related to effluent discharges from the SEWPCP would be *less than significant with mitigation*, assuming implementation of FSEIR Mitigation Measure K.2 which requires implementation of measures to ensure that businesses that discharge pollutants that are not typically associated with most wastewater discharges to the City's combined sewer system do not cause a violation of the NDPES permit for the SEWPCP.

Operational Impacts—Sea Level Rise. Like the proposed project, it would be expected that operation of the Reduced Intensity Alternative would not expose people or structures to a significant risk of loss, injury, or death involving flooding associated with sea level rise. As described in Chapter 5, Section 5.9, the project site could be temporarily flooded at depths of up to 2.5 feet with 36 inches of sea level rise in combination with 100-year storm surge by 2100. The proposed project would be designed and constructed to resist flood damage and provide for the safety of occupants and visitors in the event of flooding, and it is assumed that this alternative would be designed similarly. Therefore, like the proposed project, this impact would be *less than significant* and no mitigation would be required.

Hazards and Hazardous Materials

All impacts related to hazards and hazardous materials would be identical for the Reduced Intensity Alternative to those identified for the proposed project, since all impacts would result from the conversion of a vacant parcel to a mixed-use development on Blocks 29-32, regardless of the design or size of the development. Like the proposed project, the Reduced Intensity Alternative would not impair implementation or physically interfere with an adopted emergency response plan or expose people or structures to a significant risk involving fires; these impacts would be *less than significant* and no mitigation would be required.

The Reduced Intensity Alternative would be required to implement all required measures in compliance with applicable hazardous materials and hazardous waste regulations such that impacts related to routine use, transport, and disposal of hazardous materials would be less than significant; however, like the proposed project, because the future uses are currently unknown, there is a potential that future uses could involve handling of biohazardous materials, but implementation of mitigation measures identified in the Mission Bay FSEIR would reduce potential health and safety impacts to less than significant. Similarly, potential impacts related to encountering naturally occurring asbestos during construction could be reduced to less than significant with implementation of Mitigation Measure M-HZ-1b (Geologic Investigation and Dust Mitigation Plan for Naturally Occurring Asbestos). Furthermore, impacts related to excavation and construction on a site with identified hazardous waste contamination would be reduced *to less than significant with mitigation* measures previously identified in the Mission Bay FSEIR.

Mineral and Energy Resources

Like the proposed project, the Reduced Intensity Alternative would not result in the use of large amounts of fuel, water, or energy, or use of these materials in a wasteful manner. These impacts would be *less than significant* with compliance with applicable regulations, including the San Francisco Green Building Code, and no mitigation would be required.

Agricultural and Forest Resources

As described for the proposed project, Blocks 29-32 does not contain agricultural or forest resources, and development under the Reduced Intensity Alternative would have *no impact* on these resources.

7.3.2.4 Reduced Intensity Alternative — Conclusions

The Reduced Intensity Alternative would meet all of the basic project objectives. It would generally have the same environmental impacts as those of the proposed project identified in Chapter 5 of this SEIR and in Appendix NOP-IS. Key differences in the impact conclusions for the Reduced Alternative compared to the impact conclusions of the proposed project are summarized below.

The Reduced Intensity Alternative would not avoid or substantially lessen any of the significant and unavoidable impacts that were identified for the proposed project. Nor would the Reduced Intensity Alternative result in any changes to the significance determinations identified for the proposed project, and all mitigation measures would apply to this alternative.

However, the Reduced Intensity Alternative would have ***similar but slightly less severe*** significant impacts than the proposed project (i.e., the significance determination would be the same but the severity, magnitude and/or frequency of the impact would be notably less) with respect to:

- Traffic impacts during the weekday p.m. peak hour at the intersection of Seventh/Mississippi/16th (Impact would remain SUM, but the magnitude of the delay would be less and the intersection would remain at LOS E, compared to LOS F for the project.)

- Cumulative traffic noise levels on Illinois Street between Mariposa and 20th Street during Saturday evening period (Impact would remain SUM, but unlike the proposed project, the Reduced Intensity Alternative would not result in a cumulatively considerable noise increase along this same roadway segment during the weekday p.m. peak hour.)

- Construction air quality impacts associated with emissions of ROG and NOx (Impact would remain SUM, but under the proposed project, ROG and NOx emissions would be 59 and 226 pounds per day, respectively, and would be reduced to 49 and 203 pounds per day, respectively, under the Reduced Intensity Alternative. With implementation of mitigation under the proposed project and the Reduced Intensity Alternative, NOx emissions would still exceed these thresholds.)

- Operational air quality impacts associated with emissions of ROG and NOx (Impact would remain SUM, but under the proposed project, ROG and NOx emissions would be 79 and 124 pounds per day, respectively, and would be reduced to 64 and 105 pounds per day, respectively, under the Reduced Intensity Alternative).
- Wastewater demand requiring construction or expansion of wastewater treatment facilities (Impact would remain SU, but there would be reduced wastewater demand and potentially reduced construction or expansion of wastewater facilities.)
- Wastewater demand resulting in the determination by the SFPUC that it has inadequate capacity to serve the project (Impact would remain SUM, but there would be reduced wastewater demand.)

Overall, the Reduced Intensity Alternative would result in somewhat less severe environmental impacts than the proposed project, while achieving most of the basic objectives of the project.

With the exception of the event center, the Reduced Intensity Alternative reduces the scale of development at the site. The project sponsor has indicated that this reduction may affect the economic feasibility of the project. Based on current information, however, this alternative is considered potentially feasible. The feasibility of this alternative (based on economic or other considerations) will be determined at the time OCII decides whether to approve the project or an alternative to the project.

7.3.3 Alternative C: Off-site Alternative at Piers 30-32 / Seawall Lot 330

As described in Chapter 2, Introduction, the project sponsor previously proposed to construct a multi-purpose event center, event hall, public open space, maritime uses, fire station, a parking facility, and visitor-serving retail and restaurant uses on Piers 30-32 along the San Francisco waterfront, south of the Bay Bridge, in conjunction with a residential and hotel mixed-use development across The Embarcadero on Seawall Lot 330. For the purposes of this SEIR, this alternative would be essentially the same as that previous proposal, although without the fire station, since the San Francisco Fire Department has proceeded with a different plan for upgrading its waterfront facilities.

7.3.3.1 Description of Off-site Alternative at Piers 30-32 / Seawall Lot 330

Site Description

Piers 30-32 and Seawall Lot 330 are located along The Embarcadero, between Bryant Street and Brannan Street, just south of the Bay Bridge, and within the jurisdictional boundary of the Port of San Francisco (Port). Piers 30-32 is an approximately 12.7-acre rectangular-shaped concrete pier structure that extends east from the bulkhead wharf into the San Francisco Bay. With the exception of Red's Java House, located on the northwest corner of the piers, Piers 30-32 has no existing on-deck structures and is used for surface parking and an occasional berthing location for cruise ships and other large vessels. Substantial areas of Piers 30-32 are in poor structural condition and can no longer safely support heavy loads such as trucks or large crowds. Seawall Lot 330 is an approximately 2.3-acre paved inland site, located directly across The Embarcadero from Piers 30-32, and currently operates as a surface parking lot. The site is within the City's Rincon Point-South Beach neighborhood adjacent to several existing residential uses. Piers 30-32 is within an area subject to the San Francisco Bay Conservation and Development Commission (BCDC) San Francisco Waterfront Special Area Plan. In addition, Piers 30-32 is within the purview of the State Lands Commission as part of its stewardship of state-owned lands, waterways, and resources and subject to public trust considerations under the Burton Act.

Alternative Description

This alternative assumes the same design and programming as the project sponsor's previously proposed project at this location, with the only exception being the removal of the fire house and associated San Francisco Fire Department facilities; the conceptual site plan is depicted in **Figure 7-3**. The Off-site Alternative at Piers 30-32 and Seawall Lot 330 would have an event center on Piers 30-32 with the same basketball seating capacity as the currently proposed project (18,064 seats), totaling 694,944 gsf (including the GSW offices), plus an event hall covering 25,946 gsf. Also located on Piers 30-32, this off-site alternative would include about 90,000 gsf of retail/restaurant uses, 13,172 gsf for services, about 252,554 gsf for parking and loading, and 1,820 gsf for Red's Java House, for a total building area of about 1,078,436 gsf. The height of the event center would be 128 feet high, with seven arena levels, height of the retail buildings 32 to 58 feet, with 1 to 3 levels, and the parking would be 31 feet high, with 3 levels. Red's Java House would be relocated from its current location in the northwest corner of Piers 30-32 to near the southwest corner, and relocation would be conducted consistent with the Port of San Francisco Building Code requirements and the Secretary of the Interior's Standards for the Treatment of Historic Properties. Other proposed facilities on Piers 30-32 would include a water taxi dock, a "dolphin" berthing structure[4], and over 7 acres of public open space on Piers 30-32. There would be 500 parking spaces at Piers 30-32. Vehicular access would be at one midblock access point on The Embarcadero, between Bryant and Brannan Streets. Maritime uses include a water taxi dock on the north side and berthing for deep water vessels on the east side.

Seawall Lot 330 would be developed with a combination of residential, hotel, and retail uses (including restaurants and parking) and would be designed to architecturally connect to the development at Piers 30-32. A total of 534,890 gsf of building development is proposed at Seawall Lot 330, consisting of 208,844 gsf of residential, 178,406 gsf of hotel, 29,854 gsf of retail, 106,339 gsf parking, and 11,447 gsf of shared support areas. The development would include a four-story building (ground level plus three podium levels containing a combination of retail, residential,

4 A "dolphin" berthing structure would provide an extended berthing point for large deep water vessels on the east side of Piers 30-32. The structure was proposed to be located south of the southeast corner of Piers 30-32, and would consist of an above-water concrete platform (approximately 36 square feet in surface area) with a single mooring post, attached to the seabed.

SOURCE: Snøhetta, Manica Architecture, BAR Architects, 2014

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 7-3
Off-Site Alternative at Piers 30-32 and
Seawall Lot 330 Conceptual Site Plan

hotel and parking uses) above which a 13-story residential tower would be developed in the south portion of the site (i.e., 17 stories total) and a 7-story hotel tower in the north portion of the site. The tallest structure on Seawall Lot 330 would be the proposed residential tower, which would measure approximately 175 feet at its building rooftop. The hotel would consist of two building wings connected by a multi-level glass bridge, approximately 105 feet in height. The podium building would vary in height, ranging from 20 to 50 feet depending on location, and would incorporate rooftop open space areas. The Seawall Lot 330 development would contain multiple ground-level vehicular and pedestrian/bicycle access points to the site, and a pedestrian/bicycle pathway through the development connecting Main Street and The Embarcadero. A total of 259 vehicle parking spaces are proposed on Seawall Lot 330.

Operations under this alternative are assumed to be essentially the same as those of the proposed project at Mission Bay, with the same year-round schedule and types of events at the event center, and typical operational schedules for the hotel, residential, and retail uses.

Construction of the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would require approximately 32 months for the entire development, about 6 months longer than the construction schedule for the proposed project. Unlike the proposed project, extensive in-water construction activities would be required in the vicinity of Piers 30-32 due to the seismic and structural upgrades to the pier structure that would be required. At or in the vicinity of Piers 30-32, construction activities would include: demolition of portions of the existing Piers 30-32 pier deck; removal and/or disconnection of existing pier piles; installation of new pier piles and reconstruction of the pier deck; dredging within a portion of the Pier 28-30 open water area; strengthening of the seawall and sections of the bulkhead wharf adjacent to Piers 30-32 along The Embarcadero promenade; construction of all above-deck Piers 30-32 development, including foundations, event center structure, retail buildings, parking and loading structure, and open space features; installation of associated on-site utilities; interior finishing, exterior hardscaping and landscaping improvements; installation of floating dock facilities along the north side of Piers 30-32; and installation of frontage improvements along The Embarcadero.

At Seawall Lot 330, construction activities would include: site demolition, clearing and excavation; pile installation and foundation construction; construction of all proposed Seawall Lot 330 development, including podium structure and residential and hotel towers; installation of associated on-site utilities; interior finishing; exterior hardscaping and landscaping improvements; and installation of frontage improvements along The Embarcadero and Bryant and Beale Streets.

This alternative would require numerous federal and state permits and approvals, including approvals from the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Services, National Marine Fisheries Service, California State Lands Commission, San Francisco Bay Conservation and Development Commission, and California Department of Fish and Wildlife. Local approvals would be required from the San Francisco Planning Commission, San Francisco Port Commission, and the San Francisco Board of Supervisors as well as the San Francisco voters.

It should be noted that this alternative includes a different mix of uses than that of the proposed project, including new residential and hotel uses and substantially less office uses. Because of these differences, this alternative would result in impacts that would not occur for the proposed project, particularly due to the residential uses. However, the program for this alternative is based on the previous proposal by the project sponsor for this site, and was determined to be the most viable mix of uses for this site at that time.

Under the Off-site Alternative, development at Blocks 29-32 at Mission Bay would not be precluded. Development of the Off-site Alternative, could occur concurrently with development of Blocks 29-32 per the Mission Bay Plan, potentially contributing to localized impacts at both sites. See the analysis of the No Project Alternative for the impacts associated with development at Blocks 29-32, in Section 7.3.1 above.

7.3.3.2 Ability of the Off-site Alternative to Meet Project Objectives

The Off-site Alternative at Piers 30-32 and Seawall Lot 330 would meet most of the basic project objectives, although like the Reduced Intensity Alternative, the current financial feasibility is unknown. Presumably, based on the previous conceptual design at this site, this alternative would meet all of the project objectives related to providing a venue for sporting events, entertainment, and convention purposes. In addition, this alternative would meet the objectives related to optimizing public transit, pedestrian, and bicycle access, provision of adequate parking, developing a year-round visitor-serving destination; and promoting environmental sustainability.

7.3.3.3 Impacts of the Off-site Alternative

Land Use

Similar to the proposed project, the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would not physically divide an established community, conflict with applicable land use plans, or have a substantial impact upon the existing character of the vicinity. The conceptual design would occur within the boundaries of the existing lot lines and does not include any physical barriers or obstacles to circulation that would restrict existing patterns of movement between the site and adjacent neighborhoods. This alternative would require a rezoning of the project site to increase the height limit, but these changes would not result in an environmental effect under CEQA, as modified by SB 743. This alternative would require approval by San Francisco Bay Conservation and Development Commission (BCDC), the Port of San Francisco (Port), the San Francisco Planning Commission, and other relevant regulatory agencies as part of their project approval process. In addition, the State Lands Commission would need to make a determination with regard to its consistency of the proposed uses with the public trust.[5] These agencies would determine whether, on balance, the alternative would be consistent with their applicable plans. The development on Piers 30-32 and Seawall Lot 330 would generally represent an intensification of land uses already

5 Assembly Bill No. 1273 was approved in September 2013, which authorizes the State Lands Commission to approve a mixed-use development on the San Francisco waterfront at Piers 30-32, which would include a multipurpose venue for events and public assembly, if the State Lands Commission finds at a properly noticed public meeting, that specified conditions are met.

present in the project vicinity and would complement the existing character of the vicinity. Thus, all land use impacts would be *less than significant* and no mitigation would be required.

Aesthetics

Like the proposed project, the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would be on an infill site, within a transit priority area, and an employment center, therefore under Public Resources Code Section 21099, aesthetics are not to be considered in determining significant environmental effects.

Population and Housing

Similar to the proposed project, the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would not induce substantial population growth, displace housing units, create substantial demand for additional housing, or displace substantial numbers of people. Employment projections for both construction and operation would be similar to or less than that for the proposed project, based on the reduced gross square footage of development, and could be met by the local and regional labor force. No housing would be displaced, considering that this alternative would include new residential uses, and housing needs would be met by residents already living in the region. All population and housing impacts would be *less than significant* and no mitigation would be required.

Cultural and Paleontological Resources

Like the proposed project, the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would not destroy a unique paleontological resource or unique geological feature, and not disturb any human remains, assuming compliance with applicable regulations; these impacts would be *less than significant* and no mitigation would be required. Similar to the proposed project, this alternative would not affect the significance of a historic resource, even though unlike the proposed project where there are no historic resources, historic resources are present at and near this off-site location at Piers 30-32, including Red's Java House, sections of the bulkhead wharf, and the Seawall. However, it is assumed that design and construction of a project at this location would be consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties as well as comply with Port of San Francisco requirements for alterations to historic resources; therefore, impacts on historic resources, like the proposed project, would be *less than significant* and no mitigation would be required.

However, this alternative could result in a potentially significant impact on historic resources in the project vicinity (e.g., sections of the bulkhead wharf) due to the potential effects of groundborne vibration during construction on nearby historic resources, although feasible mitigation measures to conduct pre-construction assessments and implement a vibration monitoring and management plan would reduce this impact to less than significant. This impact would not occur under the proposed project.

This alternative, like the proposed project, could cause a substantial adverse change in the significance of an archaeological resource that could be mitigated to less than significant. Ground disturbance associated with grading and foundation work at Seawall Lot 330 could affect unidentified archaeological resources, and the same mitigation measures, Mitigation Measure M-CP-2a, Archaeological Testing, Monitoring and/or Data Recovery Program, and Mitigation Measure M-CP-2b, Accidental Discovery of Archaeological Resource, would be applicable to this alternative and would make this impact *less than significant with mitigation*.

Transportation and Circulation

The Off-site Alternative at Piers 30-32 and Seawall Lot 330 would be located about 1.3 miles north of the project site in Mission Bay, closer to the downtown core, and therefore a direct comparison of transportation impacts of the Off-site Alternative to the proposed project is not possible. Thus, the assessment of potential transportation impacts is based on preliminary analyses conducted for the Event Center and Mixed-Use Development at Piers 30-32 and Seawall Lot 330 project in 2013 and 2014 prior to the proposed project's relocation to the Mission Bay site. The Off-site Alternative would include an event center, similar to the proposed project, and would include about 120,500 gsf of retail/restaurant uses, 35,600 gsf of office uses, 176 residential units, and 227 hotel rooms (compared to 125,000 gsf of retail/restaurant uses, 605,000 gsf of office uses, and an event center for the proposed project).

Similar to the proposed project, the Off-site Alternative would include a TMP for events that would manage vehicular access to the site, facilitate travel to/from an event by non-auto modes, minimize conflicts between vehicles and pedestrians or bicycles, and ensure emergency vehicle access to the site.

Under the Off-site Alternative, about 500 on-site vehicle parking spaces would be provided on Piers 30-32 and 260 vehicle spaces on Seawall Lot 330. Vehicular ingress and egress from the proposed event center parking garage would be from The Embarcadero. Similar to the proposed project on-site loading spaces would be provided within the buildings on both Pier 30-32 and Seawall Lot 330. Passenger loading/unloading for the event center would be located on The Embarcadero between Bryant and Brannan Streets.

Because the Off-site Alternative would be located closer to the downtown core, with multiple transit routes within walking distance, the auto mode share for the Off-site Alternative would be less than for the proposed project. For example, for the Basketball Game scenario during the weekday p.m. peak hour, the estimated auto mode share for all trips (i.e., all uses, including the event center, residential, hotel, retail/restaurant, and office uses) would be 35 percent for the Off-site Alternative, compared to 43 percent for the proposed project, and for the post-game late evening peak hour, the auto mode share for all trips would be 36 percent the Off-site Alternative, compared to 53 percent for the proposed project. See **Appendix TR** for additional details.

As indicated in **Table 7-3**, above**,** for conditions without an event at the site, the number of weekday p.m. and Saturday evening person trips and vehicle trips generated by the Off-site Alternative would be less than with the proposed project. The Off-site Alternative would generate 1,787 person trips by all modes, compared to 2,796 person trips for the proposed project (i.e., 1,009 fewer person trips) during the weekday p.m. peak hour, and 2,680 person trips for the Off-site Alternative compared to 3,130 person trips for the proposed project (i.e., 450 fewer person trips) during the Saturday evening peak hour.

Construction Impacts. Construction-related ground transportation impacts would be similar to the proposed project, even though the duration of construction would be 6 months longer, and impacts would be less than significant. Improvement Measure I-TR-1: Construction Management Plan and Public Updates, identified for the proposed project, would also be applicable to this alternative.

Traffic Impacts. The Off-site Alternative would generate fewer vehicle trips than the proposed project, although as described below, traffic impacts would be significant and unavoidable. During the weekday p.m. peak hour for the No Event scenario, the Off-site Alternative would generate about 355 vehicle trips compared to 702 vehicle trips for the proposed project (i.e., 347 fewer vehicle trips), while during the Saturday evening peak hour, the Off-site Alternative would generate 435 vehicle trips compared to 785 vehicles for the proposed project (i.e., 350 fewer vehicle trips). **Table 7-19** and **Table 7-20** present the intersection LOS for the No Event and Basketball game scenarios for the Off-site Alternative for existing and existing plus Off-site Alternative conditions for the weekday p.m. and Saturday evening peak hours, respectively. As indicated in **Table 7-19**, during the weekday p.m. peak hour, a greater proportion of the study intersections in the vicinity of the Off-site Alternative currently operate at LOS E or LOS F conditions (i.e., 13 of the 26 study intersections for the Off-site Alternative, compared to 4 of the 22 study intersections for the proposed project). During the Saturday evening peak hour, all study intersections operate at LOS D or better, similar to the study intersections for the proposed project.

During the weekday p.m. peak hour for the No Event scenario, the Off-site Alternative would result in project-specific impacts (i.e., from LOS D or better to LOS E or LOS F, or from LOS E to LOS F) at six intersections, and would contribute considerably to existing LOS E or LOS F conditions at two intersections (i.e., traffic impacts at eight intersections, compared to one intersection for the proposed project). Under the Basketball Game scenario, the Off-site Alternative would result in eight project-specific impacts and contribute considerably to existing LOS E or LOS F conditions at four intersections (i.e., traffic impacts at 12 intersections, compared to 10 intersections for the proposed project). As shown in **Table 7-20**, for Saturday evening peak hour conditions, the Off-site Alternative would result in significant traffic impacts at one intersection for the No Event scenario, and at seven intersections for the Basketball Game scenario.

During overlapping evening events at AT&T Park, the magnitude and number of significant traffic impacts at intersections would increase due to the greater congestion levels at the same nearby intersections, and use of similar access routes and ramps to and from the I-80 and I-280 freeways. Mitigation measures similar to those identified for the proposed project but focused on conditions in the vicinity of Piers 30-32 (i.e., Mitigation Measure M-TR-2b: Additional Strategies to Reduce Transportation Impacts, Mitigation Measure M-TR-11a: Additional PCOs during Overlapping Events, Mitigation Measure M-TR-11b: Participation in the Ballpark/Mission Bay Transportation Coordinating Committee, and Mitigation Measure M-TR-11c: Additional Strategies to Reduce Transportation Impacts of Overlapping Events), would be applicable to the Off-site Alternative, and would serve to lessen the severity of significant traffic impacts. However, similar to the proposed project, the Off-site Alternative's traffic impacts would be *significant and unavoidable with mitigation*.

TABLE 7-19
OFF-SITE ALTERNATIVE AT PIERS 30-32 AND SWL 330 –
INTERSECTION LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS –
WITHOUT A SF GIANTS GAME – WEEKDAY PM PEAK HOUR

					Existing plus Off-site Alternative			
			Existing		No Event		Basketball Game	
#	**Intersection Location**		**Delay[a]**	**LOS[a]**	**Delay**	**LOS**	**Delay**	**LOS**
1	Broadway	The Embarcadero	36.7	D	36.9	D	37.4	D
2	Washington St	The Embarcadero	30.5	C	31.5	C	38.0	D
3	Mission Street	The Embarcadero	**79.5**	**E**	**> 80**	**F**	**> 80**	**F**
4	Howard Street	The Embarcadero	**> 80**	**F**	**> 80**	**F**	**> 80**	**F**
5	Folsom Street	The Embarcadero	**61.9**	**E**	**66.8**	**E**	**> 80**	**F**
6	Harrison Street	The Embarcadero	**71.0**	**E**	**> 80**	**F**	**> 80**	**F**
7	Bryant Street	The Embarcadero	**> 80**	**F**	**> 80**	**F**	**> 80**	**F**
8	Brannan Street	The Embarcadero	39.1	D	37.6	D	42.4	D
9	Townsend Street	The Embarcadero	**58.1**	**E**	**62.6**	**E**	**70.4**	**E**
10	King Street	Second Street	**55.8**	**E**	**59.6**	**E**	**63.1**	**E**
11	King Street	Third Street	**72.7**	**E**	**> 80**	**F**	**> 80**	**F**
12	King Street	Fourth Street	51.9	D	**56.0**	**E**	**59.5**	**E**
13	King/Fifth Streets	I-280 ramps	**59.2**	**E**	**56.0**	**E**	**72.8**	**E**
14	Harrison Street	Main Street	**> 80**	**F**	**> 80**	**F**	**> 80**	**F**
15	Bryant Street	Main Street	21.2	C	32.5	C	24.2	C
16	Mission Street	Beale Street	33.8	C	37.1	D	41.8	D
17	Bryant Street	Beale Street	54.0	D	**> 80**	**F**	**> 80**	**F**
18	Harrison Street	Fremont Street	32.4	C	34.4	C	38.8	D
19	Folsom Street	Fremont Street	53.6	D	54.0	D	**> 80**	**F**
20	Harrison Street	First Street	**> 80**	**F**	**> 80**	**F**	**> 80**	**F**
21	Howard Street	Fourth Street	52.2	D	53.1	D	54.4	D
22	Harrison Street	Fourth Street	41.8	D	42.0	D	44.5	D
23	Bryant Street	Fourth Street	**> 80**	**F**	**> 80**	**F**	**> 80**	**F**
24	Harrison/Fifth St	I-80 WB off-ramp	48.4	D	**60.9**	**E**	**> 80**	**F**
25	Brannan Street	Second Street	20.2	C	21.3	C	28.2	C
26	Bryant Street	Second Street	**> 80**	**F**	**> 80**	**F**	**> 80**	**F**

NOTES:
[a] Delay presented in seconds per vehicle.
[b] Intersections operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015.

TABLE 7-20
OFF-SITE ALTERNATIVE AT PIERS 30-32 AND SWL 330 –
INTERSECTION LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS –
WITHOUT A SF GIANTS GAME – SATURDAY EVENING PEAK HOUR

			Existing		Existing plus Off-site Alternative			
					No Event		Basketball Game	
#	Intersection Location		Delay[a]	LOS[a]	Delay	LOS	Delay	LOS
1	Broadway	The Embarcadero	26.1	C	26.4	C	29.2	C
2	Washington St	The Embarcadero	31.4	C	31.9	C	33.3	C
3	Mission Street	The Embarcadero	12.8	B	13.0	B	12.9	B
4	Howard Street	The Embarcadero	38.3	D	46.0	D	**> 80**	**F**
5	Folsom Street	The Embarcadero	21.3	C	21.2	C	54.9	D
6	Harrison Street	The Embarcadero	21.0	C	23.9	C	25.1	C
7	Bryant Street	The Embarcadero	22.9	C	**> 80**	**F**	**> 80**	**F**
8	Brannan Street	The Embarcadero	23.9	C	26.2	C	33.4	C
9	Townsend Street	The Embarcadero	19.1	B	23.1	C	27.0	C
10	King Street	Second Street	33.9	C	36.8	D	39.4	D
11	King Street	Third Street	26.6	C	32.5	C	39.8	D
12	King Street	Fourth Street	22.6	C	30.8	C	**56.8**	**E**
13	King/Fifth Streets	I-280 ramps	< 10	A	< 10	A	**76.1**	**E**
14	Harrison Street	Main Street	22.0	C	22.5	C	51.1	D
15	Bryant Street	Main Street	< 10	A	< 10	A	< 10	A
16	Mission Street	Beale Street	12.0	B	12.1	B	13.2	B
17	Bryant Street	Beale Street	26.8	C	50.2	D	**63.6**	**E**
18	Harrison Street	Fremont Street	18.0	B	17.6	B	34.5	C
19	Folsom Street	Fremont Street	30.2	C	30.2	C	54.2	D
20	Harrison Street	First Street	28.3	C	36.3	D	**79.4**	**E**
21	Howard Street	Fourth Street	28.7	C	28.8	C	29.5	C
22	Harrison Street	Fourth Street	21.8	C	21.9	C	23.1	C
23	Bryant Street	Fourth Street	27.1	C	27.1	C	32.9	C
24	Harrison/Fifth St	I-80 WB off-ramp	29.2	C	29.0	C	**55.2**	**E**
25	Brannan Street	Second Street	10.7	B	11.2	B	15.3	B
26	Bryant Street	Second Street	25.9	C	28.3	C	38.5	D

NOTES:
a Delay presented in seconds per vehicle.
b Intersections operating at LOS E or LOS F conditions highlighted in **bold**. Significant project impacts shaded.

SOURCE: Adavant Consulting/Fehr & Peers/LCW Consulting, 2015.

Transit Impacts. The Off-site Alternative would be located in an area with multiple Muni and regional routes nearby, and the majority of transit riders would be expected to walk between the Muni and regional transit stops. Under the No Event scenario, the Off-site Alternative would generate 514 transit trips compared to 881 transit trips for the proposed project (i.e., 367 fewer transit trips) during the weekday p.m. peak hour, and 792 transit trips compared to 673 transit trips for the proposed project (i.e., 119 more transit trips) during the Saturday evening peak hour.

Under the basketball game scenario, the Off-site Alternative would not require provision of the Muni Special Event Transit Service Plan included as part of the proposed project. Event attendees taking transit would be distributed among numerous routes, and similar to the proposed project, impacts on Muni transit operations would be *less than significant*. However, because the number of regional transit trips traveling to and from the event center under the Off-site Alternative would be greater than for the proposed project, the significant and unavoidable impact on regional transit (i.e., Caltrain and North Bay Ferry and Bus Service) would also occur. This regional transit impact, similar to the proposed project, would be *significant and unavoidable with mitigation*. Mitigation Measure M-TR-5a: Additional Caltrain Service and Mitigation Measure M-TR-5b: Additional North Bay Ferry and Bus Service would also be applicable to the Off-site Alternative.

On days when a basketball game overlaps with a SF Giants evening game, the Off-site Alternative would require additional Muni transit service along The Embarcadero, and the Off-site Alternative would result in *less than significant* impacts *with mitigation* on Muni transit, the same as the proposed project, and a mitigation measure similar to Mitigation Measure M-TR-13, Additional Muni Transit Service during Overlapping Events, would be required. Similar to the proposed project, on days with overlapping evening events, additional capacity would be required to accommodate the combined BART East Bay transit demand. Therefore, similar to the proposed project, on days when a basketball game overlaps with a SF Giants evening game, the Off-site Alternative would result in a significant impact on one additional regional transit service provider (i.e., BART). Implementation of Mitigation Measure M-TR-14: Additional BART Service to the East Bay during Overlapping Events would reduce or minimize the severity of the transit impact, however, since the provision of additional East Bay, South Bay, and North Bay transit service is uncertain and full funding for the service has not been identified, the Off-site Alternative's significant impacts to BART, Caltrain, Golden Gate Transit and WETA would be, similar to the proposed project, *significant and unavoidable with mitigation*.

Pedestrian Impacts. The Off-site Alternative would result in a reduced number of person trips accessing Piers 30-32 and Seawall Lot 330 than the proposed project for Mission Bay Blocks 29-32. Pedestrians would be accommodated in The Embarcadero promenade and on nearby streets providing access to transit stops and nearby off-street parking facilities. The nearby sidewalks and crosswalks would accommodate the additional pedestrians, with the crosswalks at the intersection of The Embarcadero/Bryant experiencing the greatest increase in pedestrian trips. During large events, the north and south crosswalks across The Embarcadero would operate at LOS E or LOS F conditions, particularly during overlapping evening events at AT&T Park, and this would be considered a significant impact. Implementation of mitigation measures that are similar in nature to the proposed project Mitigation Measure M-TR-6: Active Management of Pedestrian Flows at the

Intersection of Third/South would mitigate pedestrian impacts during events, and similar to the proposed project, pedestrian impacts would be *less than significant with mitigation*.

Bicycle Impacts. Under the Off-site Alternative, similar to the proposed project, it is anticipated that the existing, planned, and proposed bicycle facilities in the vicinity of Pier 30-32 and Seawall Lot 330 would be well utilized, and it is not expected that the additional vehicle, bicycle or pedestrian trips associated with the Off-site Alternative would result in significant impacts on bicyclists. Because the Off-site Alternative includes the event center adjacent to the bicycle lane on The Embarcadero, vehicular access to Piers 30-32 and passenger loading/unloading activities could conflict with northbound bicycle travel. The TMP developed for the event center at Piers 30-32 would include provisions for providing a temporary bicycle lane, delineated with cones or other methods, which would provide a clear path of travel for bicyclist traveling northbound on The Embarcadero. Thus, similar to the proposed project, it is possible that increased congestion associated with the proposed project, particularly during post-event conditions, could result in an increased potential for vehicular-bicycle and pedestrian-bicycle conflicts, however, it would not increase to a level that would adversely affect bicycle facilities in the area. Therefore, similar to the proposed project, the impacts of the Off-site Alternative on bicycle facilities and circulation would be *less than significant.*

Loading Impacts. Similar to the proposed project, the Off-site Alternative would include on-site commercial loading spaces on both Piers 30-32 and Seawall Lot 330 to accommodate the loading demand. Because the Off-site Alternative would provide commercial loading spaces, the loading demand would be accommodated, and loading impacts under this alternative, similar to the proposed project, would be *less than significant*. Improvement Measure I-TR-8: Truck and Service Vehicle Loading Operations Plan, identified for the proposed project, would also be applicable to the Off-site Alternative.

Emergency Vehicle Access Impacts. The Off-site Alternative would not change the configuration or capacity of the travel lanes adjacent to the project site. During events that may require closure of one or more lanes on The Embarcadero post-event, a TMP would be implemented to ensure that emergency vehicle access to the project site and vicinity is maintained. Therefore, similar to the proposed project, the impact of the Off-site Alternative on emergency vehicle access would be *less than significant*. In addition, given its location, the Off-site Alternative would have notably less effects on emergency access to the UCSF Hospital compared to the proposed project.

Cumulative Impacts. The Off-site Alternative's contribution to 2040 cumulative impacts in the vicinity of Piers 30-32 and Seawall Lot 330 would be similar to the proposed project. Similar to the proposed project, the Off-site Alternative would not contribute considerably to significant cumulative construction-related ground transportation impacts, and the Off-site Alternative's cumulative impacts related to bicycle, loading, and emergency vehicle access would be less than significant. Similar to the proposed project, the Off-site Alternative's pedestrian impacts and cumulative Muni transit impacts during overlapping events at AT&T Park would be *less than significant with mitigation*, while cumulative regional transit impacts would be *significant and unavoidable with mitigation*. Under 2040 cumulative conditions, it is anticipated that due to development in the Transbay Transit Center and South of Market areas, additional study intersections would operate at LOS E or LOS F conditions, particularly during the weekday p.m. peak hour, and the Off-site Alternative would contribute considerably to a portion of the additional intersections operating at LOS E or LOS F. Thus, similar to the proposed project, the Off-site Alternative would result in *significant and unavoidable with mitigation* cumulative traffic impacts.

Helipad Safety. The Off-site Alternative at Piers 30-32 and Seawall Lot 330 would *avoid* the potentially significant impacts on helipad safety that were identified for the proposed project, with respect to construction effects associated with the temporary obstruction of the UCSF helipad airspace surfaces and the potential operational effect of specialized outdoor lighting associated with the event center. Even though these helipad impacts could be reduced to less than significant for the proposed project, there would be *no impact* for this alternative because this location is not in proximity to any private or public helipad or other air safety risks.

Noise

Construction Impacts. Unlike the proposed project, which would have less-than-significant construction noise impacts, construction of the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would result in *significant and unavoidable* noise impacts. As described in Chapter 5, Section 5.3, construction of the proposed project would result in temporary increases in noise levels that would be noticeable but below significance thresholds, due in part because piles would be cast in place into augured holes and would not require use of an impact or vibratory pile driver. For the Off-site Alternative at this location, not only would the construction duration be longer (32 months over a four-year period compared to 26-months total for the proposed project), but construction activities at both Piers 30-32 and Seawall Lot 330 would be more intensive and require prolonged pile-driving activities in proximity to sensitive receptors, resulting in substantial increases in noise levels over ambient levels even with implementation of best available noise controls and noise-reducing techniques, including exceeding the Federal Transit Administration (FTA) criterion for residential exposure to construction due to construction at Seawall Lot 330. Thus, this impact would be *significant and unavoidable with mitigation*, and would be a *substantially more severe* impact than would occur under the proposed project.

Also, unlike the proposed project, which would have less-than-significant construction vibration impacts, construction of the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would result in *significant and unavoidable* groundborne vibration impacts. Under the proposed project, use of rapid impact compaction during construction at the project site would not result in excessive vibration levels that would result in structural damage or human annoyance at nearby structures or at residential or hospital receptors, and all other construction activity would generate diminished vibration levels such that vibration-related impacts due to project construction would be less than significant. In contrast, under this off-site alternative, pile driving activities for construction at Seawall Lot 330 would be as close as 25 feet to existing residential uses, and vibration from construction could have potentially significant effects on both people and structures. With implementation of feasible mitigation measures, vibration effects on structures could be reduced to less than significant, but the magnitude and duration of vibration effects combined with the proximity to sensitive receptors would be *significant and unavoidable*, even *with mitigation* with respect to human annoyance. Thus, this impact would be a *substantially more severe* impact than would occur under the proposed project.

However, like the proposed project, construction of the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would not expose people to or generate noise levels in excess of applicable standards; and this impact would be *less than significant*.

Cumulative construction noise and vibration impacts in the vicinity of Piers 30-32 and Seawall Lot 330 would be speculative to determine at this time, given the hypothetical nature of this off-site alternative and the non-existent construction schedule, and it is unknown to what extent there would be other construction activities in the project vicinity overlapping with construction activities at Piers 30-32 and Seawall Lot 330. However, since this alternative would result in significant and unavoidable construction noise and vibration impacts, if other construction activities were to be occurring in the vicinity, it is likely that this alternative's contribution to cumulative adverse noise and vibration impacts would be *significant and unavoidable* due to the magnitude of the construction activities and the proximity to sensitive receptors. On the other hand, the proposed project was determined to have a less-than-significant with mitigation contribution to cumulative construction noise impacts.

Operational Impacts. Operational noise impacts are discussed with respect to the potential exposure to or generation of noise levels in excess of standards; increased vehicular traffic noise; and crowd noise.

Exposure to or Generation of Noise Levels in Excess of Standards. Like the proposed project, operation of the Off-site Alternative at Piers 30-32 and Seawall Lot 330 could result in exposure of persons to or generate noise levels in excess of established standards, but this impact would be *less than significant with mitigation*. In both cases, use of amplified sound equipment at the event center would have the potential to result in noise levels in excess of standards, but implementation of a noise control plan for outdoor amplified sound would reduce this impact to less than significant.

However, unlike the proposed project, the Off-site Alternative would introduce new sensitive receptors (proposed residential units) to an area that is already impacted by high noise levels from vehicle traffic on The Embarcadero and the overhead span of the San Francisco-Oakland Bay Bridge as well as from operations of the Muni light rail line. Thus, this alternative would have the potential to expose these sensitive uses to noise levels exceeding acceptable standards, but implementation of the state code requirements of Title 24 and recently adopted amendments to the San Francisco Building Code would ensure that interior noise levels within habitable rooms would not exceed 45 dBA, Ldn. Consequently, even though this potential impact would not occur under the proposed project, the interior noise impact to future residential users would be *less than significant*, with compliance with existing regulatory requirements (Building Code Sections 1207.5–1207.8).

Increased Vehicular Traffic Noise. Both the Off-site Alternative and the proposed project would introduce permanent, new mobile noise sources to their respective project vicinities; these noise sources include increased vehicular traffic noise and crowd noise associated with visitors/patrons/attendees at the event center. The Off-site Alternative location has greater access to regional transit including BART and therefore would generate fewer vehicles than under the proposed project. Like the proposed project, the increased traffic levels would increase weekday traffic noise levels, but the incremental increase would be considered less than significant, as shown in **Table 7-21**. For the weekday 4 to 6 p.m. peak hour, these roadway noise impacts would be comparable to those under the proposed project (shown in Chapter 5, Table 5.3-9). For both the proposed project and the Off-site Alternative, the increased noise levels at all modeled roadway segments would be *less than significant* during this time period.

TABLE 7-21
MODELED TRAFFIC NOISE LEVELS, OFF-SITE ALTERNATIVE[a]

Roadway Segment	Existing (2014)	Existing plus Convention Off-site Alternative	dBA Difference	Significant Increase?
Weekday Peak Hour Noise Levels (4 PM – 6 PM)				
The Embarcadero between Harrison Street and Bryant Street	69.4	69.6	0.2	No
The Embarcadero between Brannan and Townsend Streets	69.1	69.2	0.1	No
Brannan Street from Delancey Street to Embarcadero	61.1	61.4	0.3	No
Bryant Street from Rincon Street to Embarcadero	60.7	61.8	1.1	No
Roadway Segment	**Existing (2014)**	**Existing plus Basketball Game Off-site Alternative**	**dBA Difference**	**Significant Increase?**
Weekday Late Hour Noise Levels (9 PM – 11 PM)				
The Embarcadero between Harrison Street and Bryant Street	67.2	69.1	1.9	No
The Embarcadero between Brannan and Townsend Streets	67.4	68.0	0.6	No
Brannan Street from Delancey Street to Embarcadero	55.0	55.9	0.9	No
Bryant Street from Rincon Street to Embarcadero	56.9	56.7	-0.2	No
Roadway Segment	**Existing (2014)**	**Existing plus Basketball Game Off-site Alternative**	**dBA Difference**	**Significant Increase?**
Saturday Evening Noise Levels (6 PM – 8 PM)				
The Embarcadero between Harrison Street and Bryant Street	67.6	68.1	0.5	No
The Embarcadero between Brannan and Townsend Streets	67.7	68.8	1.1	No
Brannan Street from Delancey Street to Embarcadero	58.2	59.8	1.6	No
Bryant Street from Rincon Street to Embarcadero	58.1	57.8	-0.3	No

NOTES:
[a] Road center to receptor distance is assumed to be 50 feet for values shown in this table. Noise levels were determined using the Federal Highway Administration (FHWA) traffic noise model. The average speed on these segments is assumed to be 25 or 30 miles per hour, depending on the roadway. For all other assumptions, refer to Appendix NO. In an existing ambient noise environment of 65 dBA or greater, an incremental increase is considered significant if the noise increase is equal to or greater than 3.0 dBA. In an existing ambient noise environment below 65 dBA, an incremental increase is considered significant if the noise increase is equal to or greater than 5.0 dBA.

SOURCE: ESA 2015

Under the proposed project, as shown in Chapter 5, Table 5.3-9, roadside noise levels at multi-family receptors adjacent to Illinois Street and Terry A. Francois Boulevard would exceed significance thresholds under several scenarios: weekday late night 9 to 11 p.m. period due to post-basketball game traffic at Illinois Street and at Terry Francois Boulevard; and on Saturday evening 6 to 8 p.m. period due to basketball game traffic at Illinois Street. As described in Chapter 5, Section 5.3, Noise, these impacts are considered a significant and unavoidable permanent increase in noise levels, even with mitigation. However, under the Off-site Alternative, modeled increases in roadway noise levels would not exceed significance thresholds along any of the roadway segments during the weekday late night 9 to 11 p.m. period or the Saturday evening 6 to 8 p.m. period. Thus, the roadway noise impact under the Off-site Alternative would be *less than significant*, which is substantially less severe than the roadway noise impacts identified for the proposed project. Similarly, under cumulative conditions, the Off-site Alternative's contribution to significant roadway noise increases along all roadways analyzed would likely be *less than significant* Therefore, the Off-site Alternative would have a substantially less severe, cumulative roadway noise impacts than the proposed project.

Crowd Noise. With respect to crowd noise, increased noise levels above ambient conditions could occur, particularly during the evening and nighttime hours and at the end of scheduled events. Because of its location approximately five blocks from the Embarcadero BART station, it may reasonably be assumed that substantially fewer patrons of the event center under the Off-site Alternative would take Muni light rail, opting instead to walk to the BART station. Notwithstanding this reduction, it is likely that after each event upwards of 1,000 patrons would board the Muni light rail at the platform at The Embarcadero and Brannan Street. Similar to the proposed project, the nearest Muni platform to the Off-site Alternative is also directly in from of an existing residential land use (Delancey Street Housing at 600 Embarcadero). Noise levels from departing crowds after an event were estimated by monitoring of crowd egress to the Muni T-Line platform after a San Francisco Giants baseball game. Monitored noise levels during the egress period when the game ended averaged 69 dBA, L_{90}. These noise levels may be compared to the existing noise level that was monitored in 2013 during the 10:00 p.m. hour at the Off-site Alternative location receptors (with no game at AT&T Park), which was 62 dBA, L_{90}. The L_{90} data indicate that existing noise levels at the Off-site Alternative residential receptor during quieter periods would be increased by crowds gathering to board northbound Muni service on event days by about 7 dBA, which would be a clearly perceptible increase. Consequently, like the proposed project, the noise impact of the Off-site Alternative resulting from the increase in noise levels from crowds gathering at the Muni T-Line platform during quieter nighttime periods would be *significant and unavoidable*. As described in Chapter 5, Section 5.3, impacts from crowd noise under the proposed project would be significant and unavoidable, due to anticipated noise levels from crowds gathering at the Muni platform adjacent to the UCSF Hearst Tower housing building during the evening hours when patrons would be departing from basketball games or concerts at the event center. Therefore, the Off-site Alternative and the proposed project would result in comparable significant and unavoidable impacts related to crowd noise at a Muni platform adjacent to a sensitive receptor.

Air Quality

Construction Impacts. Like the proposed project, construction emissions of criteria air pollutants under the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would be significant and unavoidable with mitigation. As described in Chapter 5, Section 5.4, Air Quality, estimated construction-related emissions of ROG and NOx for the project would be 59 and 226 pounds per day, respectively, which would exceed the applicable significance thresholds. Even with implementation of Mitigation Measure M-AQ-1 (Construction Emissions Minimization), NOx levels would exceed the significance threshold, at 144 pounds per day, assuming the minimum level of compliance (Tier 2 with NOx VDECS). Similarly, as shown in **Table 7-22**, the construction-related criteria air pollutant emissions for the Off-site Alternative would exceed the thresholds for emissions of ROG and NOx, and even with mitigation, as shown in **Table 7-23**, emissions of NOx under the Off-site Alternative would still be significant with implementation of Mitigation Measure M-AQ-1. Thus, similar to the proposed project, an offset emissions mitigation measure would be required to provide for reduction of levels of ozone precursors exceeding the significance thresholds through implementation of pollution reduction programs elsewhere in the air basin. Consequently, like the proposed project, construction-related criteria pollutant emissions under the Off-site Alternative would be *significant and unavoidable with mitigation*.

TABLE 7-22
AVERAGE DAILY CONSTRUCTION-RELATED EMISSIONS
FOR THE OFF-SITE ALTERNATIVE

	Average Daily Construction Emissions (pounds/day)			
	ROG	**NOx**	**PM_{10}**	**$PM_{2.5}$**
Off-road Equipment Emissions	14	204	7.6	7.6
Truck and Vehicle Emissions	5.1	30	0.51	0.47
Marine Vessel Emissions	6.9	60	3.4	3.4
Architectural Coating Emissions	29	0	0	0
Total[a]	**55**	**295**	12	11
Significance Threshold	54	54	82	54
Above Threshold?	**Yes**	**Yes**	No	No

NOTES:

[a] The total emissions may not sum precisely due to rounding of subtotals.

SOURCE: ENVIRON, 2015

TABLE 7-23
MITIGATED AVERAGE DAILY CONSTRUCTION-RELATED EMISSIONS FOR THE OFF-SITE ALTERNATIVE

	Average Daily Construction Emissions (pounds/day)			
	ROG	**NOx**	**PM10**	**PM2.5**
Off-road Equipment Emissions	0.88	157	1.1	1.1
Truck and Vehicle Emissions	5.1	30	0.51	0.47
Marine Vessel Emissions	2.1	11	0.25	0.25
Architectural Coating Emissions	29	0	0	0
Total[a]	37	**199**	1.9	1.8
Significance Threshold	54	54	82	54
Above Threshold?	No	**Yes**	No	No

NOTES:

[a] The total emissions may not sum precisely due to rounding of subtotals.

SOURCE: ENVIRON, 2015

Operational Impacts. Unlike the proposed project, operational air quality impacts of the Off-site Alternative would be less than significant, compared to a significant and unavoidable impact for the proposed project. As described in Chapter 5, Section 5.4, Air Quality, estimated operational emissions of ROG and NOx under the proposed project would be 79 and 124 pounds per day, respectively, exceeding significance thresholds. As shown in **Table 7-24,** the Off-site Alternative would result in operational criteria air pollutant emissions of ROG and NOx emissions substantially lower than those for the proposed project, at levels that would be below the applicable significance thresholds. The primary reason for this difference is that the Off-site Alternative is located in Superdistrict 1 which, because of its proximity to major regional transit connections results in lower vehicle trip rates compared to the proposed project. Consequently, mitigation measures would not apply to the Off-site Alternative for operational emissions of criteria air pollutants. Therefore, the operational air quality impacts of the Off-site Alternative would be *less than significant.*

Toxic Air Contaminant Impacts – Existing Receptors. Similar to the proposed project, construction and operation of the Off-site Alternative would generate toxic air contaminants (TAC), including diesel particulate matter. However, unlike the proposed project, the Off-site Alternative would occur within an Air Pollutant Exposure Zone (APEZ) and consequently would be subject to more stringent significance thresholds. Specifically, because air quality in an APEZ already exceed the cumulative exposure thresholds of the City, projects within an APEZ are assessed by the individual contribution of the project to this cumulative impact (project and existing).

TABLE 7-24
AVERAGE DAILY AND MAXIMUM ANNUAL OPERATIONAL EMISSIONS FOR THE OFF-SITE ALTERNATIVE

	Average Daily Emissions (pounds/day)			
	ROG	**NOx**	**PM10**	**PM2.5**
Emission Source				
Mobile Sources (Alternative – GSW Trips)	12	17	4.9	2.2
Standby Diesel Generators (assumes 5)	0.26	0.81	0.03	0.03
Boilers (assumes 4 at Piers 30-32, 10 at SWL 330)	3.3	23	4.6	4.6
Area Sources	29	0.10	0.04	0.04
Marine Sources	1.1	7.4	0.28	0.28
Total	**46**	**48**	**10**	**7.1**
Significance Threshold	54	54	82	54
Above Threshold?	No	No	No	No
	Maximum Annual Emissions (short tons/year)			
	ROG	**NOx**	**PM10**	**PM2.5**
Emission Source				
Mobile Sources (Alternative – GSW Trips)	2.2	3.2	0.89	0.40
Standby Diesel Generators (assumes 5)	0.05	0.15	<0.01	<0.01
Boilers (assumes 4 at Piers 30-32, 10 at SWL 330)	0.60	4.1	0.83	0.83
Area Sources	5.3	0.02	<0.01	<0.01
Marine Sources	0.20	1.3	0.05	0.05
Total	**8.3**	**8.8**	**1.8**	**1.3**
Significance Threshold	10	10	15	10
Above Threshold?	No	No	No	No

SOURCE: ENVIRON, 2015

For those locations already meeting the Air Pollutant Exposure Zone criteria, a lower significance standard is required to ensure that a proposed project's contribution to existing health risks would not be significant. In these areas a proposed project's contribution to $PM_{2.5}$ concentrations above 0.2 µg/m3 or a contribution to excess cancer risk greater than 7.0 per million would be considered a significant impact[6].

[6] An increase of 0.2 µg/m3 in PM2.5 would result in a 0.28 percent increase in non-injury mortality or an increase of about twenty-one excess deaths per 1,000,000 population per year from non-injury causes in San Francisco. This information is based on Jerrett M et al. 2005. *Spatial Analysis of Air Pollution and Mortality in Los Angeles*. Epidemiology. 16:727-736. The excess cancer risk has been proportionally reduced to result in a significance criterion of 7 per million persons exposed.

Similar to the proposed project, the Off-site Alternative would require operation of off-road and on-road diesel construction equipment. Unlike the project, however, the Off-site Alternative would have a significant construction-related impact from $PM_{2.5}$ emissions resulting from contributions to $PM_{2.5}$ concentrations at off-site receptor locations above the applicable significance threshold in an APEZ (see **Table 7-25**). Even with mitigation, as shown in Table 7-25, concentrations of $PM_{2.5}$ under the Off-site Alternative would still be significant. Consequently, this impact would be *significant and unavoidable with mitigation*.

TABLE 7-25
ANNUAL AVERAGE $PM_{2.5}$ CONCENTRATIONS AT OFF-SITE RECEPTORS FOR THE OFF-SITE ALTERNATIVE

	$PM_{2.5}$ Concentration (μg/m^3, Annual Average)	
Source	**Residential Receptor with Highest Project Impact**	**Residential Receptor with Highest Background Impact**
Construction		
Background at the receptor	9.1	10.1
Unmitigated Construction Contribution	1.8	0.13
Mitigated (Tier 3 + NOx VDECS) Construction Contribution	0.29	0.02
Total Cumulative $PM_{2.5}$ Concentration (Unmitigated/Mitigated)	11 / 9.4	10 / 10
Project Total (Unmitigated/Mitigated)	1.8 / 0.29	0.13 / 0.021
Project Contribution Significance Threshold	0.2	0.2
Above Threshold? (Unmitigated/Mitigated)	**Yes/Yes**	No/No
Operation		
Background at the maximally impacted receptor	9.1	10.1
Project Operations – Generators	0.055	0.055
Project Operations – Mobile	0.32	0.32
Project Operations - Marine	0.08	0.04
Total Cumulative $PM_{2.5}$ Concentration	9.6	10
Project Total	0.45	0.41
Project Contribution Significance Threshold	0.2	0.2
Above Threshold?	**Yes**	**Yes**

NOTES:
[a] The total concentrations may not sum precisely due to rounding of subtotals.

SOURCE: Ramboll Environ, 2015

Similar to the proposed project, the Off-site Alternative would generate TAC emissions from construction as well as from operation of back-up diesel generators during project operation, which have the potential to increase cancer risks. Unlike the proposed project, however, the Off-site Alternative would have a significant impact from increased cancer risk contributions at off-site receptor locations above the applicable significance threshold in an APEZ (see **Table 7-26**). This increased cancer risk impact would persist even with implementation of Mitigation Measure M-AQ-1 which represents all feasible mitigation to address risks from construction. Operational emissions from generators and vehicles would further contribute to this significant impact.

TABLE 7-26
LIFETIME EXCESS CANCER RISK AT OFF-SITE RECEPTORS
FOR THE OFF-SITE ALTERNATIVE

	Excess Cancer Risk (in one million)	
Source	**Residential Receptor with Highest Project Impact**	**Residential Receptor with Highest Background Impact**
Background at the receptor	113	560
Unmitigated Construction Contribution	285	17
Mitigated (Tier 3 + NOx VDECS) Construction Contribution	44	2.7
Project Operations – Generators	30	30
Project Operations – Mobile Sources	7.2	7.2
Project Operations - Marine Sources	44	23
Cumulative Cancer Risk (Unmitigated/Mitigated)	479 / 238	637 / 622
Project Total (Unmitigated/Mitigated)	366 / 125	77 / 62
Project Contribution Significance Threshold	7	7
Above Threshold? (Unmitigated/ Mitigated)	**Yes/Yes**	**Yes/Yes**

NOTES:
[a] The total risks may not sum precisely due to rounding of subtotals.
SOURCE: Ramboll Environ, 2015

Consequently, unlike the proposed project, the impact of the Offsite Alternative with regard to exposure of sensitive receptors to increased $PM_{2.5}$ concentrations and cancer risk due to air pollutant concentrations would be *significant and unavoidable with mitigation*.

Toxic Air Contaminant Impacts – Proposed Receptors. Unlike the proposed project, the Off-site Alternative would introduce new sensitive receptors (proposed residential units) to an area that is within an APEZ. For projects proposing new sensitive uses, the threshold of significance used to evaluate exposure and hazard is based on whether the project would locate these uses within an APEZ. However, Health Code Article 38 requires that residential uses located within an APEZ include air filtration measures to reduce the potential exposure of future residents. Therefore, implementation of protective measures in compliance with this regulation would reduce impacts to new sensitive receptors to less-than-significant levels, and although not an impact under the proposed project, this impact would be *less than significant*.

Consistency with Clean Air Plan. Like the proposed project, impacts related to consistency with the Clean Air Plan for the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would be less than significant with mitigation. This alternative would be consistent with the 2010 CAP by virtue of incorporation of mitigation measures which would include maximum feasible control measures, and offsetting emissions to below significance thresholds. Additionally, the Off-site Alternative would be consistent with the 2010 CAP by virtue of incorporation of control measures of the CAP, including land use/local impact measures and energy/climate measures now required through the various components of the City's Greenhouse Gas Reduction Strategy as well as the transportation demand management measures that would be assumed to part of this alternative, similar to those for the proposed project. The Off-site Alternative would also not hinder implementation of the 2010 CAP. Therefore, the Off-site Alternative would not conflict with, or obstruct implementation of the *2010 Clean Air Plan*, and this impact would be *less than significant with mitigation*.

Odors. Like the proposed project, this alternative would not create objectionable odors that would affect a substantial number of people.

Cumulative Air Quality Impacts. Similar to the proposed project, the cumulative construction-related criteria air pollutant impacts of the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would be significant and unavoidable with mitigation. Like the proposed project, the Off-site Alternative would result in construction emissions of NOx exceeding the applicable significance threshold. Therefore, the alternative's contribution to cumulative construction air quality impacts is considered *significant and unavoidable, even with mitigation*. Mitigation measures similar to those identified for the proposed project would be required, including construction emissions minimization measures (Mitigation Measure M-AQ-1) and offset emissions measures (Mitigation Measure M-AQ-2b).

However, unlike the proposed project, which would result in significant and unavoidable operational criteria air pollutant impacts and thus contribute considerably to cumulative criteria air pollutant impacts, operation of the Off-site Alternative would not result in significant cumulative criteria air pollutant impacts because this alternative's project-level emissions would not exceed the project-level significance thresholds. Thus, operational emissions from the Off-site Alternative would not result in a cumulatively considerable contribution to regional criteria air pollutants. Therefore, with respect to cumulative, operational air quality impacts, the Off-site Alternative would have a *less-than-significant* impact and have substantially less severe impacts than the project.

On the other hand, the Off-site Alternative would have substantially greater and more severe impacts than the proposed project with respect to cumulative health risk. Because this alternative is located in an APEZ and would result in exposure of sensitive receptors to increased $PM_{2.5}$ concentrations and cancer risk due to air pollutant concentrations that exceed the significance thresholds, the alternative's contribution to cumulative impacts would be considered *significant and unavoidable with mitigation*, as compared to the proposed project, which would have a less than significant impact with mitigation.

Overall, the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would result in significant and unavoidable air quality impacts after implementation of feasible mitigation measures, and consequently, would result in a cumulatively considerable contribution to regional and local air quality impacts. Therefore, this impact would be *significant and unavoidable with mitigation*.

Greenhouse Gas Emissions

Similar to the proposed project, construction and operation of the Off-site Alternative would generate GHG emissions, but also similar to the proposed project, it can be assumed that the Off-site Alternative would be designed and operated such that it would qualify as an environmental leadership project under AB 900. As described in Chapter 5, Section 5.5, the proposed project is a certified environmental leadership project under AB 900 and CARB has determined that the proposed project would result in no net increase in GHG emissions based on the AB 900 application which includes voluntary acquisition of carbon credits by the project sponsor. Therefore, it is assumed that the Off-Site Alternative would be designed and constructed to the same green building and sustainability standards as the proposed project, and would include strategies to reduce GHG emissions that would be consistent with the City's GHG Reduction Strategy and the associated AB 900 application that would be submitted for this alternative. Thus, given the assumptions that this alternative would be designed and constructed to the same green building and sustainability standards as the project and would also qualify as an environmental leadership project under AB 900, the Off-site Alternative would result in no net increase in GHG emissions, like the proposed project. Therefore, impacts related to GHG emissions would be *less than significant* and no mitigation is required.

Wind and Shadow

Wind. Piers 30-32, and to a lesser extent, Seawall Lot 330, are fully exposed to winds that approach over the Bay. Northwest winds approach Piers 30-32 along the Bay and the open Embarcadero roadway and pier buildings. Seawall Lot 330 is less exposed to the northwest winds, since it is partially sheltered by Rincon Hill and upwind buildings along Beale Street. The west southwest and west winds must approach Piers 30-32 and Seawall Lot 330 over the City’s hills and substantial core of tall buildings in the downtown and Rincon Hill areas. Piers 30-32 currently contains no buildings, except for Red’s Java House; and Seawall Lot 330 contains no buildings. Existing structures adjacent to and upwind of the project site at Seawall Lot 330 include the 22-story Watermark building located at the west corner of the city block containing Seawall Lot 330, the mid-level (8-story) Portside building located across Bryant Street to the northwest, and the 4-story Bayside Village buildings located across Beale Street to the southwest.

Similar to the project site in Mission Bay, the standards of City Planning Code Section 148 do not apply to Piers 30-32 and Seawall Lot 330. However, the Planning Department uses wind standards set forth in Section 148 as an appropriate methodology and criteria for the analysis of potential wind effects at Piers 30-32 at Seawall Lot 330. Consequently, a project's exceedance of the Section 148 wind hazard criterion would be a significant environmental impact for development at Piers 30-32 and Seawall Lot 330

A wind tunnel test was conducted by ESA in April 2014 for the sponsor's previously-proposed project at Piers 30-32 and Seawall Lot 330. Since, as discussed above, the previously-proposed project at Piers 30-32 and Seawall Lot 330 is identical in design to the Off-site Alternative considered in this SEIR; the results of that wind study are representative of the Off-site Alternative. Similar to the wind study conducted for the proposed project at Blocks 29-32 in Mission Bay, the wind study for the previously-proposed project at Piers 30-32 and Seawall Lot 330 assessed the pedestrian wind environment under existing, existing plus project, and project-plus-cumulative scenario for the same four prevailing wind directions.

The wind study for the previously-proposed project at Piers 30-32 and Seawall Lot 330 revealed that under existing conditions, existing-plus-project and cumulative conditions, the wind hazard criterion was not exceeded at any of the off-site pedestrian study locations in the Piers 30-32/ Seawall Lot 330 vicinity. Based on these results, the wind hazard impact for the Off-site Alternative would be *less than significant*, and this alternative would avoid a significant and unavoidable project wind hazard that would occur under the proposed project at Mission Bay Blocks 29-32.

Shadow. As discussed above, there are no buildings on Piers 30-32 (except for Red's Java House) and Seawall Lot 330. Consequently, the only notable shadows currently created from this site are from the approximate 13-acre footprint of the Piers 30-32 deck on the Bay water beneath it. Existing structures adjacent to the project site include the 22-story Watermark building (west corner of Seawall 330), the 8-story Portside building (across Bryant Street to the northwest), and the 4-story Bayside Village buildings (across Beale Street to the southwest). Of these buildings, only the Watermark building creates prominent shadows on Seawall Lot 330; these occur in the afternoon.

Public open space within the vicinity of the project site includes the newly constructed Brannan Street Wharf located on The Embarcadero between Piers 30-32 and Pier 38. The Herb Caen Way promenade extends along The Embarcadero between Piers 30-32 and Seawall Lot 330. The Rincon Hill Dog Park is located at the northwest corner of Bryant and Beale Streets, approximately 260 feet from Seawall Lot 330. Other open spaces in the immediate area includes privately-owned open space, such as inner courtyards and plazas located within the residential development of Bayside Village, and small unnamed parks at the corners of The Embarcadero and Bryant and Brannan Streets. In addition, Rincon Park and South Beach Park are located on The Embarcadero approximately ¼-mile north and south of the project site, respectively, however, are of sufficient distance from Piers 30-32/Seawall Lot 330 that they would not be affected by any shading from the Off-site Alternative.

Section 295 of the San Francisco Planning Code, the Sunlight Ordinance, protects public open space under the jurisdiction of the Recreation and Park Commission from shadow created by new structures. The nearest park under the jurisdiction of the Recreation and Parks Commission and protected by Section 295 is South Park, located one-third mile southwest of the project site.

This park is also of sufficient distance from Piers 30-32/Seawall Lot 330 that it would not be affected by any shading from the Off-site Alternative.

A shadow analysis was conducted to evaluate the potential shadow effects of the Off-site Alternative on surrounding parks and open space. The representative periods selected were the winter solstice (approximately December 21), summer solstice (approximately June 21) and the fall equinox (approximately September 21); the fall equinox is similar to the spring equinox.

- During the winter solstice, the Piers 30-32 development would cast shadow on the small park at the corner of The Embarcadero/Bryant Streets in the early morning (before 9:00 a.m.), on portions of The Embarcadero promenade until approximately noon, and on portions of the Bay throughout the day. The Seawall Lot 330 development would cast shadow on portions of the small park at the corner of The Embarcadero/Bryant Street in the midday (10:00 a.m. to 3:00 p.m.), and on portions of The Embarcadero promenade throughout the afternoon (noon to sunset).

- During the summer solstice, the Piers 30-32 development would cast shadow on the northernmost corner of the Brannan Street Wharf and adjacent Bay in the early morning (before 8:00 a.m.), on portions of The Embarcadero promenade until approximately noon, and on portions of the Bay to the east after 3:00 p.m. The Seawall Lot 330 development would cast shadow on portions of The Embarcadero from early afternoon (approximately 1:00 p.m.) to sunset; and on the northernmost corner of the Brannan Street Wharf and adjacent Bay in the late afternoon (after 4:00 p.m.).

- During the spring/fall equinox, the Piers 30-32 development would cast shadow on portions of The Embarcadero promenade in the early morning (before 9:00 a.m.), and on portions of the Bay after 2:00 p.m. The Seawall Lot 330 development would cast shadow on a portion of the small park at the corner of The Embarcadero/Bryant Street in the midday (10:00 a.m. to 3:00 p.m.), and on portions of The Embarcadero promenade throughout the afternoon (1:00 p.m. to sunset).

Based on these results, the Off-site Alternative would not be expected cast new shadow in a manner that would substantially affect outdoor recreation facilities or other public areas, and the shadow impact for the Off-site Alternative would be *less than significant*, similar to the significance of the shadow impact of the proposed project, and no mitigation would be required.

Recreation

Like the proposed project, the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would not substantially increase the use of existing recreational facilities or require the construction or expansion of recreational facilities. Employment under this scenario would be less than or similar to that for the proposed project, based on the overall reduced gross square footage, and recreational demands would be met by existing and planned parks and open space located adjacent to and nearby this location. Furthermore, this alternative would include extensive new recreational and open space opportunities as part of the development on Piers 30-32. Thus, all recreation impacts would be *less than significant* and no mitigation would be required.

Utilities and Service Systems

Similar to the proposed project, the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would not require new or expanded water supply resources, require construction of new water treatment facilities, and would be served by existing landfills for solid waste disposal. Given the reduced gross square footage of uses, projected demands for water supply resources, water treatment facilities, and solid waste disposal would be less than that of the proposed project. These impacts would be *less than significant* and no mitigation would be required. This alternative would also not require construction of new stormwater drainage facilities, as the existing facilities have adequate capacity, and similar to the proposed project, this impact would be *less than significant.*

However, unlike the proposed project, this alternative would result in wastewater flows that could be served within the existing capacity of wastewater facilities and would not require construction or expansion of wastewater facilities. Furthermore, this wastewater flows generated under this alternative would not cause the SFPUC's combined sewer system to exceed wastewater treatment requirements of the RWQCB. Therefore, under the Off-site Alternative at Piers 30-32 and Seawall Lot 330, utilities impacts associated with wastewater treatment capacity would be *less than significant*, and this alternative would *avoid* the significant and unavoidable utilities impact that was identified for the proposed project with respect to the need to construct new or expanded wastewater treatment facilities. Similarly, under this alternative, it would not be expected for the SFPUC to determine that it has inadequate treatment capacity to serve the project's wastewater demand, and therefore, this impact would be *less than significant*, which would be substantially less severe impact than the significant and unavoidable impact identified for the proposed project.

Public Services

Schools, Public Health, Childcare, Library, and Street Maintenance Services. Like the proposed project, the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would not result in increased demand for governmental public services, including public health, childcare, library, street maintenance, and emergency medical that would require construction of new facilities, the construction of which could cause significant environmental impacts. As indicated in the Population and Housing assessment, employment projections for both construction and operation would be expected to be met by the existing local and regional labor force. Furthermore, the proposed residential development at Seawall Lot 330 would be to subject to Senate Bill 50 School Impact Fees, which would be deemed to constitute full and complete mitigation for school impacts. Thus, like the proposed project, impacts of this alternative on schools, public health, childcare, library, and street maintenance services would be *less than significant* and no mitigation would be required.

Fire Protection and Emergency Medical Services. Like the proposed project, construction and operation of the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would not result in the need for new or physically altered governmental facilities for fire protection and emergency medical services. The population increases associated with the project would be minimal in comparison to the population served by the existing fire stations in the project area. The increase in calls for fire protection and medical emergency response would not be substantial in light of the existing demand and capacity for fire protection and emergency medical services in the City. The project site is located in an existing urban area and would not extend demand of the San Francisco Fire Department (SFFD) beyond the current limits of its service area. The proposed development would neither adversely affect SFFD service standards nor require an increase in SFFD staff that would require the construction of new fire protection facilities. Furthermore, as part of project operations for games and large events at Piers 30-32, the Warriors or other event sponsors would provide on-site medical services, including a first aid station and on-site medical personnel to provide first aid to game/event patrons or employees that may require medical assistance, which would further reduce potential effects on general emergency medical response providers. This impact would therefore be *less than significant* and no mitigation would be required.

Law Enforcement Services. Like the proposed project, construction and operation of the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would not result in the need for new or physically altered governmental facilities for law enforcement services. The project site is located within the San Francisco Police Department's (SFPD) Southern District, which is headquartered at the new Public Safety Building in Mission Bay, approximately one-mile from the project site. Similar to the proposed project, as described in Chapter 5, Section 5.8, the SFPD would provide increased police protection for sports games and adequate police protection services would be available and provided for the games/events at the project site; such services would not detract from other SFPD police operations within the City. Furthermore, the event center, residential tower, hotel and retail uses would also provide their own on-site private security personnel similar to other mixed use developments in the City. This impact would therefore be *less than significant* and no mitigation would be required.

Biological Resources

Unlike the proposed project, the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would have the potential to affect marine biological resources due to the extensive in-water construction activities required for the seismic upgrade and strengthening of the pier structure. While impacts on marine birds, roosting bats, and critical fish habitat would be less than significant, construction impacts on critical fish habitat and on migratory corridors for marine wildlife would be potentially significant, although feasible mitigation measures are available (e.g., water quality and construction best management practices) that could reduce these impacts to less than significant. In addition, impacts on marine biological resources due to trash and littering during both construction and operation would be potentially significant, but mitigable with appropriate trash management programs. However, most importantly, pile driving required for project construction of improvements to the pier structure would produce high underwater sound levels that could adversely affect special-status fish and marine mammals. This would be a *significant and unavoidable impact, with mitigation*, because even with implementation of the best available sound attenuation systems for noise reduction for impact hammer and pile driving activities and establishment of safety zones around the construction area, acute and chronic effects on special-status fish could still occur.

However, like the proposed project, this alternative would not have an effect on federally protected wetlands, riparian habitat or other sensitive natural community, or conflict with any local policies protecting biological resources; these impacts would be *less than significant* and no mitigation would be required.

Similar to the proposed project, under the Off-site Alternative at Piers 30-32 and Seawall Lot 330, potential impacts on breeding birds which may be nesting within the project site could be mitigated to less than significant with implementation of Mitigation Measure M-BI-4a (Preconstruction Surveys for Nesting Birds), and this impact would be *less than significant with mitigation*.

Unlike the proposed project which is not subject to the same requirements, potential impacts related to avian collisions with buildings or night lighting would be *less than significant* because this project site would be subject to the from City's *Standards for Bird Safe Buildings*, compliance with which would avoid and minimize impacts on birds during their migrations due to lighting and glare effects under both nighttime and daytime conditions. The proposed project includes mitigation consistent with City's Standards for *Bird Safe Buildings,* and thus this impact under the proposed project would be less than significant with mitigation.

Thus, overall, the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would have *more severe significant* impacts on biological resources than the proposed project. The proposed project at Mission Bay Blocks 29-32 would have no impacts on marine biological resources, while this off-site alternative would have significant impacts, including significant and unavoidable impacts on fish and marine mammals during project construction. All other impacts on biological resources would be comparable for this alternative and the proposed project.

Geology and Soils

Similar to the proposed project, the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would not expose people or structures to substantial earthquake or landslide hazards, result in erosion or loss of top soil, be located on a geologic unit that could become unstable, be located on corrosive or expansive soils, substantially change the topography, or affect any unique geologic features. These impacts would be *less than significant* with implementation of protective measures required by applicable regulations, and no mitigation would be required.

Hydrology and Water Quality

Construction Impacts. Unlike the proposed project, construction of the Off-site Alternative at Piers 30-32 and Seawall Lot 330 could result in potentially significant water quality impacts due to the extensive in-water construction activities that would be required at Piers 30-32. However, there are feasible mitigation measures requiring best management practices during construction that would reduce this impact to *less than significant with mitigation*. Construction of the proposed project, on the other hand, would have less than significant impacts with implementation of protective measures required by applicable regulations, and no mitigation would be required. However, construction water quality impacts of this alternative would be more severe than those of the proposed project; due to extent of in-water construction, there would be greater potential for adverse effects on water quality to occur, as well as more complex mitigation requirements.

Operational Impacts—Groundwater, Drainage, Flooding, and Inundation by Seiche or Tsunami. Similar to the proposed project, the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would not deplete groundwater supplies or interfere with groundwater recharge; would not alter existing drainage pattern that would result in erosion, siltation, or flooding; expose people, housing, or structures to substantial risk of loss due to flooding risks; redirect or impede flood flows; or expose people or structures to significant risk involving inundation by seiche or tsunami. These impacts would be *less than significant* with compliance with applicable regulations, and no mitigation would be required.

Operational Impacts—Water Quality. Similar to the proposed project, operation of the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would have the potential to affect water quality due to dry weather flows (sanitary sewage only), wet weather flows (sanitary sewage and stormwater), discharges from the Southeast Water Pollution Control Plant (SEWPCP), stormwater runoff and drainage discharges, and litter. However, given the reduced total gross square footage of the development under this alternative compared to that of the proposed project (which would be expected to result in a reduced volume of sanitary sewage), water quality impacts would generally be the same or less severe than those described in Chapter 5, Section 5.9. Under both the proposed project and this alternative, all discharges to the Bay, whether sanitary sewage, stormwater, or a combination of both, would be treated as required by the San Francisco Regional Water Quality Control Board (RWQCB), and all discharges would be in compliance with applicable National Pollutant Discharge Elimination System (NPDES) permits that have been issued by the RWQCB for the express purpose of protecting water quality.

There would be two differences in operational water quality impacts of this alternative compared to the proposed project. One differences would be that under this alternative, potential water quality impacts associated with littering would be more severe, due to the proximity to the Bay and the Bay's designation as in impaired water body for litter; however, there is feasible mitigation available, such as trash management planning and training, that would reduce this impact to *less than significant with mitigation*. Conversely, the other difference would be that this alternative would not include research and development land uses and wastewater discharges would be typical of municipal wastewater; implementation of FSEIR Mitigation Measure K.2 would not be required for the Off-site Alternative (this measure would ensure that businesses that discharge pollutants that are not typically associated with most wastewater discharges to the City's combined sewer system do not cause a violation of the NDPES permit for the SEWPCP).

Operational Impacts—Sea Level Rise. Like the proposed project, it would be expected that operation of the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would not expose people or structures to a significant risk of loss, injury, or death involving flooding associated with sea level rise. As described in Chapter 5, Section 5.9, the proposed project would be designed and constructed to resist flood damage and provide for the safety of occupants and visitors in the event of flooding. Although there is only a conceptual design for the Off-site Alternative, it is assumed that all structures under this alternative at both Piers 30-32 and Seawall Lot 330 would be designed and constructed to the same standards as the proposed project with respect to flood protection. In addition to being subject to San Francisco's Floodplain Management requirements, an alternative at Piers 30-32 is within the jurisdiction of the San Francisco Bay Conservation and Development Commission (BCDC), and structures would be required to be consistent with the climate change policies of the San Francisco Bay Plan, including preparation of a sea level rise risk assessment and adaptation plan. Therefore, like the proposed project, this impact would be *less than significant* for the Off-site Alternative because the alternative would include appropriate provisions to resist flood damage and provide for the safety of occupants and visitors in the event of flooding.

Hazards and Hazardous Materials

Unlike the proposed project, all impacts related to hazards and hazardous materials for the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would be less than significant with implementation of protective measures required by applicable regulations, and no mitigation would be required. This alternative would not create a significant hazard through routine transport, use, or disposal of hazardous materials; would not result in a substantial risk of upset involving the release of hazardous materials; would not impair implementation or physically interfere with an adopted emergency response plan or expose people or structures to a significant risk involving fires. Compliance with existing regulations and implementation of required measured during construction and operation of this alternative would adequately address these potential effects, and these impacts would be *less than significant* and no mitigation would be required.

As described in the Initial Study for the proposed project (see Appendix NOP-IS), the proposed project could result in potentially significant impacts related to the potential for uses that would handle biohazardous materials, but those impacts would be reduced to less than significant with implementation of mitigation measures identified in the Mission Bay FSEIR would reduce potential health and safety impacts to less than significant. Similarly, potential impacts related to encountering naturally occurring asbestos during construction could be reduced to less than significant with implementation of Mitigation Measure M-HZ-1b (Geologic Investigation and Dust Mitigation Plan for Naturally Occurring Asbestos). Neither of these impacts would occur under the Off-site Alternative, and consequently, neither of these mitigation measures would be required.

Thus, the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would result in less severe hazardous materials impacts than those identified for the proposed project.

Mineral and Energy Resources

Like the proposed project, the Off-site Alternative would not result in the use of large amounts of fuel, water, or energy, or use of these materials in a wasteful manner. These impacts would be *less than significant* with compliance with applicable regulations, including the San Francisco Green Building Code, and no mitigation would be required.

Agricultural and Forest Resources

As for the proposed project site in Mission Bay, Piers 30-32 and Seawall Lot 330 do not contain agricultural or forest resources, and development under the Off-site Alternative would have *no impact* on these resources.

7.3.3.4 Off-site Alternative — Conclusions

The Off-site Alternative at Piers 30-32 would meet most of the basic project objectives, although the financial feasibility at this time is unknown. It would avoid or lessen some of the impacts of the proposed project identified in this SEIR, but it would also result in different significant impacts—including significant and unavoidable impacts—that would not occur under the proposed project. Key differences in the impact conclusions for the Off-site Alternative compared to the impact conclusions of the proposed project are summarized below.

The Off-site Alternative would ***avoid*** or ***substantially lessen*** the significant and unavoidable impacts that were identified for the proposed project (i.e., the significance determination would change from SU or SUM to LS or NI) with respect to:

- Vehicular traffic noise on local roadways during the weekday late night period and the Saturday evening period, both direct and cumulative impacts (Impact would change from SUM to LS.)
- Operational criteria air pollutant impacts and the alternative's contribution to cumulative regional criteria air pollutant impacts. (Impact would change from SUM to LS.)
- Wind hazard impacts at off-site pedestrian locations (Impact would change from SUM to LS.)
- Utilities impacts requiring the construction or expansion of wastewater treatment facilities, the construction of which could result in environmental impacts (Impact would change from SU to LS.)
- Utilities impact regarding the determination by the SFPUC that there is currently inadequate wastewater treatment capacity to serve the project's wastewater demand (Impact would change from SUM to LS.)

The Off-site Alternative would have ***less severe*** significant impacts than the proposed project (i.e., the significance determination would change from LSM to LS or NI) with respect to:

- Helipad safety impacts during construction and operation (Impact would change from LSM to NI.)
- Biological resources impacts due to potential avian collisions with buildings (Impact would change from LSM to LS, although the residual impact would be essentially the same.)
- Water quality impact on discharges at the SEWPCP due to atypical wastewater discharges from research and development uses (Impact would change from LSM to NI.)
- Hazardous materials impacts due to the potential for future uses to handle biohazardous materials (Impact would change from LSM to NI.)

- Hazardous materials impacts due to the potential to encounter naturally-occurring asbestos during construction (Impact would change from LSM to LS.)

The Off-site Alternative would have ***different less-than-significant*** impacts that were not identified for the proposed project (i.e., new impacts would be LS and no new mitigation measures would be required) with respect to:

- Potential exposure of new sensitive receptors (residential uses) to noise levels in excess of acceptable standards would be reduced to less than significant with implementation of applicable regulatory requirements for interior noise levels within habitable room. (Impact would be LS.)

The Off-site Alternative would have ***different significant but mitigable*** impacts that were not identified for the proposed project (i.e., new impacts would be LSM and would require implementation of different mitigation measures not required for the proposed project) with respect to:

- Construction impacts on nearby historic resources due to groundborne vibration (Impact would be LSM.)
- Construction impacts on marine habitats and special-status and managed fish (Impact would be LSM.)
- Construction impacts on critical fish habitat and migratory corridors of fish and marine mammals (Impact would be LSM.)
- Marine biological resources impacts associated with trash and littering (Impact would be LSM.)

The Off-site Alternative would have ***slightly more severe*** impacts than were identified for the proposed project (i.e., impact determination would change from LS to LSM and would require implementation of additional mitigation measures not required for the proposed project) with respect to:

- Construction water quality impacts (Impact would change from LS to LSM. There would be greater potential for adverse effects on water quality to occur, as well as more complex mitigation requirements.)
- Water quality impacts associated with trash and littering (Impact would change from LS to LSM.)

The Off-site Alternative would have ***substantially more severe*** significant impacts than were identified for the proposed project (i.e., impact determination would change from LS or LSM to SU or SUM and would require implementation of additional and/or different mitigation measures not required for the proposed project) with respect to:

- Construction noise levels substantially higher than ambient levels, exceeding FTA criterion for residential exposure to construction. (Impact would change from LS to SUM.)

- Construction vibration impacts exceeding thresholds for human annoyance at nearby sensitive receptors (Impact would change from LS to SUM.)
- Cumulatively considerable contribution to construction noise and vibration impacts, assuming other construction activities in the vicinity were to overlap with the construction activities. (Impact would change from LSM to SUM.)
- Exposure of sensitive receptors to increased PM2.5 concentrations and cancer risk from toxic air contaminant concentrations during construction and operation and associated contribution to cumulative impacts. (Impact would change from LSM to SUM.)

The Off-site Alternative would have ***different significant and unavoidable*** impacts that were not identified for the proposed project (i.e., new SU or SUM impact and would require implementation of different mitigation measures not required for the proposed project) with respect to:

- Traffic impacts at different intersections than those identified for the proposed project. The number of intersections with significant traffic impacts would increase, and these impacts would occur under a greater number of scenarios. Even though the Off-site Alternative would generate fewer vehicle trips than the proposed project, traffic impacts would be substantially greater due to its more central and congested location closer to downtown. (Impact would be SUM.)
- Construction noise impacts on special-status fish and marine mammals (Impact would be SUM.)

Overall, the Off-site Alternative at Piers 30-32 and Seawall Lot 330 would avoid and substantially lessen several of the environmental impact identified for the proposed project in Mission Bay, but it would also result in new and different significant environmental impacts that would not occur under the proposed project. This alternative would achieve all of the basic project objectives.

The Off-site Alternative at Piers 30-32 and Seawall Lot 330 is considered potentially feasible for the purposes of this SEIR due in large part to the previous investigations and studies that were conducted in 2012-2013 for the previously proposed project at this site, and the potential economic viability of that project at that time. However, that process also indicated that there remain uncertainties with regard to the acquisition of all the necessary permits and approvals required for this site, including permits from the U.S. Army Corps of Engineers, State Lands Commission, San Francisco Bay Conservation and Development Commission (BCDC), Port of San Francisco, and voter approval under Proposition B (see Table 7-1 above for the complete list). Furthermore, the financial feasibility of a project at this site is currently unknown.

7.4 Comparison of Alternatives and Environmentally Superior Alternative

The CEQA Guidelines require the identification of an environmentally superior alternative to the proposed project (Section 15126.6[e]). If it is determined that the "no project" alternative would be the environmentally superior alternative, then the EIR shall also identify an environmentally superior alternative among the other project alternatives (Section 15126.6[3]).

As described above in Section 7.3.1, the No Project Alternative would result in substantially less severe environmental impacts than the proposed project. However, the No Project Alternative would not meet the project sponsor's most basic objective, which is construction of an event center to serve the Golden State Warriors basketball team. Furthermore, per CEQA Guidelines Section 15126.6[3], the "no project" alternative cannot be selected as the environmentally superior alternative.

The three remaining alternatives consist of the Reduced Intensity Alternative, the Off-site Alternative at Piers 30-32 and Seawall Lot 330, and the Third Street Plaza Variant (see Chapter 8 for a description of this variant and its environmental impacts compared to those of the proposed project). All three of these alternatives would achieve most of the basic project objectives. The Reduced Intensity Alternatives would result in somewhat less severe environmental impacts than the proposed project across a broad range of environmental resources, including transportation, noise, air quality, and wastewater demand; however, this alternative would not avoid or substantially lessen any of the significant and unavoidable impacts that were identified for the proposed project. The Off-site Alternative at Piers 30-32 and Seawall Lot 330 would more effectively avoid and substantially reduce the severity of a number of significant impacts related to noise, air quality, wind, and utilities that were identified for the proposed project; however, this alternative would result in substantially more severe significant impacts related to noise, vibration, and air quality, and also introduce new significant and unavoidable adverse impacts related to transportation and biological resources that would not occur under the proposed project. The Third Street Plaza Variant would have all of the same significant impacts as the proposed project, save one: wind impacts at off-site public areas. This impact, though determined to be significant and unavoidable for the proposed project due to current unknowns in the project design, can be expected to be mitigated to less than significant prior to project implementation with appropriate design refinements.

Therefore, overall, the Reduced Intensity Alternative is considered the environmentally superior alternative, because it would reduce the severity of adverse environmental effects across a broad range of environmental resources and would not result in any new significant environmental impacts.

Table 7-27 compares the significant impacts of the No Project, Reduced Intensity, and Off-site Alternatives with those of the proposed project; please see Chapter 8 for the impacts of the Third Street Plaza Variant (as described in Chapter 8, the Third Street Plaza Variant would have all the same significant impacts as the proposed project except that Impact WS-1, regarding wind hazards at off-site public areas would be less than significant instead of significant and unavoidable with mitigation). Table 7-27 lists only the significant impact of the project and alternatives (with significant and unavoidable impacts noted in bold italic type); less-than-significant impacts are not shown on this table since they are not considered in the alternatives analysis.

TABLE 7-27
COMPARISON OF SIGNIFICANT ENVIRONMENTAL IMPACTS OF THE PROJECT TO IMPACTS OF THE ALTERNATIVES

Environmental Resource	Proposed Project	Alternative A: No Project	Alternative B: Reduced Intensity	Alternative C: Off-site at Piers 30-32 and Seawall Lot 330
Land Use	All impacts less than significant.	All impacts would be the same as or similar to those of the project.	All impacts would be the same as those of the project.	All impacts would be the same as or similar to those of the project.
Population and Housing	All impacts less than significant.	All impacts would be the same as or less than those of the project due to reduced development.	All impacts would be the same as or less than those of the project due to reduced development.	All impacts would be the same as or similar to those of the project.
Cultural and Paleontological Resources	Impact CP-2: The project could cause a substantial adverse change in the significance of an archaeological resource. Identified mitigation would reduce this impact to less than significant.	Impact and mitigation would be the same or very similar to that of the project due to similar excavation requirements.	Impacts and mitigation would be the same or very similar to that of the project due to similar excavation requirements.	Impact and mitigation would be the same or very similar to that of the project due to similar excavation requirements.
	Impact C-CP-1: The project's contribution to cumulative impacts on archaeological resources could be cumulatively considerable. Identified mitigation would reduce this impact to less than significant.	Impact and mitigation would be the same or very similar to that of the project due to similar excavation requirements.	Impact and mitigation would be the same or very similar to that of the project due to similar excavation requirements.	Impact and mitigation would be the same or very similar to that of the project due to comparable excavation requirements at Seawall Lot 330.
	No impact on historic resources.	No impact on historic resources.	No impact on historic resources.	Potentially significant impact on nearby historic resources during construction due to groundborne vibration, which could be reduced to less than significant with feasible mitigation.
Transportation and Circulation	Impact TR-2: Proposed project would result in ***significant and unavoidable with mitigation***, traffic impacts at multiple intersections that would operate at LOS E or LOS F under conditions without a SF Giants game at AT&T Park.	***Significant and unavoidable*** traffic impacts at one study intersection, similar to the proposed project for the No Event scenario; less than significant impacts for event scenarios.	***Significant and unavoidable with mitigation*** traffic impacts at one study intersection for the No Event scenario, similar to the proposed project, but intersection would remain at LOS E compared to LOS F for the project. ***Significant and unavoidable with mitigation*** traffic impacts same as proposed project for event scenarios.	***Significant and unavoidable with mitigation*** traffic impacts at multiple intersections in the vicinity of Piers 30-32 and Seawall Lot 330, which would be substantially more severe than the traffic impacts of the proposed project.
	Impact TR-3: Proposed project would result in ***significant and unavoidable with mitigation***, traffic impacts at one freeway ramp that would operate at LOS E or LOS F under conditions without a SF Giants game at AT&T Park.	Traffic impacts at freeway ramps less than significant.	Traffic impacts at freeway ramps ***significant and unavoidable with mitigation***, similar to proposed project.	Similar to the proposed project, traffic impacts at freeway ramps in the vicinity of Piers 30-32 and Seawall Lot 330 would be ***significant and unavoidable with mitigation.***

TABLE 7-27 (Continued)
COMPARISON OF SIGNIFICANT ENVIRONMENTAL IMPACTS OF THE PROJECT TO IMPACTS OF THE ALTERNATIVES

Environmental Resource	Proposed Project	Alternative A: No Project	Alternative B: Reduced Intensity	Alternative C: Off-site at Piers 30-32 and Seawall Lot 330
Transportation and Circulation (cont.)	Impact TR-5: Proposed project would result in ***significant and unavoidable with mitigation***, transit impacts on regional transit service under conditions without a SF Giants game at AT&T Park.	Transit impacts less than significant.	Transit impacts on regional service providers ***significant and unavoidable with mitigation***, similar to the proposed project for event scenarios.	Similar to the proposed project, transit impacts on regional transit service would be ***significant and unavoidable with mitigation*** for event scenarios**.**
	Impact TR-6: Proposed project could result in pedestrian impacts under conditions without a SF Giants game at AT&T Park, but identified mitigation would reduce this impact to less than significant.	Pedestrian impacts less than significant.	Pedestrian impacts same as the proposed project.	Pedestrian impacts similar to the proposed project.
	Impact TR-9: Project construction could temporarily obstruct helipad airspace surfaces, and specialized outdoor lighting as part of event center operations could affect helipad flight operations. Identified mitigation would reduce this impact to less than significant.	Impacts related to construction effects on helipad airspaces surfaces would be the same as or less severe than the proposed project, and the same mitigation would apply. No impact related to event center lighting.	Impacts related to construction effects on helipad airspaces surfaces would be the same as or less severe than the proposed project, and the same mitigation would apply. Impacts related to specialized outdoor lighting as part of event center operations would be the same as the proposed project, and the same mitigation measure would apply.	No helipad safety impacts.
	Impact TR-11: Proposed project would result in ***significant and unavoidable with mitigation***, traffic impacts at multiple intersections that would operate at LOS E or LOS F under conditions with an overlapping SF Giants game at AT&T Park.	No overlapping events, so no impact.	Traffic impacts at multiple intersections ***significant and unavoidable with mitigation***, similar to proposed project.	Similar to the proposed project, traffic impacts at multiple intersections in the vicinity of Piers 30-32 and Seawall Lot 330 would be ***significant and unavoidable with mitigation***.
	Impact TR-12: Proposed project would result in ***significant and unavoidable with mitigation***, traffic impacts at 3 freeway ramp that would operate at LOS E or LOS F under conditions with an overlapping SF Giants game at AT&T Park.	No overlapping events, so no impact.	Traffic impacts at freeway ramps ***significant and unavoidable with mitigation***, similar to proposed project.	Similar to the proposed project, traffic impacts at freeway ramps in the vicinity of Piers 30-32 and Seawall Lot 330 would be ***significant and unavoidable with mitigation.***
	Impact TR-13: Proposed project could result in significant transit impacts on Muni transit service under conditions with an overlapping SF Giants game at AT&T Park, but identified mitigation would reduce this impact to less than significant.	No overlapping events, so no impact.	Transit impacts on Muni, same as the proposed project.	Transit impacts on Muni less than significant.

TABLE 7-27 (Continued)
COMPARISON OF SIGNIFICANT ENVIRONMENTAL IMPACTS OF THE PROJECT TO IMPACTS OF THE ALTERNATIVES

Environmental Resource	Proposed Project	Alternative A: No Project	Alternative B: Reduced Intensity	Alternative C: Off-site at Piers 30-32 and Seawall Lot 330
Transportation and Circulation (cont.)	Impact TR-14: Proposed project would result in ***significant and unavoidable with mitigation***, transit impacts on regional transit service under conditions with an overlapping SF Giants game at AT&T Park.	No overlapping events, so no impact.	Transit impacts on regional service providers ***significant and unavoidable***, similar to the proposed project.	Similar to the proposed project, transit impacts on regional transit service would be ***significant and unavoidable with mitigation.***
	Impact TR-15: Proposed project could result in pedestrian impacts under conditions with an overlapping SF Giants game at AT&T Park, but identified mitigation would reduce this impact to less than significant.	No overlapping events, so no impact.	Pedestrian impacts same as the proposed project.	Pedestrian impacts similar to the proposed project.
	Impact TR-18: Proposed project would result in ***significant and unavoidable with mitigation***, traffic impacts at multiple intersections that would operate at LOS E or LOS F under conditions without the Muni Special Event Transit Service Plan.	Muni Special Event Transit Service Plan not applicable, so no impact.	Impact would be ***significant and unavoidable with mitigation***, same as the proposed project.	Muni Special Event Transit Service Plan not applicable, so no impact.
	Impact TR-19: Proposed project would result in ***significant and unavoidable with mitigation***, traffic impacts at freeway ramps that would operate at LOS E or LOS F under conditions without the Muni Special Event Transit Service Plan.	Muni Special Event Transit Service Plan not applicable, so no impact.	Impact would be ***significant and unavoidable with mitigation***, same as the proposed project.	Muni Special Event Transit Service Plan not applicable, so no impact.
	Impact TR-20: Proposed project would result in ***significant and unavoidable with mitigation***, transit impacts on Muni transit capacity under conditions without the Muni Special Event Transit Service Plan.	Muni Special Event Transit Service Plan not applicable, so no impact.	Impact would be ***significant and unavoidable with mitigation***, same as the proposed project.	Muni Special Event Transit Service Plan not applicable, so no impact.
	Impact TR-21: Proposed project would result in ***significant and unavoidable with mitigation***, transit impacts on regional transit capacity under conditions without the Muni Special Event Transit Service Plan.	Muni Special Event Transit Service Plan not applicable, so no impact.	Impact would be ***significant and unavoidable with mitigation***, same as the proposed project.	Muni Special Event Transit Service Plan not applicable, so no impact.
	Impact TR-22: Proposed project could result in pedestrian impacts under conditions without the Muni Special Event Transit Service Plan, but identified mitigation would reduce this impact to less than significant.	Muni Special Event Transit Service Plan not applicable, so no impact.	Impact would be ***significant and unavoidable with mitigation***, same as the proposed project.	Muni Special Event Transit Service Plan not applicable, so no impact.

TABLE 7-27 (Continued)
COMPARISON OF SIGNIFICANT ENVIRONMENTAL IMPACTS OF THE PROJECT TO IMPACTS OF THE ALTERNATIVES

Environmental Resource	Proposed Project	Alternative A: No Project	Alternative B: Reduced Intensity	Alternative C: Off-site at Piers 30-32 and Seawall Lot 330
Transportation and Circulation (cont.)	Impact C-TR-2: Proposed project would result in ***significant and unavoidable with mitigation***, cumulative traffic impacts at multiple intersections under 2040 cumulative conditions.	***Significant and unavoidable*** cumulative traffic impact at two intersections.	***Significant and unavoidable with mitigation*** cumulative traffic impact at multiple intersections, same as the proposed project	***Significant and unavoidable with mitigation*** cumulative traffic impact at multiple intersections, similar to the proposed project.
	Impact C-TR-3: Proposed project would result in ***significant and unavoidable with mitigation***, cumulative traffic impacts at multiple freeway ramps under 2040 cumulative conditions.	Cumulative traffic impacts at freeway ramps less than significant.	***Significant and unavoidable with mitigation*** cumulative traffic impacts on freeway ramps same as the proposed project.	***Significant and unavoidable with mitigation*** cumulative traffic impacts on freeway ramps similar to the proposed project.
	Impact C-TR-4: Proposed project could result in significant transit impacts on Muni service under 2040 cumulative conditions, but identified mitigation measures would reduce impacts to less than significant.	Cumulative transit impacts less than significant.	Cumulative transit impacts on Muni service same as the proposed project.	Cumulative transit impacts on Muni less than significant.
	Impact C-TR-5: Proposed project would result in ***significant and unavoidable with mitigation***, cumulative transit impacts on regional transit capacity under 2040 cumulative conditions.	Cumulative transit impacts less than significant.	***Significant and unavoidable with mitigation*** cumulative transit impacts on regional providers same as the proposed project.	***Significant and unavoidable with mitigation*** cumulative transit impacts on regional providers similar to the proposed project.
	Impact C-TR-6: Proposed project could result in significant pedestrian impacts under 2040 cumulative conditions, but identified mitigation measures would reduce impacts to less than significant.	Cumulative pedestrian impacts less than significant.	Cumulative pedestrian impacts same as the proposed project.	Cumulative pedestrian impacts similar to the proposed project.
Noise and Vibration	Construction noise impacts less than significant.	Construction noise impacts less than significant.	Construction noise impacts less than significant.	Construction noise would be a substantial increase over ambient levels and would be ***significant and unavoidable with mitigation.***
	Construction vibration impacts less than significant.	Construction vibration impacts less than significant.	Construction vibration impacts less than significant.	Construction groundborne vibration would exceed threshold for human annoyance and would be ***significant and unavoidable with mitigation.***

TABLE 7-27 (Continued)
COMPARISON OF SIGNIFICANT ENVIRONMENTAL IMPACTS OF THE PROJECT TO IMPACTS OF THE ALTERNATIVES

Environmental Resource	Proposed Project	Alternative A: No Project	Alternative B: Reduced Intensity	Alternative C: Off-site at Piers 30-32 and Seawall Lot 330
Noise and Vibration (cont.)	Impact NO-4: Project operations could include use of amplified sound equipment in outdoor areas that could result in noise levels violating the noise ordinance, and there is the potential for leakage of interior concert/event noise to affect sensitive land uses. Identified mitigation would reduce this impact to less than significant.	No impacts related to amplified sound equipment, and no mitigation required.	Impacts and mitigations would be the same as those of the project.	Impacts and mitigations would be the same as or similar to those of the project.
	Impact NO-5: Noise levels from increased traffic on local roadways would be ***significant and unavoidable*** at Illinois St under weekday late evenings and Saturday evenings and on Terry Francois Blvd under on weekday late evenings, even with implementation of transportation mitigation measures to reduce traffic.	Increased roadway noise levels in the project vicinity would be less than significant under all modeled scenarios.	Impact of traffic noise would be ***significant and unavoidable with mitigation***, similar to the proposed project, at Illinois St under weekday late evenings and Saturday evenings and on Terry Francois Blvd under on weekday late evenings, though the increases would be slightly less than the project but still exceed significance thresholds.	Roadway noise levels would be less than significant.
	Impact NO-5: Increased noise levels due to crowd noise at the Muni T-Line platform in the nighttime when event patrons are departing would be a ***significant and unavoidable*** impact on nearby residential uses.	No impact related to crowd noise.	***Significant and unavoidable*** impact related to crowd noise would be the same as for the proposed project.	***Significant and unavoidable*** impact related to crowd noise would be the same as or similar to those of the proposed project.
	Impact C-NO-1: The project's contribution to cumulative impacts on construction noise could be cumulatively considerable. Identified mitigation would reduce this impact to less than significant.	Cumulative construction noise impacts would be similar to those of the project. Identified mitigation would reduce this impact to less than significant.	Cumulative construction noise impacts would be the same as those of the project. Identified mitigation would reduce this impact to less than significant.	Cumulative construction noise would be ***significant and unavoidable with mitigation***, assuming there would be concurrent construction activities in the site vicinity.
	Impact C-NO-2: The project's contribution to cumulative impacts on traffic noise levels would ***significant and unavoidable*** at Illinois St during weekday peak hour and Saturday evenings and at Mariposa during Saturday evenings, even with implementation of transportation mitigation measures to reduce traffic.	Cumulative impact of traffic noise would be less than significant on local roadways under all modeled scenarios.	Cumulative impact of traffic noise would be ***significant and unavoidable with mitigation***, at Illinois St during Saturday evenings, similar to the proposed project, but unlike the project, the cumulative noise impact at this location on weekday peak hours would be less than significant.	Contribution to cumulative roadway noise levels would be less than significant.

TABLE 7-27 (Continued)
COMPARISON OF SIGNIFICANT ENVIRONMENTAL IMPACTS OF THE PROJECT TO IMPACTS OF THE ALTERNATIVES

Environmental Resource	Proposed Project	Alternative A: No Project	Alternative B: Reduced Intensity	Alternative C: Off-site at Piers 30-32 and Seawall Lot 330
Air Quality	Impact AQ-1: Construction emissions of ROG and NOx would exceed BAAQMD thresholds, and impacts would be ***significant and unavoidable with mitigation***, even with implementation of an emission offset mitigation measure.	Construction emissions would be less than significant.	Construction emissions would be similar to that of the project, assuming comparable construction scenario, and would be ***significant and unavoidable with mitigation***.	Construction emissions would be similar to that of the project, and would be ***significant and unavoidable with mitigation***.
	Impact AQ-2: Operational emissions of ROG and NOx would exceed BAAQMD thresholds and impacts would be ***significant and unavoidable with mitigation***, even with implementation of an emission offset mitigation measure.	Operational emissions would be less than significant	Operational emissions would be similar to that of the project, and would be ***significant and unavoidable with mitigation***.	Operational emissions would be similar to that of the project, and would be ***significant and unavoidable with mitigation***.
	Impact AQ-3: Construction and operation would generate toxic air contaminants that could exceed significance thresholds for cancer risk, but identified mitigation would reduce the risk to less than significant.	Impacts related to toxic air contaminants would be less than significant and no mitigation required.	Impacts related to cancer risk of toxic air contaminants would be the same as that identified for the proposed project and the same mitigation measures would reduce impacts to less than significant.	Significant construction-related impact from PM2.5 emissions could be reduced to less than significant with feasible measures ***Significant and unavoidable with mitigation*** construction-related impact from increased cancer risk contributions at off-site receptors.
	Impact AQ-4: The project with implementation of identified air quality mitigation measures would be consistent with the 2010 Clean Air Plan, and this impact is less than significant with mitigation.	Impacts related to consistency with the Clean Air Plan would be less than significant and no mitigation required.	Impacts related to consistency with the Clean Air Plan would be the same as that identified for the proposed project and the same mitigation measures would reduce impacts to less than significant.	Impacts related to consistency with the Clean Air Plan would be the same as that identified for the proposed project and the same mitigation measures would reduce impacts to less than significant.
	Impact C-AQ-1: The project's contribution to cumulative construction and operational ROG and NOx emissions could be cumulatively considerable, and impacts would be ***significant and unavoidable with mitigation***, even with implementation of and emission offset mitigation measure.	Cumulative air quality impacts would be less than significant.	Cumulative air quality impacts would be the same as that identified for the proposed project and the same mitigation measures apply, and the impact would be ***significant and unavoidable with mitigation***.	Cumulative air quality impacts would be similar to that identified for the proposed project and the same mitigation measures apply, and the impact would be ***significant and unavoidable with mitigation***.
	Impact C-AQ-2: The project's contribution to cumulative impacts on exposure to toxic air contaminants could exceed significance thresholds for cancer risk, but identified mitigation would reduce the risk to less than significant.	Impact would be less than significant.	Impact would be the same as the proposed project, less than significant with mitigation.	Cumulative air quality impacts related to health risks would be ***significant and unavoidable with mitigation*** because this location is within an Air Pollution Exposure Zone.

TABLE 7-27 (Continued)
COMPARISON OF SIGNIFICANT ENVIRONMENTAL IMPACTS OF THE PROJECT TO IMPACTS OF THE ALTERNATIVES

Environmental Resource	Proposed Project	Alternative A: No Project	Alternative B: Reduced Intensity	Alternative C: Off-site at Piers 30-32 and Seawall Lot 330
Greenhouse Gas Emissions	Impact is less than significant.	Impact would be similar to that of the project.	Impact would be the same as that of the project.	Impact would be similar to that of the project.
Wind and Shadow	Impact WS-1: The project would alter wind in a manner that would substantially increase the number of wind hazard hours at off-site public areas. Due to the currently unknown wind effects that would occur under the final design refinements, this impact would be ***significant and unavoidable, with mitigation***.	Wind hazard impacts could be the same as or less than that of the project, but in the absence of wind tunnel testing, the specific change in wind conditions cannot be quantified.	Wind hazard impacts could be the same as or less than that of the project, but in the absence of wind tunnel testing, the specific change in wind conditions cannot be quantified.	Wind hazard impacts would be less than significant based on wind tunnel testing conducted for the previous design proposal at this location.
Recreation	All impacts less than significant.	All impacts would be the same or similar to those of the project.	All impacts would be the same or similar to those of the project.	All impacts would be the same or similar to those of the project.
Utilities and Service Systems	Impact C-UT-2: The project in combination with past, present, and foreseeable future projects would require construction of new or upgraded wastewater facilities, the construction of which could have significant environmental effect. This impact is ***significant and unavoidable***, with no mitigation available to the project sponsor.	Impacts related to wastewater treatment capacity would be the same as the proposed project, and would be ***significant and unavoidable***.	Impacts related to wastewater treatment capacity would be the same as the proposed project, and would be ***significant and unavoidable***.	Impact would be less than significant, no mitigation required because of adequate capacity of existing wastewater facilities at this location.
	Impact C-UT-4: The SFPUC has determined that it has inadequate capacity to serve the project's wastewater demand in addition to its existing commitments. This impact is ***significant and unavoidable***, even ***with mitigation*** by the project sponsor to contribute its fair share to the construction of capacity improvements.	Impacts related to wastewater demand would be similar to the proposed project, though wastewater demand would be somewhat reduced, but the impact would still be ***significant and unavoidable with mitigation***.	Impacts related to wastewater demand would be similar to the proposed project, though wastewater demand would be somewhat reduced, but the impact would still be ***significant and unavoidable with mitigation***.	Impact would be less than significant, no mitigation required.
Public Services	All impacts less than significant.	All impacts would be the same or similar to those of the project.	All impacts would be the same or similar to those of the project.	All impacts would be similar to those of the project.
Biological Resources	Impact BI-4: Project construction could affect breeding birds, and project operations could adversely affect birds due to increased risk of collisions with buildings. Identified mitigation would reduce this impact to less than significant.	Impacts and mitigation would be the same or very similar to those of the project due to similar construction effects and similar maximum heights of structures.	Impacts and mitigation would be the same or very similar to those of the project due to similar construction effects and similar maximum heights of structures.	Same impact and mitigation with respect to breeding birds; less-than-significant impact with respect to avian collisions with buildings.

TABLE 7-27 (Continued)
COMPARISON OF SIGNIFICANT ENVIRONMENTAL IMPACTS OF THE PROJECT TO IMPACTS OF THE ALTERNATIVES

Environmental Resource	Proposed Project	Alternative A: No Project	Alternative B: Reduced Intensity	Alternative C: Off-site at Piers 30-32 and Seawall Lot 330
Biological Resources (cont.)	No impacts on marine biological resources.	No impacts on marine biological resources.	No impacts on marine biological resources.	***Significant and unavoidable*** impact on special-status fish and marine mammals due to construction noise. Construction impacts on critical fish habitat and on migratory corridors for marine wildlife could be reduced to less than significant with feasible mitigation measures. Construction and operational impacts on marine biological resources due to trash and littering could be reduced to less than significant with feasible mitigation measures.
Geology and Soils	All impacts less than significant.	All impacts would be the same as or similar to those of the project.	All impacts would be the same as or similar to those of the project.	All impacts would be similar to those of the project.
Hydrology and Water Quality	Impact HY-6: Impacts related to dry and wet weather flows and combined sewer discharges would be less than significant, but effluent discharges from the SEWPCP could be affected due to unknown nature of future business and research uses. Identified mitigation from the Mission Bay FSEIR would reduce this impact to less than significant.	Impact would be same as the proposed project.	Impact would be same as the proposed project.	No impact, because future uses would generate typical municipal wastewater.
	No impact because no in-water construction.	No impact because no in-water construction.	No impact because no in-water construction.	Potentially significant construction impacts on water quality of the Bay due to extensive in-water construction activities could be reduced to less than significant with implementation of complex though feasible mitigation measures.
	Littering impact determined to be less than significant with implementation of required trash control and management programs.	Impact would be same as or similar to that of the proposed project.	Impact would be same as that of the proposed project.	Potential water quality impact associated with littering due to proximity to the Bay could be reduced to less than significant with feasible mitigation measures.

TABLE 7-27 (Continued)
COMPARISON OF SIGNIFICANT ENVIRONMENTAL IMPACTS OF THE PROJECT TO IMPACTS OF THE ALTERNATIVES

Environmental Resource	Proposed Project	Alternative A: No Project	Alternative B: Reduced Intensity	Alternative C: Off-site at Piers 30-32 and Seawall Lot 330
Hazards and Hazardous Materials	Impact HZ-1: Project operations could include uses that handle biohazardous materials, which could have health and safety impacts; project construction could encounter naturally-occurring asbestos. Identified mitigation would reduce this impact to less than significant.	Impacts would be same as or similar to those of the proposed project.	Impacts would be same as or similar to those of the proposed project.	No impact related to use of biohazardous materials because of different uses would be expected at this location, and impact associated with the potential to encounter naturally-occurring asbestos would be less than significant based on available data on subsurface materials.
	Impact HZ-2: Project operations could include child-care centers that could expose a sensitive population to hazardous materials. Identified mitigation would reduce this impact to less than significant.	Impact would be same as or similar to that of the proposed project.	Impact would be same as or similar to that of the proposed project.	Impact would be less than significant, no mitigation required.
Mineral and Energy Resources	All impacts less than significant.	All impacts would be the same or similar to those of the project.	All impacts would be the same or similar to those of the project.	All impacts would be the same or similar to those of the project.
Agriculture and Forest Resources	No impacts.	No impacts, same as the project.	No impacts, same as the project.	No impacts, same as the project.

7.5 Alternatives Considered but Rejected

In developing the proposed project and the alternatives analyzed in this SEIR, the project sponsor considered multiple alternative locations as well as alternative concepts/designs at the project site. The OCII, as CEQA lead agency, and with the assistance of the Planning Department, reviewed these alternative concepts and locations as potential strategies for reducing or avoiding the significant adverse impacts that were identified for the proposed project. In some cases, the alternative concepts were incorporated into the Reduced Intensity Alternative analyzed in this chapter as Alternative B or into a mitigation measure recommended for the proposed project. However, in other cases, alternative concepts or locations were determined to either be infeasible or to result in the same or more severe environmental impacts compared to those of the project. The alternatives considered and the reasons they have been rejected from further analysis are described below.

7.5.1 Alternatives Identified During Scoping

During the scoping process for the SEIR, one individual raised a concern regarding the need to consider alternatives to the proposed project as summarized in Chapter 2, Table 2-1. This suggestion is for a modified site plan at Blocks 29-32 that would incorporate design changes to reduce transportation and circulation impacts. This suggestion has been incorporated into the project design for the proposed project, as discussed and analyzed in Chapter 5, Section 5.2, Transportation and Circulation. In addition, as described in Chapter 2, Introduction, public scoping was conducted on a previous proposal by the project sponsor to construct an event center at Piers 30-32 in San Francisco (described in Section 7.5.2.1, below), and comments from that scoping process regarding alternatives were also considered for the currently proposed project.

7.5.2 Alternatives Considered but Rejected

As described above in Section 7.2.3, several alternative strategies were considered as part of the alternatives screening and selection process for this SEIR. The alternative strategy to reduce the size/scale of the event center was rejected because not only would it fail to meet most of the basic project objectives, reducing the size/scale of the event center would likely not substantially avoid or lessen significant and unavoidable transportation impacts, and consequently, associated air quality and noise impacts. Please see discussion above in Section 7.2.3 for further discussion.

An additional alternative strategy that was considered but rejected was a "no build" alternative at the project site at Blocks 29-32. This no build strategy assumes that the site would remain in its current state as a parking lot and undeveloped site for the foreseeable future. While such a strategy would avoid all identified significant impacts of the proposed project, it would not meet any of the project objectives. It would also not be consistent with the Mission Bay South Redevelopment Plan and would in fact undermine the Plan, because OCII would lose the ability to construct affordable housing as well as certain infrastructure improvements within the Plan area. Furthermore, a no build alternative at this location is not reasonably foreseeable for financial reasons, given the active development currently occurring on the surrounding parcels.

The last category of alternatives considered but rejected is alternative site locations. The project sponsor has explored numerous alternative locations for developing an event center and mixed-use development in San Francisco. As described in Chapter 2, Introduction, and in Section 7.3.3 above, in 2012, the project sponsor proposed to construct a multi-purpose event center, event hall, public open space, maritime uses, fire station, a parking facility, and visitor-serving retail and restaurant uses on Piers 30-32 in conjunction with a residential and hotel mixed-use development on Seawall Lot 330. The San Francisco Planning Department published a Notice of Preparation of an EIR for this previous project, received extensive public comment on that proposal, and conducted preliminary analysis of potential impacts of that proposal. As a part of the preliminary environmental review for this previous proposal, the Planning Department also examined two alternative site locations, Seawall Lot 337 and the Former Potrero Power Plant site (described below in Table 7-28), as possible ways to avoid or lessen significant environmental impacts of that previous project. At that time, the currently proposed project site at Blocks 29-32 in Mission Bay was not available, as the site owner, salesforce.com, was in the process of developing the site with a mix of commercial/industrial/retail uses as allowed under the Mission Bay South Redevelopment Plan. However, due to the changes in circumstances since that time (including the availability of Blocks 29-32 due to the withdrawal of salesforce.com of its development proposal for Blocks 29-32), the GSW as project sponsor withdrew its application for an event center and mixed uses at Piers 30-32 and Seawall Lot 330, and replaced it with the currently proposed project at Blocks 29-32 in Mission Bay.

Nevertheless, as a part of the preliminary environmental review for the previous proposal, numerous alternative sites in San Francisco were considered for an event center. Many of these alternative sites were raised by the public and agencies during scoping for the proposal to construct the event center at Piers 30-32. Currently, the OCII, as the CEQA lead agency for the proposed project, has considered these alternative sites as potentially applicable as alternatives to the proposed project at Mission Bay Blocks 29-32. The alternative sites considered are listed and described in **Table 7-28**, along with OCII's reasons for rejecting these options.

TABLE 7-28
ALTERNATIVE LOCATIONS CONSIDERED BUT REJECTED

Alternative Location	Description	Reason for Rejection
Seawall Lot 337	Seawall Lot 337 is a 16-acre parcel located directly south of China Basin, between Third Street and Terry A. Francois Boulevard, about one third mile north of Blocks 29-32. This site is adjacent to the northeast side of the Mission Bay South Plan area but outside of the Plan boundary. It is currently used for surface parking.	Seawall Lot 337 is within the jurisdiction of the Port of San Francisco. However, this site is part of the proposed Mission Rock mixed-use project (see Chapter 5, Section 5.1, for description), and the Seawall Lot 337 LLC, an affiliate of the San Francisco Giants, is currently collecting signatures to qualify for a ballot measure for the November 2015 election to approve height increases for a proposed development at Seawall Lot 337. The project sponsor would not reasonably be able to acquire, control, or otherwise have access to this site for the purpose of pursuing such alternative location. Furthermore, an event center and mixed use development at this site would be expected to have the same or similar significant and unavoidable impacts as the proposed project, particularly with respect to transportation impacts and overlapping events with AT&T Park.
Former Potrero Power Plant Site	This site, also known as the Mirant site, is located between 22nd and 23rd Streets, along Illinois Street, about 200 feet from the Bay shoreline. This site contains many built features of the former power generation facilities and is directly adjacent to former power plant structures and facilities that are expected to be removed as part of ongoing site remediation activities. It is part of a 34-acre site that is currently undergoing various stages of environmental investigation and remediation by the RWQCB due to its long history of industrial uses since the mid-1800s.	This site is less well served by transit and due to its remote location, would not meet the project objectives to locate the event center within walking distance to local and regional transit hubs. Therefore, an event center at this location would likely have the same or more severe transportation-related impacts as the proposed project, including significant and unavoidable traffic, transit, air quality, and noise impacts. There are also concerns regarding site suitability and feasibility of project construction because of the ongoing hazardous materials remediation activities at this site. It is unknown if the project sponsor would reasonably be able to acquire, control, or otherwise have access to this site.
Pier 50	Pier 50 is located on the Bay waterfront, south of China Basin, east of Terry A. Francois Boulevard, about one half mile northeast of the project site. The 20-acre site on the Bay has four existing shed structures. Current uses include harbor services, deep draft vessel berthing, and the Port's maintenance facility.	Pier 50 is under both Port of San Francisco and BCDC jurisdiction, subject to a public trust easement. Pier 50 is the Port's maintenance center for the entire Port of San Francisco waterfront, an essential trust use. Pier 50 is also a deep water permanent berthing facility, designated a Port priority facility in BCDC's Seaport Plan. Therefore, an event center at this site would displace maritime uses currently on Pier 50 and conflict with the Seaport Plan. Construction would require extensive seismic and structural upgrades to the pier, which would result in potentially significant and unavoidable impacts on marine wildlife, which would not occur under the proposed project. Significant and unavoidable transportation, air quality, and noise impacts would likely be the same as or similar to the proposed project, particularly with respect to transportation impacts and overlapping events with AT&T Park. In addition, no seismic or engineering feasibility studies have been conducted for construction of a large development like the proposed project on Pier 50, so, site suitability of Pier 50 is unknown.

TABLE 7-28 (Continued)
ALTERNATIVE LOCATIONS CONSIDERED BUT REJECTED

Alternative Location	Description	Reason for Rejection
Pier 80 or India Basin Area	Pier 80 is located on the Bay waterfront, on the north side of Islais Creek Channel at the eastern terminus of Cesar Chavez Street and adjoins the City's Potrero Hill/Dogpatch and Bayview-Hunters Point neighborhoods. Pier 80 is a 69-acre facility and one of the Port of San Francisco's primary cargo terminals, operated by Metropolitan Stevedore Company (Metro Ports).	Pier 80 is under both Port of San Francisco and BCDC jurisdiction and is subject to a public trust easement. Pier 80 is one of the Port's two major cargo terminals, and is designated as a Port priority facility in BCDC's Seaport Plan, which calls for Pier 80 to be retained to support cargo operations Construction of an event center at Pier 80 would displace maritime-dependent cargo handling and industrial uses that are not available or feasible elsewhere in San Francisco, and would conflict with the Seaport Plan. In addition, constructing an event center would require seismic and structural upgrades to the pier, which would result in significant in-water construction impacts on water quality and biological resources. Construction would require extensive seismic and structural upgrades to the pier, which would result in potentially significant and unavoidable impacts on marine wildlife, which would not occur under the proposed project. The site is less well served by Muni and regional transit, and access would primarily be via auto, and the roadway network serving Pier 80 is less developed with narrower cross-sections (i.e., fewer travel lanes). Therefore, transportation and associated air quality and noise impacts would likely be the same or potentially more severe than those under the proposed project. Due to its remote location, this site would not meet the project objectives to locate the event center within walking distance to local and regional transit hubs.
Candlestick Point and Hunters Point Shipyard	Candlestick Point and Hunters Point Shipyard covers approximately 702 acres along the southeastern waterfront of San Francisco, consisting of 281 acres at Candlestick Point (Candlestick) and 421 acres at Hunters Point Shipyard (HPS Phase II). Both areas are under the jurisdiction of the San Francisco Office of Community Investment and Infrastructure (OCII), successor agency to the San Francisco Redevelopment Agency.	Candlestick Point and the Hunters Point Shipyard are approved for redevelopment of both areas with a major mixed-use project including open space, housing, commercial (office, regional retail, and neighborhood retail) uses, research and development, artist space, a marina, new infrastructure, community uses, and entertainment venues. The site is less well served by Muni and regional transit. Due to its remote location, this site would not meet the project objectives to locate the event center within walking distance to local and regional transit hubs. The site is actively being developed, and is not available. The project sponsor would not reasonably be able to acquire, control, or otherwise have access to this site for the purpose of pursuing such alternative location.

TABLE 7-28 (Continued)
ALTERNATIVE LOCATIONS CONSIDERED BUT REJECTED

Alternative Location	Description	Reason for Rejection
Schlage Lock site	About 20-acre now-vacant former industrial site wedged between the residential neighborhoods of Visitacion Valley and Little Hollywood along the City's southern border. The site is located east of Tunnel Avenue, across Bayshore Boulevard, and extends roughly along Leland Avenue to just beyond Rutland Street. The former site of Schlage Lock factory that closed in 1999, this location is considered a brownfield site with contaminated soil and groundwater identified at the site, but with an approved Remedial Action Plan. The site is potentially a historic site with historic resources.	The site is within the Visitacion Valley Redevelopment project area and is programmed for mixed-use development, including approximately 1,250 residential units. The City has approved a development agreement (Ordinance No. 149-14) and has recently approved a tentative subdivision map. The site is less well served by Muni and regional transit, and because access would primarily be via auto, would require substantial nearby parking supplies. Due to its remote location, this site would not meet the project objectives to locate the event center within walking distance to local and regional transit hubs. Given that the Schlage Lock Project has been approved and is moving forward to its implementation phase, the project sponsor would not reasonably be able to acquire, control, or otherwise have access to this site.
Bill Graham Civic Auditorium	This site is an existing multi-purpose arena located in the Civic Center area, on Grove Street, between Larkin and Polk Streets. It holds 6,000 people, and is the former home of the Golden State Warriors from 1964 to 1966.	The size of this site is not adequate to accommodate an event center and would fail to meet most of the project objectives. It is unknown if the project sponsor would reasonably be able to acquire, control, or otherwise have access to this site.
The Presidio	The Presidio is a park and former military base on the northern tip of the San Francisco Peninsula in San Francisco, and is part of the Golden Gate National Recreation Area. The park is identified as a California Historical Landmark and a National Historic Landmark.	Development within the Presidio is subject to the Presidio Trust Management Plan, and an arena would be incompatible with the plan. Even if a site were available and desirable for an event center, development at the Presidio would require approval by the National Park Service. Furthermore, the area is less well served by Muni and regional transit, and auto usage would require substantial nearby parking supply. Transportation and associated air quality and noise impacts would likely be the same or potentially more severe than those under the proposed project. Due to its remote location, this site would not meet the project objectives to locate the event center within walking distance to local and regional transit hubs. Also because of the extent of undisturbed land at the Presidio, there would be a greater potential for impacts on biological resources that would not occur under the proposed project.
Cow Palace	This site is an existing indoor, multi-purpose arena located in Daly City on Geneva Avenue, just south of the City border and Visitacion Valley. Built in 1941, the Cow Palace currently houses the rodeo, circus, boat show, dog show, and a wide variety of events. The San Francisco Warriors played at the Cow Palace from 1962 to 1964 and again from 1966 to 1971.	The Cow Palace is under control of 1-A District Agricultural Association, a State agency of the California Department of Food and Agriculture's Division of Fairs and Expositions, and it is within the City of Daly City's jurisdiction. This site is less well served by Muni and regional transit. Transportation and associated air quality and noise impacts would likely be the same or potentially more severe than those under the proposed project. Due to its remote location, this site would not meet the

TABLE 7-28 (Continued)
ALTERNATIVE LOCATIONS CONSIDERED BUT REJECTED

Alternative Location	Description	Reason for Rejection
Cow Palace (cont.)		project objectives to locate the event center within walking distance to local and regional transit hubs. This site would have no advantages over the proposed site with respect to avoiding or lessening significant environmental impacts. It is unknown if the project sponsor could reasonably be able to acquire, control, or otherwise have access to the Cow Palace site for the purpose of pursuing such alternative location.
On top of the new Transbay Terminal	Downtown San Francisco, roughly bounded by Mission, Howard, Beale and Second Streets.	This alternative location is technically infeasible, because an event center has not been incorporated into the design and approval of the Transbay Terminal, which is currently under construction. Even if the development of an event center on top of another structure were to be technically feasible, the project sponsor would not reasonably be able to acquire, control, or otherwise have access to this site for the purpose of pursuing such alternative location.
Land beneath the northern section of Interstate 280 (I-280) should it be demolished (King Street Caltrain yard and railroad right-of-way north of the Mariposa exit)	The Planning Department is currently conducting the Railyard Alternatives and I-280 Boulevard Feasibility Study (RAB) to study transportation and land use alternatives within southeast San Francisco. The RAB is made up of five distinct components of analysis: (1) Reconfigure and/or relocate portions of the Fourth/King railyard storage and maintenance functions (service to Fourth/King would remain) (2) Verify and/or potentially modify the proposed Downtown Rail Extension, (3) Create a loop track out of the east side of the Transbay Transit Center, (4) Replace the elevated portion of I-280 north of Mariposa or 16th Streets with a surface boulevard, similar to The Embarcadero or Octavia Boulevard, including improved circulation and connections throughout the area, and (5) Create opportunities for new public spaces, housing, and jobs at the Railyard and along the freeway/rail alignment between Townsend and Mariposa Streets, including the potential to raise additional revenue to realize the transportation infrastructure. The Phase I feasibility assessment of options for each of the components is currently underway, and the Phase II alternatives development phase will focus on developing and defining alternatives from those options. A substantial amount of additional discussion and analysis is	This site is currently unavailable and will not be in the foreseeable future. Furthermore, the project sponsor would not reasonably be able to acquire, control, or otherwise have access to this site for the purpose of pursuing such alternative location.

TABLE 7-28 (Continued)
ALTERNATIVE LOCATIONS CONSIDERED BUT REJECTED

Alternative Location	Description	Reason for Rejection
Land beneath the northern section of Highway 280 should it be demolished (King Street Caltrain yard and railroad right-of-way north of the Mariposa exit) (cont.)	required before the details of the feasibility and potential design and removal of I-280 and construction of California's planned high-speed rail network and related components within San Francisco are developed to a level at which that project's effects on the transportation system in Mission Bay could be understood. Funding has not been secured to study these identified options beyond the Phase II alternatives development phase, or to undertake or implement any aspect of this project.	

CHAPTER 8
Third Street Plaza Variant

8.1 Overview

The GSW Arena LLC (GSW), as the project sponsor, has requested that this SEIR include environmental analysis of a variant to the proposed project described and analyzed in Chapters 3 and 5, respectively. The project variant, the Third Street Plaza Variant, is a minor variation of the proposed project at the same project site at Mission Bay Blocks 29-32, with all of the same objectives, background, and development controls, and with one exception, same approvals as the proposed project. The Third Street Plaza Variant is analyzed in this SEIR at an equal level of detail as the proposed project, and therefore the variant analysis satisfies all California Environmental Quality Act (CEQA) requirements, should this variant be selected for approval. It should be noted that the variant also serves as an alternative to the proposed project, because it would meet all of the project objectives, and as described below, would lessen or avoid a significant environmental impact of the project. Please see Chapter 7 of this SEIR for the description and analysis of all other CEQA alternatives.

The University of California, San Francisco (UCSF) currently maintains a view easement on the project site that extends 100 feet in length east from the Third Street right-of-way, and 68.75 feet in width along the Campus Way axis. As discussed in Chapter 3, Project Description, approval from the University of California would be required under the proposed project to vacate this on-site view easement. The Third Street Plaza Variant was developed with the goal of accommodating the proposed project design to the extent feasible while meeting the *Adjacent Parcels Design Standards*[1] of the view easement. Accordingly, this variant avoids any above-grade structural development within the boundary of the on-site UCSF view easement, with the exception of certain features allowed by the standards, as described below.

Section 8.2 presents the project variant characteristics; and Section 8.3 presents the environmental impacts of the project variant.

1 Amended and Restated Declaration and Agreement of Covenants, Conditions and Restrictions for the UCSF Mission Bay Campus dated 6/24/99, and recorded 7/19/99 as Instrument No. 99-G622193-00.

8.2 Third Street Plaza Variant Description

Under the Third Street Plaza Variant, all aspects of design, uses, programming, construction, and operation would be identical to that of the proposed project with one exception: the area of the proposed Third Street Plaza would be modified to be consistent with the design standards of the UCSF view easement on the project site. Consequently, the area of the project site within the view easement would be part of a proposed at-grade "Main Lower Plaza" with no above-grade structural development (i.e., there would be no elevated plaza or "gatehouse" building within the view easement as is proposed under the project). **Figure 8-1** presents a proposed conceptual site plan for the variant; **Figure 8-2** presents a west building elevation for the variant, looking east from Third Street. The Main Lower Plaza would contain a large open paved area for passive recreational use. The Main Lower Plaza would also contain appropriate subgrade utilities and design features to allow for a variety of temporary alternate at-grade uses, such as an ice rink, basketball court, and/or movie seating.

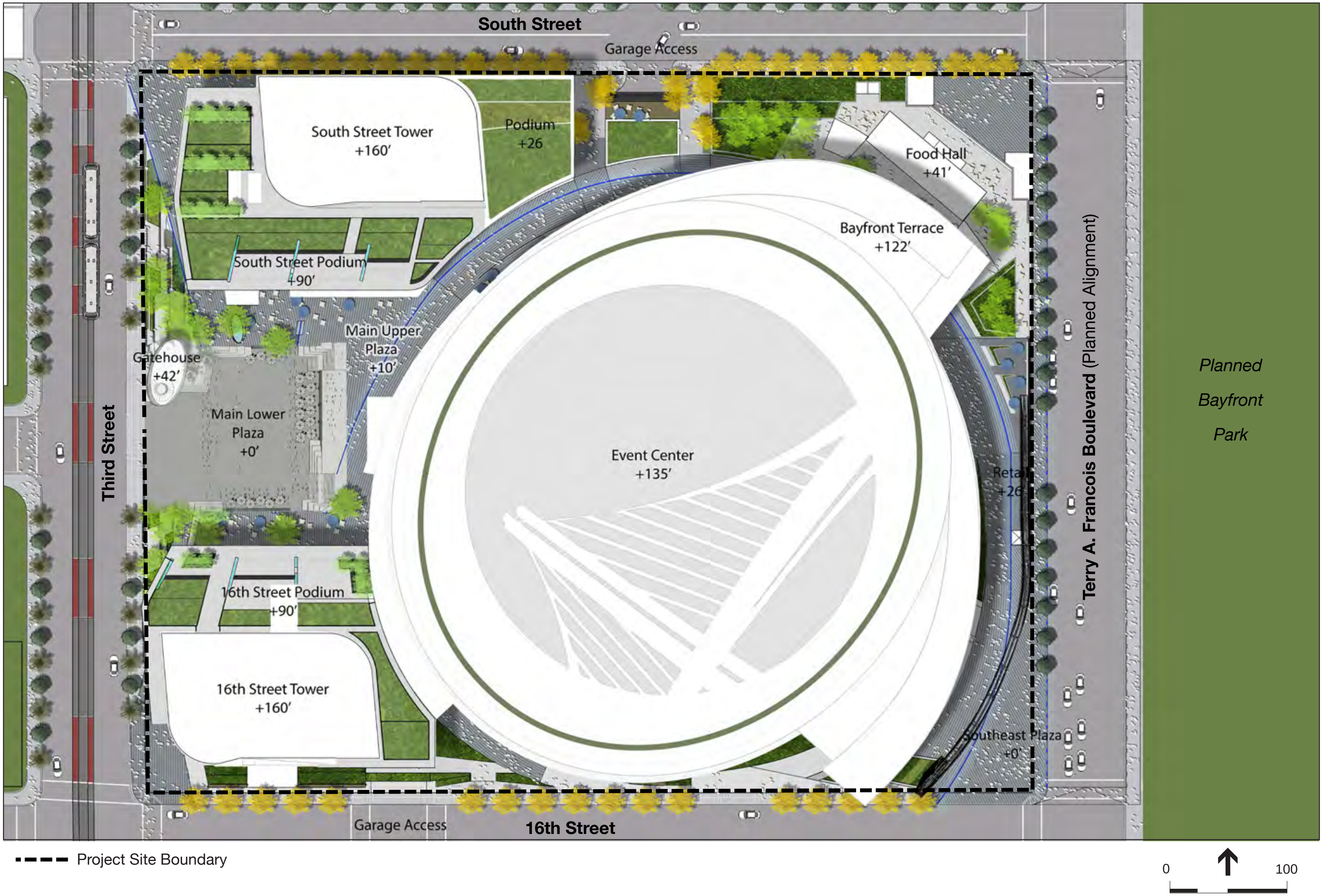
The gatehouse building along Third Street that is included in the proposed project would be relocated to the north, outside the view easement, just off the northwest corner of the variant's Main Lower Plaza. The gatehouse building for the variant would also be smaller in size than the gatehouse building for the proposed project (4,150 gsf vs. 11,550 gsf), although it would be four feet taller (42 feet agl vs. 38 feet agl).[2]

An elevated plaza ("Main Upper Plaza") would extend around the outside of the north, east and south boundaries of the Main Lower Plaza. Several stairways and a series of landscaped terraces would provide pedestrian access, seating, and a visual transition between the Main Lower Plaza and Main Upper Plaza. The Main Upper Plaza, similar to the elevated plaza of the proposed project, would provide pedestrian access to the main event center entrance, the plaza entrances of the office and retail buildings, and the event center exterior perimeter walkways.

Similar to the proposed project, the variant would provide three levels of enclosed, on-site parking (two below grade: Lower Parking Levels 1 and 2, and one at street level: Upper Parking Level). However, because the variant would contain a smaller elevated plaza in which to enclose parking on the Upper Parking Level, it would provide less total on-site parking than the proposed project (875 to 900 parking spaces under the variant vs. 950 parking spaces under the proposed project, or 50 to 75 fewer parking spaces). As under the proposed project, the sponsor would also use 132 existing off-site parking spaces in the 450 South Street parking garage to provide additional parking to serve the project employees. Proposed on-site loading spaces of the variant would be identical to that of the proposed project.

All other respects of the Third Street Plaza Variant design would be the same as the proposed project, including meeting LEED® Gold standards; total building square footage; number of above- and below-grade levels; building shapes, heights and massing; event center seating

[2] Heights at the gatehouse building's sloping roof peak.



SOURCE: Manica Architecture, 2015

Note: All building elevations were estimated per *Mission Bay South Design for Development* guidelines; please see text for additional description.

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Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 8-1
Third Street Plaza Variant Conceptual Site Plan

capacity; open space area; pedestrian, bicycle and vehicle facilities and access points; pervious/impervious surfaces; and utilities. All operational aspects of the Third Street Plaza Variant would also be the same as those for the proposed project, including annual number, type and timing of games/events at the event center, site employment, and proposed implementation of a Transportation Management Plan. Moreover, proposed construction characteristics would be the same as the proposed project, including proposed depth of construction, construction techniques, construction equipment, construction employment, and construction duration.

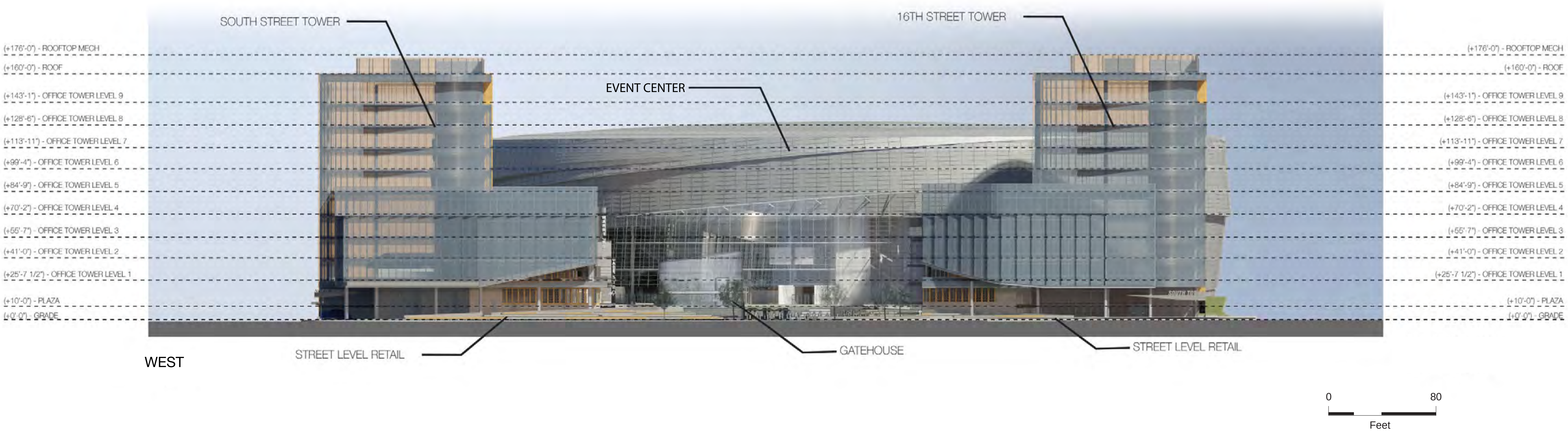
8.3 Impact Evaluation

In essentially all respects, the Third Street Plaza Variant would have the same environmental impacts as those identified for the proposed project in the Initial Study (Appendix NOP-IS) and in Chapters 4 and 5 of this SEIR. The environmental analyses contained and focused out in the Initial Study—Land Use, Aesthetics, Population and Housing, Cultural and Paleontological Resources, Recreation, Biological Resources, Geology and Soils, Hazards/Hazardous Materials, Mineral/Energy Resources, and Agricultural and Forest Resources—apply identically to the Third Street Plaza Variant as they do to the proposed project because the minor design modifications at the Third Street Plaza would not affect any of the identified effects on these resource areas. All identified mitigation measures identified for the proposed project would also apply to the Third Street Plaza Variant. Therefore, no further analyses of these topics is required.

The discussion in Chapter 4, Plans and Policies, also applies to the Third Street Plaza Variant the same as it does to the proposed project because, again, the minor design modifications at the Third Street Plaza would not alter the discussion of consistency with applicable plans and policies. The same design and development controls identified for the proposed project would apply to the variant. When compared to the proposed project, the minor design modifications under the variant would not affect the design controls related to height, towers, bulk, streetwalls, setback, parking, or loading. Therefore, Chapter 4, Plans and Policies, also applies to the Third Street Variant, and no further discussion is required.

Furthermore, the impact analyses in Chapter 5 with respect to Noise and Vibration, Air Quality, Greenhouse Gas Emissions, Shadow, Utilities and Service Systems, Public Services, and Hydrology and Water Quality also apply identically to the Third Street Plaza Variant as they do to the proposed project, and the same mitigation and improvement measures apply. The minor design modifications associated with the Third Street Plaza Variant would not change any of the underlying assumption used in the impact analyses for these resource areas. All assumptions, conditions, setting, impacts, and mitigation measures would be the exactly the same as those identified in Chapter 5 for all of these resource areas, and therefore, all of these sections of Chapter 5 also applies to the Third Street Plaza Variant, and no further discussion is required.

Chapter 5, Section 5.2, Transportation and Circulation also applies to the Third Street Plaza Variant with respect to all aspects of the setting, approach to analysis, impacts, and mitigation and improvement measures. None of the minor design modifications would affect the assumptions used for analyses of traffic, transit, loading, emergency access, or helipad safety



SOURCE: Manica Architecture, 2015

Note: • All building elevations were estimated per *Mission Bay South Design for Development* guidelines; please see text for additional description.

• These drawings show massing for the proposed development, but are not intended to show ideas for building facades, skin or materials

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Figure 8-2

Third Street Plaza Variant West Elevation

For informational purposes/reference only

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under any of the scenarios analyzed. While the modified design of the Main Plazas could result in minor changes to pedestrian and bicycle access to the site from the west side, none of these changes would substantially affect the impact analyses and significance determinations for pedestrians and bicyclists presented in Section 5.2 and no further analysis is required.

The only substantive change in the Third Street Plaza Variant design relevant to the Transportation and Circulation section would be the reduction of on-site parking spaces by 50 to 75 spaces. The reduction in parking supply may result in some drivers seeking parking in other nearby parking facilities, or on-street, during the midday period when parking demand peaks. This effect, however, would not substantially affect the intersection analysis for the analysis hours because the travel paths to the nearby parking facilities (e.g., 450 South Street, UCSF Third Street Garage) would be similar (e.g., 450 South Street, UCSF Third Street garage).

The reduction in parking supply would result in the parking demand exceeding the variant parking supply during the weekday midday period for the No Event, Convention Event, and Basketball Game event. By contrast, the proposed project would result in the parking demand exceeding the proposed project parking supply during the weekday midday period for the Convention Event scenario. During the weekday midday period the unmet parking demand would be between 17 and 42 spaces for the No Event scenario (compared to none for the proposed project), would be between 874 and 899 for the Convention Event scenario (compared to 824 for the proposed project), and would be between 40 and 65 for the Basketball Game scenario (compared to none for the proposed project). In addition, during the weekday and Saturday evenings, the on-site unmet parking demand would increase for the Basketball Game scenario by 50 to 75 spaces. The parking demand that would not be met within the on-site supply would be accommodated in other off-street parking facilities in the study area or in on-street spaces, and would not substantially affect areawide parking conditions. See **Appendix TR**. Parking information is presented for informational purposes, since consistent with SB 743 (see Chapter 2, Introduction), parking effects are not considered significant impacts under CEQA for the proposed project or the variant.

Therefore, the only resource area with potentially different environmental effects from the proposed project is Wind, discussed below. Please see Chapter 5, Section 5.6, for a description of the existing wind conditions and the significance criterion and methodology used in the impact analysis below.

Wind

This section of the SEIR analyzes potential wind impacts that could occur as a result of the proposed variant. The analyses in this section are based in part on a wind study prepared by Rowan Williams Davies & Irwin Inc. (RWDI)[3] (see Appendix WS).

3 Rowan Williams Davies & Irwin Inc., *Warriors Arena, San Francisco California, Pedestrian Wind Study*, May 15, 2015.

Significance Threshold

As with the project, the variant would have a significant impact related to wind if it were to:

- Alter wind in a manner that substantially affects public areas.

City Planning Code Section 148's wind standards provide an appropriate methodology and criteria for the analysis of wind effects in the Plan area. Consequently, for the purposes of CEQA review, an exceedance of the Planning Code's wind hazard criterion is used in this SEIR as the standard for determining whether the project would alter pedestrian winds in a manner that would substantially alter public areas. Wind effects on on-site publically accessible areas are not considered a significance threshold.

Wind Hazards at Off-site Public Areas

Impact V-WS-1: The variant would not alter wind in a manner that would substantially affect off-site public areas. (Less than Significant)

The proposed variant would include development of an event center, office and retail buildings, and other structures that would have the potential to alter winds off-site, including at pedestrian use areas such as public walkways and public open space in the variant vicinity.

A wind tunnel test was conducted to define the pedestrian wind environment that currently exists, and to determine future wind conditions on public use areas around the variant site with implementation of the variant. **Table 8-1** presents the wind analysis results, namely the 10 percent exceeded equivalent wind speeds and the number of hours per year the wind hazard criterion would be exceeded at 46 off-site study test points located on public walkways along the site perimeter and vicinity for the existing and existing-plus-variant wind scenarios. **Figure 8-3** presents a map showing the location of the off-site wind test points, including the location of wind hazards for the existing-plus-variant scenario.

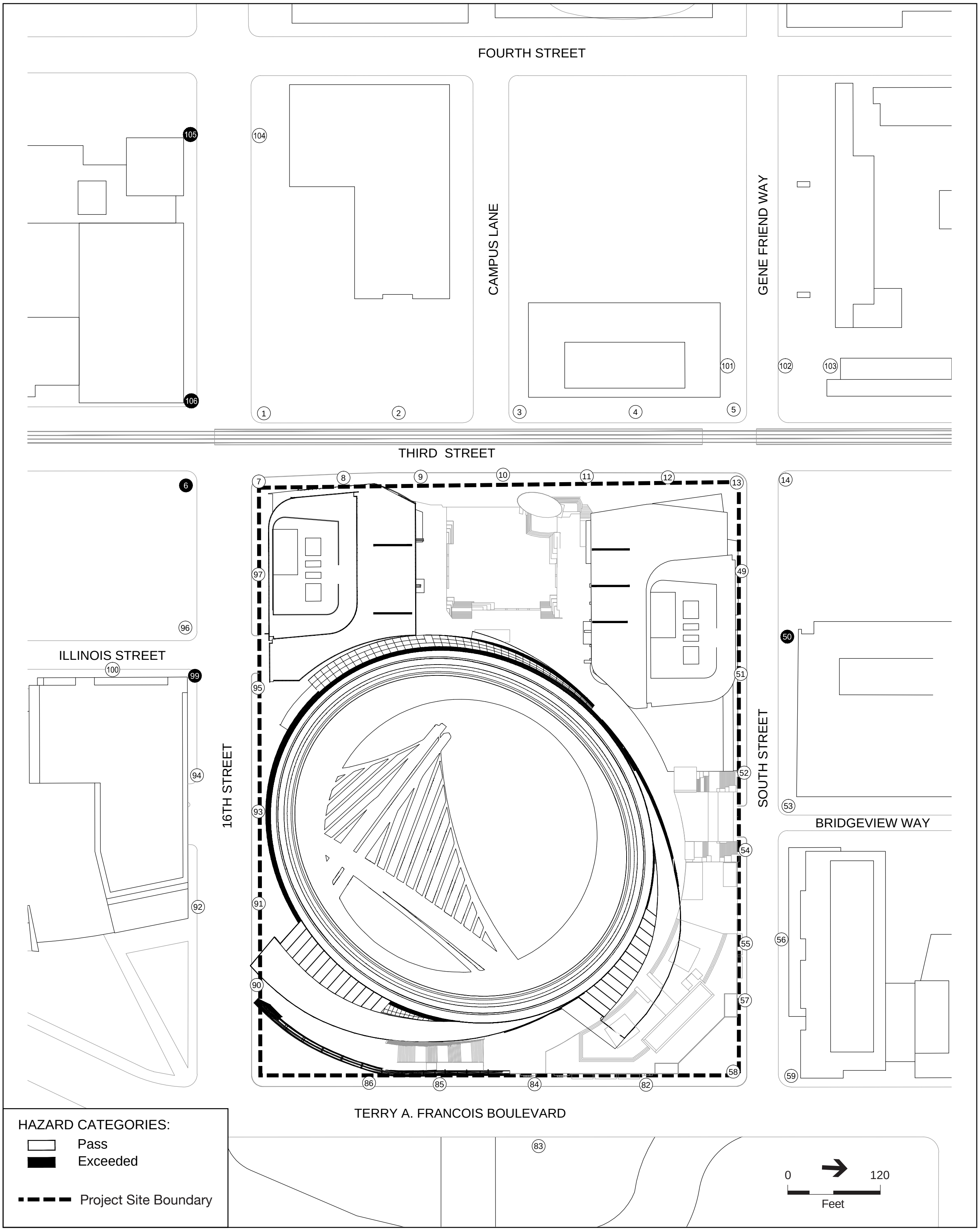
Existing Wind Hazard Conditions. Under existing conditions, the wind hazard criterion is exceeded at seven test locations on public walkways in the project vicinity. Currently, five test locations with wind hazards occur along 16th Street at test points adjacent to, across the street from, or upwind of the project site, one wind hazard location occurs along Gene Friend Way upwind of the project site, and one wind hazard location occurs on South Street adjacent to the project site. The total duration of the existing wind hazards at the seven locations on public walkways in the project vicinity is 106 hours per year, with 101 of those hours occurring at the five test points along 16th Street.

Existing-Plus-Variant Wind Hazard Conditions at Off-site Public Use Areas. Development of the variant would alter wind speeds among individual study test points at off-site public walkways. Under existing-plus-variant conditions, the total net number of off-site study test points at which wind speed would exceed the wind hazard criterion would be reduced from seven to five. There would also be a net decrease in the total duration of wind hazards on the off-site public walkways in the variant vicinity, decreasing from 106 hours per year under existing conditions to 92 hours per year under existing-plus-variant conditions (a decrease of 14 hours per year).

INSERT TABLE 8-1
EXISTING PLUS VARIANT WIND HAZARD CONDITIONS

VARIANT WIND HAZARD ANALYSIS - OFF-SITE STUDY POINTS

References		Existing			Variant			
Wind Test Location Number	Wind Hazard Criterion Speed miles/hour	1-hr./yr. Equivalent Wind Speed miles/hour	Wind Hazard Criterion Exceeded, hours/year	Source	1-hr./yr. Equivalent Wind Speed miles/hour	Wind Hazard Criterion Exceeded, hours/year	Hazard Hours Relative to Existing	Source
1	36	41	13	**e**	28		-13	**-**
2	36	28			22			
3	36	22			18			
4	36	14			19			
5	36	36			28			
6	36	36			42	22	22	**p**
7	36	39	6	**e**	34		-6	**-**
8	36	35			24			
9	36	29			29			
10	36	24			26			
11	36	15			27			
12	36	24			24			
13	36	33			27			
14	36	30			29			
49	36	31			20			
50	36	35			39	3	3	**p**
51	36	34			33			
52	36	31			28			
53	36	23			27			
54	36	38	3	**e**	26		-3	**-**
55	36	29			23			
56	36	22			26			
57	36	30			22			
58	36	19			23			
59	36	21			17			
82	36	31			23			
83	36	31			27			
84	36	34			20			
85	36	31			25			
86	36	32			23			
90	36	29			20			
91	36	34			24			
92	36	32			20			
93	36	31			27			
94	36	29			18			
95	36	35			24			
96	36	29			30			
97	36	34			21			
99	36	40	8	**e**	41	17	9	**p**
100	36	22			20			
101	36	32			27			
102	36	35			31			
103	36	37	1	**e**	34		-1	**-**
104	36	33			30			
105	36	45	70	**e**	42	43	-27	**e**
106	36	39	5	**e**	40	7	2	**p**
Ave 1-hr. Equivalent Wind Speed		**30.7**			**26.7**			
Total Hours Winds Exceeds Criterion			**106**			**92**	**-14**	
Total Exceedances:		**Total:**	**7**			**Total:**	**5**	
Subtotals by type:		*Existing*	7	**e**		*Existing*	1	**e**
						New, or increased time	4	**p**
						New, at new location	0	**n**
						Eliminated by Project	4	**-**



SOURCE: RWDI, 2015

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Figure 8-3

Existing Plus Third Street Variant Wind Hazard Conditions

When considering individual wind test points, the variant would result in the following changes to the wind environment in the variant vicinity compared to existing conditions (see Figure 8-2 for test point locations):

- Create new exceedances of the wind hazard criterion at two test points: at the southeast corner of Third Street and 16th Street (Test Point No. 6: 22 hours per year); and on the north side of South Street between Third Street and Bridgeview Way across from the project site (Test Point No. 50: 3 hours per year);
- Increase the duration of two existing wind hazard exceedances: at the southeast corner of 16th Street and Illinois Street (Test Point No. 99: 9 hour increase per year); and at the southwest corner of Third Street and 16th Street (Test Point No. 106: 2 hour increase per year);
- Decrease the duration of one existing wind hazard: on 16th Street between Third and Fourth Streets (Test Point No. 105: 27 hour decrease per year); and
- Eliminate four existing exceedances of the wind hazard criterion: at the northwest corner of Third Street and 16th Street (Test Point No. 1: 13 hours eliminated per year); at the northeast corner of Third Street and 16th Street (Test Point No. 7: 6 hours eliminated per year); on South Street adjacent to the site (Test Point No. 54: 3 hours eliminated per year); and on Gene Friend Way adjacent to UCSF Hearst Tower (Test Point No. 103: 1 hour eliminated per year).

It should be noted that the wind test results indicate that under existing-plus-variant conditions, no wind hazard exceedances would occur on public walkways located on the east side of the project site. Given that the planned Bayfront Park is located even further east, it can also be inferred from the wind test data that the variant would not cause a new wind hazard within the planned Bayfront Park.

In summary, the variant would result in a net decrease in the total duration of the wind hazard exceedance at off-site public walkways in the variant vicinity. Consequently, the variant would not alter wind in a manner that would substantially affect off-site public areas, and accordingly, the impact would be less than significant and no mitigation would be required.

Mitigation: Not required.

Comparison of Variant Impact V-WS-1 to Proposed Project Impact WS-1

As discussed in Section 5.6, in Impact WS-1, the project would result in a net increase in the total duration of the wind hazard exceedance at off-site public walkways in the project vicinity. Consequently, the project would alter wind in a manner that would substantially affect off-site public areas, and accordingly, Impact WS-1 would be significant. Mitigation Measure M-WS-1 in Section 5.6 identifies potential design measures that would serve to reduce or avoid related project wind hazards, however, given that the project design is not yet finalized, Impact WS-1 is conservatively identified as *significant and unavoidable with mitigation.* Since, as discussed in Impact V-WS-1 above, the variant wind hazard impacts would be less than significant with no mitigation required, the variant would avoid the significant wind hazard impact of the project.

Comparison of Impact V-WS-1 to Mission Bay FSEIR Impact Analysis

As discussed in Chapter 5, Section 5.6, under Summary of Impacts in the Mission Bay FSEIR, the Mission Bay FSEIR reported that proposed buildings 100 feet or higher could generate pedestrian-level wind effects, including increased wind speeds and turbulence. The Mission Bay FSEIR determined that with implementation of Mitigation Measure D.7, which required wind review, including wind tunnel testing, of proposed structures over 100 feet in height, and provided for design-specific analysis of wind hazards and a basis to incorporate design modifications to reduce significant wind hazards, that Mission Bay plan wind impacts would be less than significant.

Consistent with Mission Bay FSEIR Mitigation Measure D.7 (and the South Design for Development *Wind Analysis* standards), wind tunnel testing and analysis was conducted for the variant. As discussed above, variant wind hazard impacts at off-site public areas are determined be less than significant. As a result, the variant would not result in a substantially more severe significant wind impact than was previously identified in the Mission Bay FSEIR.

Supplemental Information – Variant Wind Hazard Effects at On-site Publically Accessible Areas of Substantial Pedestrian Use

The variant would include a variety of privately-owned, publically accessible on-site plazas and exterior walkways that would be located throughout and at varying elevations on the variant site. These proposed publically accessible areas on the variant site would experience wind effects resulting from proposed on-site development and surrounding off-site development in the project vicinity. On-site publically accessible areas that may be subject to periods of high pedestrian use, particularly prior to and following games/events at the event center, include the following:

- *Main Lower Plaza (0 feet el.), Main Upper Plaza (10 feet el.) and Approaches:* This area includes the Main Lower Plaza, the elevated Main Upper Plaza and adjacent on-site pedestrian approaches from Third Street. The primary entrance to the event center is accessed via these plazas.
- *Event Center North Side Pedestrian Path (10 to 26 feet el.):* This proposed walkway would serve as the primary pedestrian pathway around the north side of the event center, and would connect the Third Street Plaza with the bayfront overlook and Southeast Plaza. This proposed walkway would provide access to the secondary entrance to the event center for large events.
- *Event Center Southwest Side Pedestrian Path (0 to 10 feet el.):* This proposed walkway would provide pedestrian access around the southwest side of the event center, and provide access between 16th Street and the Third Street Plaza.
- *Southeast Plaza (0 feet el.)*: This proposed ground-level plaza would be located in the southeast corner of the project site. The primary entrance to the event center for smaller "theater" events, and the secondary entrance for large events, would be via this plaza.
- *Bayfront Overlook (26 feet el.):* This elevated area is located on the east side of the site adjacent to the event center and would overlook the Bay.

As discussed above, wind effects on on-site publically accessible areas are not considered a significance threshold. Nonetheless, project wind effects at on-site publically accessible areas that would be subject to substantial pedestrian use may be of interest to members of the public and to decision-makers, and are therefore presented herein for informational purposes. A discussion of potential wind effects at the on-site areas of substantial pedestrian use identified above is presented herein for informational purposes.

Other outdoor areas within the variant site that may offer private and/or public pedestrian access, include the office and retail building podium roofs (90 foot el.), the food hall roof (41-foot el.), and the event center bayfront terrace (pedestrian deck at approximate 100-foot el.). However, since the event center and/or office and retail building operators would have greater access control over these site areas so as to be able to restrict pedestrian access in the event of hazardous windy conditions, potential variant wind effects at these specific areas are not discussed further.

Under existing-plus-variant conditions, two on-site study test points at the proposed event center on the north side pedestrian path would exceed the wind hazard criterion, for a total of 24 hours per year. One of the Third Street approaches to Main Lower Plaza would also exceed the wind hazard criterion, for a total of 9 hours per year. No exceedances of the wind hazard criterion would occur at any of the other areas of substantial pedestrian use at the variant site.

Cumulative Impact— Wind

Wind Hazards at Off-site Public Areas

Impact V-C-WS-1: The variant, in combination with cumulative development, would not alter wind in a manner that would substantially affect off-site public areas. (Less than Significant)

Under cumulative conditions, past, present, and reasonably foreseeable future buildings 100 feet and taller within the variant vicinity would have the potential to result in localized wind effects that could be adverse. As part of the wind tunnel testing, one test was conducted to evaluate the pedestrian wind environment that would exist with the variant, in combination with reasonably foreseeable cumulative development, on public use areas around the variant site. In the immediate variant vicinity, this included assumed cumulative development on currently undeveloped portions of Blocks 27, 25, X3 and 33, located north, west, southwest and south of the variant site, respectively. Development of the undeveloped portions of these blocks is considered reasonably foreseeable. This scenario is consistent with the scenario used to analyze cumulative impacts for the proposed project.

Cumulative development would alter wind speeds among individual off-site study test points. The off-site wind hazards that would occur under cumulative-plus-variant conditions would be fewer than would occur under both existing conditions (reduced from 7 to 3) and existing-plus-variant conditions (reduced from 5 to 3). Furthermore, the duration of the wind hazards that would occur under cumulative-plus-variant conditions -23 hours – would be less than would occur under existing conditions (106 hours) and existing-plus-variant conditions (92 hours). Consequently, cumulative wind hazard impacts would be *less than significant*.

Mitigation: Not required.

Comparison of Impact WS-1 to Mission Bay FSEIR Impact Analysis. Consistent with Mission Bay FSEIR Mitigation Measure D.7 (and the South Design for Development *Wind Analysis* standards), wind tunnel testing and analysis was conducted for both variant and cumulative conditions. As discussed above, cumulative impacts of wind hazards at off-site public areas would be less than significant. Therefore, the variant would not result in any new or substantially more severe significant cumulative wind hazard impacts than those previously identified in the Mission Bay FSEIR.

Supplemental Information – Cumulative Wind Hazard Effects at On-site Publically Accessible Areas of Substantial Pedestrian Use

As discussed above, wind effects on on-site publically accessible areas are not considered a significance threshold; however, a discussion of potential cumulative wind effects at on-site areas of substantial pedestrian use is presented herein for informational purposes.

Under cumulative-plus-variant conditions, one on-site study test point on the event center north side pedestrian path would exceed the wind hazard criterion, for a total of 12 hours; however, this would be less than the total duration of the exceedances that would occur on this pedestrian path under existing-plus-variant conditions (24 hours). No exceedances of the wind hazard criterion would occur at any of the other areas of substantial pedestrian use at the variant site.

8.4 Other CEQA Issues and Alternatives

As indicated above, the impact analysis for the proposed project, with the exception of the Wind section, applies equally to the Third Street Plaza Variant. Therefore, in addition to the impact evaluation for the resource topics covered in Chapter 5, the discussion of other CEQA issues in Chapter 6 also applies to the variant; these topics include growth inducing impacts, significant and unavoidable impacts, effects found not to be significant, irreversible and irretrievable commitments of resources, and areas of known controversy and issues to be resolved. Furthermore, because implementation of the Third Street Plaza Variant would result in the same significant impacts as the proposed project—with the exception of the wind hazard impact as described above—the alternatives analysis presented in Chapter 7 of this SEIR also applies to the variant and no further analysis is required.

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Draft Subsequent Environmental Impact Report

EVENT CENTER AND MIXED-USE DEVELOPMENT AT MISSION BAY BLOCKS 29-32

Office of Community Investment and Infrastructure Case No. ER 2014-919-97
San Francisco Planning Department Case No. 2014.1441E
State Clearinghouse No. 2014112045

Draft SEIR Publication Date: June 5, 2015
Draft SEIR Public Hearing Date: June 30, 2015
Draft SEIR Public Comment Period: June 5, 2015 – July 20, 2015

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and INFRASTRUCTURE

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Draft Subsequent Environmental Impact Report

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APPENDIX NOP-IS

Notice of Preparation and Initial Study

Office of Community Investment and Infrastructure
(Successor to the San Francisco Redevelopment Agency)

One South Van Ness Avenue
San Francisco, CA 94103
415.749.2400

126-0822014-000

NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT

Date:	November 19, 2014
Case No.:	Office of Community Investment and Infrastructure (OCII): ER 2014-919-97 Planning Department: 2014.1441E
Project Title:	**Event Center and Mixed-Use Development at Mission Bay Blocks 29-32**
Zoning:	MB-RA; Mission Bay South Redevelopment Plan – Commercial/Industrial/ Retail Designation; Design for Development for the Mission Bay South Project Area Height Zone 5
Block/Lot:	Mission Bay South Redevelopment Plan Blocks 29-32; Assessor's Block 8722, Lots 001 and 008
Blocks Size:	Mission Bay Blocks 29-32: Approximately 11 acres
Project Sponsor:	GSW Arena LLC David Kelly (510) 986-2200 dkelly@warriors.com
Lead Agency:	OCII
Staff Contact:	Catherine Reilly, OCII – (415) 749-2516 catherine.reilly@sfgov.org

PROJECT DESCRIPTION

GSW Arena LLC (GSW), an affiliate of Golden State Warriors, LLC, which owns and operates the Golden State Warriors National Basketball Association (NBA) team, proposes to construct a multi-purpose event center and a variety of mixed uses, including office, retail, open space and structured parking on an approximately 11-acre site (Blocks 29-32) within the Mission Bay South Redevelopment Plan Area of San Francisco. The project site is bounded by South Street on the north, Third Street on the west, 16th Street on the south, and by the future planned realigned Terry A. François Boulevard on the east. The proposed event center would host the Golden State Warriors basketball team during the NBA season, as well as provide a year-round venue for a variety of other uses, including concerts, family shows, other sporting events, cultural events, conferences and conventions. GSW has entered into an agreement to purchase the project site from the current site owner, an affiliate of salesforce.com. The project is subject to review under the California Environmental Quality Act (CEQA) and a number of local and state approvals.

FINDING

This project may have a significant effect on the environment and a Subsequent Environmental Impact Report (SEIR) is required. This determination is based upon the criteria of the State CEQA Guidelines, Sections 15063 (Initial Study), 15064 (Determining Significant Effect), and 15065 (Mandatory Findings of Significance), and for the reasons documented in the Environmental Evaluation (Initial Study) for the project, which is attached.

PUBLIC SCOPING PROCESS

The Office of Community Investment and Infrastructure (OCII) will hold a PUBLIC SCOPING MEETING on Tuesday, December 9, 2014, at 6:30 p.m. at the Mission Creek Senior Community, 225 Berry Street, Second Floor Cafeteria, San Francisco. The purpose of this meeting is to receive comments to assist the OCII in reviewing the scope and content of the environmental impact analysis and information to be contained in the SEIR for the project. To request a language interpreter or to accommodate persons with disabilities at the scoping meeting, please contact the staff listed above at least 72 hours in advance of the meeting. Written comments will also be accepted until 5:00 p.m. on December 19, 2014. Written comments should be sent to Tiffany Bohee, OCII Executive Director c/o Brett Bollinger, San Francisco Planning Department, 1650 Mission Street, Suite 400, San Francisco, CA 94103, or by email to warriors@sfgov.org.

If you work for a responsible State agency, we need to know the views of your agency regarding the scope and content of the environmental information that is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency may need to use the SEIR when considering a permit or other approval for this project. Please include the name of a contact person in your agency.

Members of the public are not required to provide personal identifying information when they communicate with the OCII Commission, OCII or the Planning Department. All written or oral communications, including submitted personal contact information, may be made available to the public for inspection and copying upon request and may appear on the OCII or Planning Department's website or in other public documents.

11-17-14
Date

Tiffany Bohee
Executive Director
Office of Community Investment and Infrastructure

INITIAL STUDY

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32
Office of Community Investment and Infrastructure Case No. ER 2014-919-97
Planning Department Case No. 2014.1441E

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List of Abbreviations and Acronyms

1990 FEIR	Mission Bay Final Environmental Impact Report
ABAG	Association of Bay Area Governments
AB 26	California Assembly Bill 26
AB 32	California Global Warming Solutions Act (California Assembly Bill 32)
AB 939	California Integrated Waste Management Act of 1989 (California Assembly Bill 939)
AB 900	California Assembly Bill 900
AB 1484	California Assembly Bill 1484
ATCM	Airborne Toxic Control Measure
BAAQMD	Bay Area Air Quality Management District
BMPs	best management practices
Btu	British thermal units
CCSF	City and County of San Francisco
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CMP	Congestion Management Program
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRHR	California Register of Historical Resources
CSC	California Species of Concern
CSD	combined sewer discharges
CSO	combined sewer overflow
CWA	Federal Clean Water Act
cy	cubic yards
DPH	San Francisco Department of Public Health
DBI	San Francisco Department of Building Inspection
DPW	San Francisco Department of Public Works
EIR	Environmental Impact Report
FARR	Final Archaeological Resources Report
FTE	full-time equivalent

GHGs	Greenhouse gases
gsf	gross square feet
GSW	Golden State Warriors Arena, LLC
HEPA	High Efficiency Particulate Air Filter
HMBP	hazardous materials business plan
I-280	Interstate 280
I-80	Interstate 80
kWh	kilowatt-hours
LEED®	Leadership in Energy and Environmental Design
mgd	million gallons per day
LRDP	Long Range Development Plan
Mission Bay FEIR	Mission Bay Final Environmental Impact Report
Mission Bay FSEIR	Mission Bay Final Subsequent Environmental Impact Report
Mission Bay TMA	Mission Bay Transportation Management Association
MMcf	million cubic feet
MMRP	Mitigation Monitoring and Reporting Program
MLD	Most Likely Descendant
Muni	San Francisco Municipal Railway
NAHC	Native American Heritage Commission
NAVD88	North American Vertical Datum of 1988
NBA	National Basketball Association
NIH	National Institutes of Health
NOP	Notice of Preparation
North Design for Development	Design for Development for the Mission Bay North Project Area
North Plan	Mission Bay North Redevelopment Plan
North Plan Area	Mission Bay North Redevelopment Plan Area
NWIC	Northwest Information Center
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
OCII	Office of Community Investment and Infrastructure
OPA	Owners Participation Agreement
OPR	Governor's Office of Planning and Research
PDA	Priority Development Area

PDR	Production, Distribution, and Repair
Port	Port of San Francisco
RMP	Risk Management Plan
RRMP	Revised Risk Management Plan
ROSE	San Francisco General Plan Recreation and Open Space Element
RWQCB	Regional Water Quality Control Board
SB 743	California Senate Bill 743
Secretary's Standards	Secretary of the Interior's Standards for the Treatment of Historic Properties
SEWPCP	Southeast Water Pollution Control Plant
SEIR	Subsequent EIR
sf	square feet
SFD	San Francisco City Datum
SFPUC	San Francisco Public Utilities Commission
SFFD	San Francisco Fire Department
SFMTA	San Francisco Municipal Transportation Agency
SFUSD	San Francisco Unified School District
SHPO	State Historic Preservation Officer
SoMa	South of Market
South Design for Development	Design for Development for the Mission Bay South Project Area
South Plan	Mission Bay South Redevelopment Plan
South Plan Area	Mission Bay South Redevelopment Plan Area
SVP	Society of Vertebrate Paleontology
SWL	Seawall Lot
SWPPP	Stormwater Pollution Prevention Plan
TACs	toxic air contaminants
TMP	Transportation Management Plan
TSP	Transit Service Plan
UCMP	University of California Museum of Paleontology
UCSF	University of California at San Francisco
U.S. 101	U.S. Highway 101
USFWS	United States Fish and Wildlife Service
UWMP	Urban Water Management Plan
WAS	Water Availability Study

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INITIAL STUDY

Event Center and Mixed-Use Development at Mission Bay Block 29-32
Office of Community Investment and Infrastructure Case No. ER 2014-919-97
Planning Department Case No. 2014.1441E

A. PROJECT DESCRIPTION

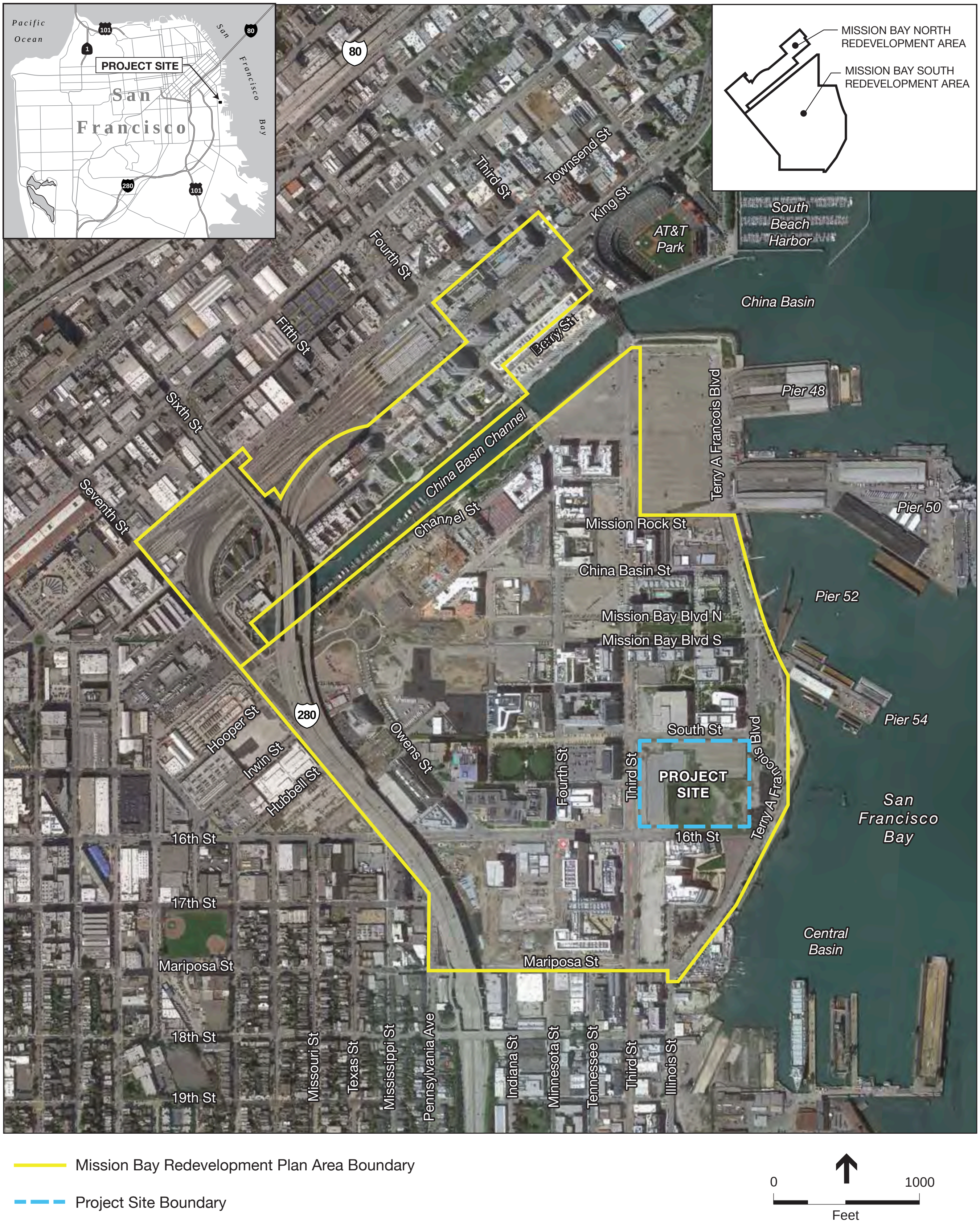
A.1 Overview

GSW Arena LLC (GSW), an affiliate of Golden State Warriors, LLC, which owns and operates the Golden State Warriors National Basketball Association (NBA) team, proposes to construct a multi-purpose event center and a variety of mixed uses, including office, retail, open space and structured parking on an approximately 11-acre site (Blocks 29-32) within the Mission Bay South Redevelopment Plan Area of San Francisco (see **Figure 1** for aerial photograph and **Figure 2** for existing roadway network in Mission Bay). The project site is bounded by South Street on the north, Third Street on the west, 16th Street on the south, and by the future planned realigned Terry A. François Boulevard on the east. The proposed event center would host the Golden State Warriors basketball team during the NBA season, as well as provide a year-round venue for a variety of other uses, including concerts, family shows, other sporting events, cultural events, conferences and conventions. GSW has entered into an agreement to purchase the project site from the current site owner, an affiliate of salesforce.com. The project is subject to review under the California Environmental Quality Act (CEQA) and a number of local and state approvals.

Development is allowed within the Mission Bay South Redevelopment Plan Area, including Blocks 29-32, consistent with the land use program and subject to the development controls of the *Mission Bay South Redevelopment Plan*, *Mission Bay South Design for Development*, and other related documents (see *Background*, below). No amendment to the South Plan would be required, although the proposed project at Blocks 29-32 would require certain amendments and/or variations to other documents.

The *Mission Bay Final Subsequent Environmental Impact Report* (Mission Bay FSEIR), certified in September 1998, is a program EIR under CEQA Guidelines 15168 and a redevelopment plan EIR under CEQA Guidelines 15180 (see *Background*, below). The Mission Bay FSEIR analyzed the environmental impacts associated with the development program proposed for the entire plan area, including the program under the Mission Bay South Redevelopment Plan, which includes Blocks 29-32. Thus, under CEQA, the proposed project at Blocks 29-32 is considered a subsequent activity under the Mission Bay South Redevelopment program, and this Initial Study evaluates the environmental effects of the proposed project relative to the certified Mission Bay FSEIR.

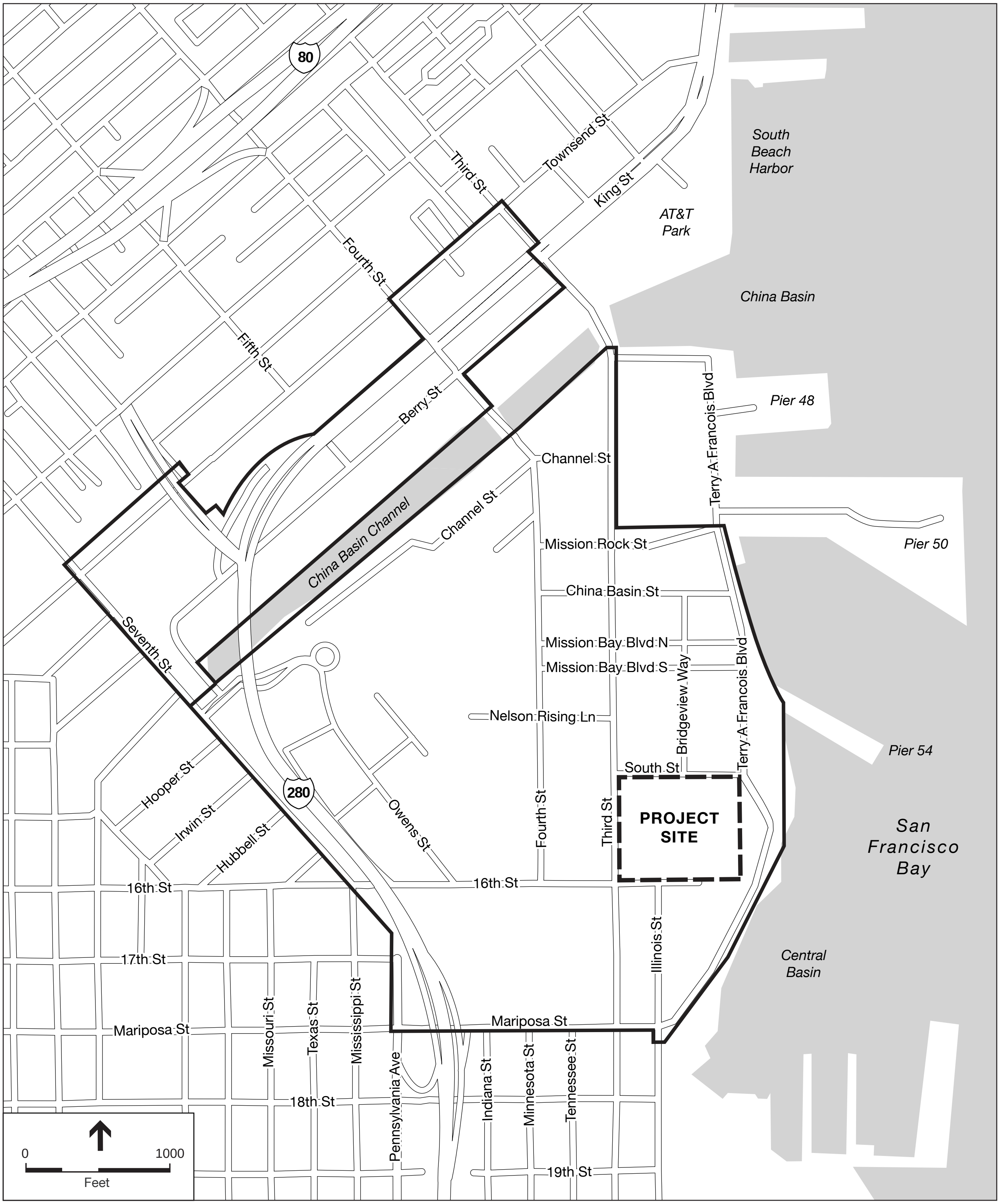
This Initial Study is prepared in accordance with the CEQA Guidelines Section 15063, which provides for preparation of an initial study to determine if a project may have a significant effect on the environment, and with CEQA Guidelines Section 15168(c), which provides for subsequent activities in a program to be examined in the light of a previously certified program EIR. The City's Office of Community Investment and Infrastructure (OCII) is the CEQA lead agency for this project, and has entered into an agreement with the San Francisco Planning Department, Environmental Planning Division, to assist in the preparation of the related environmental review documents.



SOURCE: Google Maps, ESA, 2014

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 1
Aerial Photograph of Mission Bay



Mission Bay Redevelopment Plan Area Boundary

Project Site Boundary

SOURCE: ESA, 2014

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 2
Existing Roadway Network in Mission Bay

This Initial Study, consistent with CEQA Guidelines Sections 15063(b)(1)(C) and 15168(d)(1), provides documentation to determine which of the project's effects were adequately examined in the Mission Bay FSEIR and which topics warrant more detailed environmental analysis (see Section D, Approach to Analysis, below). The topics which warrant more detailed environmental analysis are those that implementation of the proposed project could result in either new significant effects or substantially more severe impacts than were previously identified in the Mission Bay FSEIR. For these topics, a focused environmental impact report (EIR) will be prepared; the focused EIR will be a Subsequent EIR (SEIR) per CEQA Guidelines Section 15162.

A.2 Background

Mission Bay South Redevelopment Plan Approval Process and Prior Environmental Review

On August 23, 1990, the San Francisco Board of Supervisors certified the *Mission Bay Final Environmental Impact Report* (the "1990 FEIR").[1] The 1990 FEIR assessed the development program that was ultimately adopted as the *Mission Bay Plan, an Area Plan of the San Francisco General Plan*. In 1996-97, the former San Francisco Redevelopment Agency, with Catellus Development Corporation as project sponsor, proposed a new project for the Mission Bay area, consisting of two separate redevelopment plans (*Mission Bay North Redevelopment Plan* and *Mission Bay South Redevelopment Plan*) ("North Plan" and "South Plan" or, collectively, the "Plans") in two redevelopment project areas separated by the China Basin Channel.

On September 17, 1998, the San Francisco Planning Commission and the former Redevelopment Agency Commission certified the *Mission Bay Final Subsequent Environmental Impact Report* ("Mission Bay FSEIR").[2] The Mission Bay FSEIR analyzed reasonably foreseeable development under the Plans. It incorporated by reference information from the original 1990 FEIR that continued to be accurate and relevant for analysis of the Plans. Thus, the 1990 FEIR and the Mission Bay FSEIR together constitute the environmental documentation for the Plans. The 1990 FEIR and Mission Bay FSEIR are program EIRs under CEQA Guidelines 15168 and redevelopment plan EIRs under CEQA Guidelines 15180.

The former Redevelopment Agency Commission adopted the North and South Plans on September 17, 1998, along with the Mission Bay North Owner Participation Agreement (as subsequently amended, the "North OPA") and Mission Bay South Owner Participation Agreement (as subsequently amended, the "South OPA"), which are between the former Redevelopment Agency, now OCII as successor to the Redevelopment Agency, and the Mission Bay Master Developer (originally Catellus Development Corporation and now FOCIL-MB, LLC, the successor to Catellus Development Corporation).[3] The land uses in the adopted Mission Bay plan are generally illustrated in **Figure 3**.[4]

---

1 Planning Department Case No. 86.505E.

2 Planning Department Case No. 96.771E, Redevelopment Agency Case No. ER 919-97.

3 Resolution No. 191-98, and No. 188-98, respectively.

4 It should be noted that the land use program in the adopted Mission Bay plan was developed from the proposed plan plus a combination of plan variants described and analyzed in the Mission Bay FSEIR. Specifically, the adopted Mission Bay Redevelopment Plan was based on the plan description in the Mission Bay FSEIR, plus Variant 1 (Terry A. François Boulevard Variant/Expanded Bayshore Open Space Proposal), Variant 2 (Esprit Commercial Industrial/Retail Variant), Variant 3A (Modified No Berry Street Crossing Variant), and Variant 5 (Castle Metals Block Commercial Industrial/Retail Variant). The adopted plan was described in the Mission Bay FSEIR Chapter III, Project Description, and Section VII.G, Combination of Variants Currently under Consideration by the Project Sponsors. The Mission Bay FSEIR concluded that the environmental effects of the combination of plan variants would be similar to those of the proposed plan, and consequently, would not result in any new or substantially more severe significant effects identified in the Mission Bay FSEIR for the proposed plan.

Mission Bay Redevelopment Plan Area Boundary

Project Site Boundary

Note: Numbers in figure represents Mission Bay Redevelopment Plan block numbers
“X” represents parcels not owned by master developer at the time Mission Bay Redevelopment Plan was adopted
“P” represents open space parcels
“N” represents blocks within Mission Bay North Redevelopment Area

SOURCE: OCII, ESA, 2014

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 3
Land Uses in the Mission Bay Redevelopment Plan

The North and South OPAs incorporated into the Plan the mitigation measures identified in the Mission Bay FSEIR and adopted by the former Redevelopment Agency Commission at the time of Plan approval.[5] As authorized by the Plans, the former Redevelopment Agency Commission simultaneously adopted design guidelines and standards governing development, contained in companion documents, the Design for Development for the Mission Bay North Project Area (the "North Design for Development") and the Design for Development for the Mission Bay South Project Area (the "South Design for Development"), respectively.[6] The San Francisco Board of Supervisors adopted the North Plan on October 26, 1998, and the South Plan on November 2, 1998.[7] The South OPA has been amended four times, the first amendment dated February 17, 2004, the second dated November 1, 2005, the third dated May 21, 2013, and the fourth dated June 4, 2013.

The Redevelopment Agency has prepared nine addenda to the Mission Bay FSEIR (completed between 2000 and 2013) for specific developments within Mission Bay that required additional environmental review of specific issues beyond those that were covered in the 1998 FSEIR; in all of these cases, none of the conditions triggering a Subsequent or Supplemental EIR were met. These addenda are as follows:

- The first addendum, dated March 21, 2000, analyzed the ballpark parking lots.
- The second addendum, dated June 20, 2001, addressed Infrastructure Plan revisions related to the 7th Street bike lanes and relocation of a storm drain outfall.
- The third addendum, dated February 10, 2004, addressed revisions to the South Design for Development with respect to the maximum allowable number of towers, tower separation, and required setbacks.
- The fourth addendum, dated March 9, 2004, addressed revisions to the South Design for Development with respect to the permitted maximum number of parking spaces for biotechnical and similar research facilities, and specified certain changes to the North OPA to reflect a reduction in permitted commercial development and associated parking.
- The fifth addendum, dated October 4, 2005, addressed revisions to the University of California San Francisco (UCSF) Long Range Development Plan and the Final Environmental Impact Report for the Long Range Development Plan.
- The sixth addendum, dated September 10, 2008, addressed revisions of the UCSF Medical Center at Mission Bay.
- The seventh addendum, dated January 7, 2010, analyzed the development of a Public Safety Building on Mission Bay Block 8 to accommodate the headquarters of the San Francisco Police Department, a local Police Station, and new San Francisco Fire Department station, and adaptive reuse of historic Fire Station 30, along with parking for these uses.
- The eighth addendum, dated May 15, 2013, analyzed amendments to the South Plan and South OPA to allow a mix of hotel, residential, and retail use on Block 1.
- The ninth addendum, dated May 30, 2013, addressed development on Block 7E for a facility housing extended stay bedrooms and associated facilities to support families of patients receiving medical treatment primarily at UCSF's medical facilities.

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5 North and South OPAs, Attachment L.
6 Resolution No. 191-98 and Resolution No. 186-98, respectively.
7 Ordinance No. 327098 North and South OPAs, Attachment L and Ordinance No. 335-98, respectively.

Successor Agency/Oversight Board Jurisdiction

The former San Francisco Redevelopment Agency, along with all 400 redevelopment agencies in California, was dissolved on February 1, 2012, by order of the California Supreme Court in a decision issued on December 29, 2011 (*California Redevelopment Association et al. v. Ana Matosantos*). On June 27, 2012, the California Legislature passed and the Governor signed Assembly Bill (AB) 1484, a bill making technical and substantive changes to AB 26, which was the original bill that resulted in the dissolution of all redevelopment agencies. (Together, AB 26 and AB 1484 are referred to as "Dissolution Law," which is codified at California Health and Safety Code Sections 34161 – 34191.5). In response to the Dissolution Law the San Francisco Redevelopment Agency became the Successor Agency to the Redevelopment Agency of the City and County of San Francisco (Successor Agency), commonly known as the Office of Community Investment and Infrastructure (OCII). Pursuant to state and local legislation, the Successor Agency is governed by two bodies, the Oversight Board of the Successor Agency and the Commission on Community Investment and Infrastructure.

On January 24, 2012, the Board of Supervisors of the City and County of San Francisco adopted Resolution No. 11-12 in response to the Supreme Court's December 29, 2011 decision upholding AB 26. On September 25, 2012, the Board of Supervisors adopted Ordinance No. 215-12 in response to the Governor's approval of AB 1484. Together, these two local laws ("Successor Agency Legislation") create the governing structure of the OCII. Pursuant to the Successor Agency Legislation, the Commission on Community Investment and Infrastructure exercises certain land use, development and design approval authority for the Mission Bay North and Mission Bay South Plan areas (and other major approved development projects), and the Oversight Board exercises certain fiscal oversight and other duties required under the Dissolution Law.

South Plan Area Development Controls

The primary development controls for the Mission Bay South Redevelopment Plan Area ("South Plan Area") are the South Plan and the South Design for Development, which together specify development standards for the project site at Blocks 29-32, including standards and guidelines for height, setbacks, and coverage. In accordance with California Community Redevelopment Law, when the Board of Supervisors approved the South Plan in 1998, land use and zoning approvals within Mission Bay came under the jurisdiction of the former Redevelopment Agency, now OCII, as described above. Together, the South Plan and South Design for Development constitute the regulatory land use framework for the project site, and they supersede the City's *Planning Code*, except as otherwise specifically provided in those documents and associated documents for implementing the Plans.

The infrastructure serving the South Plan Area is provided by the master developer, FOCIL-MB, LLC, consistent with the South OPA, including the Mission Bay South Infrastructure Plan (Attachment D to the South OPA). The South OPA includes triggers for the phasing of required infrastructure improvements based on adjacency, ratios, and performance standards to ensure that the master developer phases the required infrastructure to match the phasing of private development occurring on adjacent blocks. In addition to the South Plan and South Design for Development, the other major development controls that apply to the project site include:

- Mitigation measures included in the Mission Bay FSEIR and which OCII has identified as required to be implemented by the developer of the project site;
- All other associated adopted plans and documents that apply in the South Plan Area under the Plan and OPA, such as the 1999 Mission Bay Risk Management Plan, with amendments (including Article 22A of the San Francisco Health Code for analyzing soils for hazardous waste), Mission Bay South Streetscape Master Plan, and Mission Bay South Signage Master Plan; and
- Other adopted City plans and regulations that apply in the South Plan Area, such as the San Francisco Building Code; Chapter 7 of the San Francisco Environment Code, "Resource Efficiency Requirements," and any engineering requirements applicable under City Code to the development.

Relevant portions of the South Plan and South Design for Development as they pertain to Blocks 29-32 are described below.

South Plan Development Controls for Blocks 29-32

In addition to providing overall planning objectives for the plan area, the South Plan designates land uses for specific parcels. Proposed land uses to be permitted for Blocks 29-32 are designated as Commercial Industrial/Retail (Attachment 3 of the South Plan), and the plan provides for either principal or secondary uses at this site. Primary uses are permitted in accordance with the plan's provisions, and secondary uses are permitted provided that such use generally conforms with redevelopment objectives and planning and design controls established pursuant to this plan. The OCII Executive Director must make a determination that secondary uses make a positive contribution to the character of the plan area, and that the secondary use "will provide a development that is necessary or desirable for, and compatible with, the neighborhood or the community."

The South Plan identifies the following principal uses under the Commercial Industrial/Retail land use designation applicable to Blocks 29-32: manufacturing; institutions; retails sales and services; arts activities and spaces; office use; home and business services; animal care; wholesaling; automotive; and other uses (e.g., greenhouse, nursery, open recreation and activity areas, parking and certain telecommunications-related facilities). The following secondary uses are identified: institutions, assembly and entertainment, and other uses (public structure or use of a nonindustrial character).

The South Plan also describes general controls and limitations for development, and sets limits on leasable square footages of various uses within defined zones within the plan area, including the project site. The plan sets a maximum floor area ratio of 2.9 to 1 for the commercial industrial/ retail uses at the project site, and the maximum building height within the entire plan area is 160 feet. The plan further indicates that within the limits, restrictions and controls established in the plan, OCII is authorized to establish height limits of buildings, land coverage, density, setback requirements, design and sign criteria, traffic circulation and access standards and other development and design controls in the Design for Development.

South Design for Development Controls for Blocks 29-32

The Mission Bay South Design for Development, a companion document to the South Plan, contains the design standards and design guidelines applicable to Blocks 29-32. The project site is within Height Zone 5, which specifies that 7 percent of the developable area (within the entire height zone) may be occupied by a maximum of three towers up to 160 feet in height, and the remaining 93 percent of the development could be at a maximum of 90 feet. However, buildings along Terry A. François Boulevard, including Blocks 30 and 32, may not exceed 90 feet in height, and no towers are permitted on Blocks 30 and 32.

Within this Height Zone 5, the South Design for Development also establishes bulk limits for development at a height greater than 90 feet (i.e., towers). The maximum tower length above 90 feet is 200 feet, and the maximum floor plate is 20,000 square feet. Further, the South Design for Development identifies setback requirements applicable to Blocks 29-32, with a minimum of 5 feet along Third Street and 20 feet along 16th Street; these setbacks are in addition to specified sidewalk widths on these streets and may be used for paved pathways and landscaping as appropriate. The minimum streetwall height is 15 feet.

Design guidelines for Commercial/Industrial buildings along the Bayfront Park (adjacent to the project site) indicate that homogeneous and unrelieved façades should be avoided. Design guidelines for city-serving retail uses at Blocks 29-32 include: street level frontage should provide visually interesting features; the block façade line should be consistent with block development throughout Mission Bay; and curb cuts are strongly discouraged along Third Street.

A.3 Project Characteristics

Proposed Facilities

Development Plan Overview

Under the project, Blocks 29-32 would be developed with a multi-purpose event center and a variety of mixed uses, including office, retail, open space and structured parking on the approximately 11-acre site. **Figure 4** presents the conceptual project site plan, illustrating primary project features and associated building heights.[8] **Table 1** provides a summary overview of the key characteristics of the project facilities.

The proposed roughly circular-shaped event center building would be located in the central-east portion of the site. The event center building would be approximately 135 feet at its roof peak, and would include multiple levels of varying elevations. The event center would include a wide variety of facilities, including spectator seating and suites, restaurants/bars and clubs, meeting rooms; spectator support facilities such as food service/kitchens, concessions, merchandising and restrooms; Golden State Warriors management offices and practice facility; media support facilities, and event center operations such as loading, staging and marshaling areas, mechanical/electrical/ plumbing space and storage and maintenance facilities. Two

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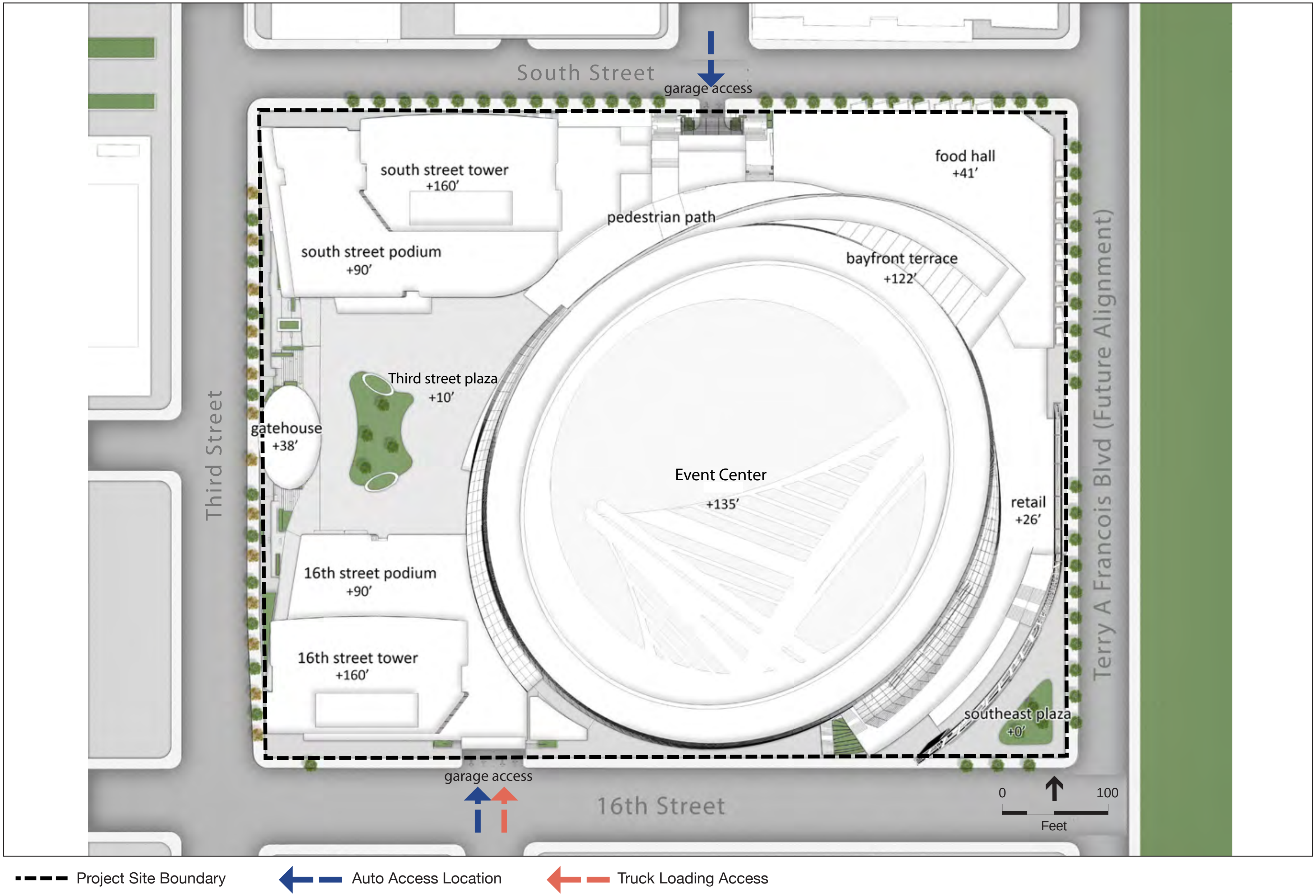
[8] For purposes of this Initial Study, ground elevations and building heights, except where noted otherwise, are as measured relative to San Francisco City Datum (SFD). SFD establishes the City's zero point for surveying purposes at approximately 8.6 feet above the mean sea level established by 1929 U.S. Geological Survey datum, and approximately 11.3 feet above the current 1988 North American Vertical Datum. Note there is also a Mission Bay Datum, equal to SFD + 100 feet. It should also be noted the method used in this Initial Study for measuring building heights differs from that specified in Section 102.12 of the San Francisco Planning Code, which provides a method for measuring building heights for purposes of consistency with the Planning Code. Under Section 102.12, building heights are generally measured from the height of the curb of the sidewalk most proximate to the property.



SOURCE: Manica Architecture, 2014

Note: Elevation values as measured relative to San Francisco City Datum

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 4
Conceptual Project Site Plan

TABLE 1
SUMMARY OF PROPOSED PROJECT FACILITIES

Project Component	Characteristic
Event Center Basketball Seating Capacity	18,064 seats[a]
Size	Total GSF
Event Center[b]	750,000
Golden State Warriors Office Space	25,000
Office Space	580,000
Retail Space[c]	125,000
Parking and Loading	475,000
Total Building Area	**1,955,000 GSF**[d]
Height[e]/Levels	
Event Center	135 feet
Office and Retail Buildings	160 feet (11 stories) total [90-foot (6-story) podiums with 70-foot (5-story) towers above]; retail uses within street level and plaza-level floors
Retail-only Buildings	41 feet in market hall building northeast corner of site; 38 feet in gatehouse building along Third Street
Parking/Loading Spaces	Blocks 29-32: 950 parking stalls below-grade or at-grade (concealed by Third Street Plaza) 13 truck docks below-grade Existing off-site at 450 South Street Parking Garage: 132 parking stalls
Vehicular Access	Access point for autos and all large trucks on 16th Street at Illinois Street Access point for autos and small trucks on South Street at Bridgeview Way
Open Space	3.2 acres

NOTES:

GSF = gross square feet.

[a] Presented maximum seating capacity is for basketball games. However, as discussed under *Proposed Operations and Employment*, below, there would other types of events at the event center, including certain concerts and conventions, that would be able to accommodate a maximum attendance of up approximately 18,500 patrons.

[b] The event center would include a variety of supporting uses, including Golden State Warriors practice facility and management offices, bayfront terrace, limited retail, and other uses. For purposes of estimating areas, the Golden State Warriors management office space square footage is presented separately from square footage of the other event center uses.

[c] Proposed retail uses are approximately 51,500 GSF sit-down restaurant, 11,000 quick-service restaurant, and 62,500 GSF soft goods retail including food retail.

[d] The CEQA analyses are based on gross square footage. However, the Mission Bay South Redevelopment Plan permits development based on adjusted gross square footage and leasable square footage. Gross Square Footage and Leasable Square Footage as defined in the Mission Bay South Redevelopment Plan for this project would be less than the gross square footage presented in this environmental document.

[e] Building heights as measured relative to San Francisco City Datum (SFD). Excludes unoccupied top floor level with mechanical equipment.

SOURCE: Manica Architecture, 2014

office and retail buildings would be located on the west side of the project site, at the corner of Third Street and South Street (northwest corner of site) and at the corner of Third Street and 16th Street (site southwest corner). The two office and retail buildings would each consist of 11 stories (160 feet tall); each office and retail building would consist of a podium ground level plus 5 podium levels (90 feet tall), with a 5-story (70-foot) tower (with smaller floorplate than the podium) above. These buildings could serve a variety of office and/or research and development uses. Retail uses would occupy several areas of the site, including the lower floor(s) of the two office and retail buildings, within or adjacent to certain plaza-facing areas of the event center (including in the 38-foot high "gate house" building located along Third Street), and 41-foot high retail building along Terry A. François Boulevard and South Street.

Three levels of enclosed on-site parking (two below grade, and one at street level) providing 950 parking spaces would be located below the office and retail buildings and plaza areas. (See also *Off-site Parking Facilities*, below.) Approximately 3.2 acres of open space would be located on-site, including a proposed Third Street Plaza (elevated at approximately 8 feet above Third Street) on the west side of the project site between the event center and Third Street, and a proposed ground-level Southeast Plaza in the southeastern corner of the site.[9] These plazas would be connected by a pedestrian ramp wrapping around the exterior of the north and eastern-sides of the event center, and an outdoor covered passageway, or atrium, wrapping around the southwest portion of the event center.

While the project would not be subject to the City's *Standards for Bird-Safe Buildings*, the project sponsor proposes to incorporate bird-safe measures that would reduce the potential effects of the project on birds.

Vehicular Access and Circulation

All vehicular ingress/egress for the garage would occur at 16th Street (at Illinois Street) or South Street (at Bridgeview Way). The 16th Street driveway would serve as the primary vehicular access point for autos to the parking garage, and the sole access point for trucks to the below-grade loading docks. Most proposed loading and service areas would be located on the lower level, while one loading slip would be provided at grade (concealed from view beneath the pedestrian path) to serve retail located at the site's northeastern corner. A total of 13 truck docks would be provided to serve the event center and office and retail uses. The South Street driveway would provide a secondary access for autos to the garage and small delivery trucks for retail located at the site's northeastern corner. (See also *Proposed Operations*, below, for a description of the proposed *Transportation Management Plan* that the sponsor would implement as part of the project.)

Pedestrian and Bicycle Access

The primary pedestrian access to the event center for large attendance events would be via the Third Street Plaza. The Southeast Plaza would serve as a primary pedestrian access for smaller-attendance events, and as a secondary access point for large-attendance events. Pedestrian access to the two office and retail buildings would be available on South and 16th Streets and from the Third Street plaza, with additional access to ground-floor retail uses within those buildings available via South and Third Streets. The retail buildings in the northeast corner of the site would be accessed directly via Terry A. François Boulevard and South Street. New sidewalks would be constructed along the perimeter of the project site.

Bike storage rooms would be located in each of the proposed office and retail buildings. Bike parking and storage racks would also be available at various locations along the perimeter of the project site, with bike valet service in proximity to the site and temporary bike corrals located within the plaza areas to serve patrons as needed.

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9 It should be noted that midpoint on the sidewalk on Terry A. François Boulevard adjacent to the site is approximately 0 feet SFD, and midpoint on the sidewalk on Third Street adjacent to the site is approximately 2 feet SFD.

Infrastructure Improvements

The project proposes all new utility infrastructure facilities on-site, including water supply (low- and high-pressure water lines and recycled water lines); wastewater collection; storm drainage; electrical/gas, and communications. Infrastructure and utilities within adjacent streets that serve the project site are provided by the master developer, FOCIL-MB, LLC, as part of the Mission Bay South Infrastructure Plan.

Off-Site Parking Facilities

As part of the project, the sponsor has acquired 132 existing off-site parking spaces in the 450 South Street parking garage, accessed from South Street and Bridgeview Way directly north of the project site, to provide additional parking to serve the project.

Sustainability

The proposed development would be subject to a number of sustainability requirements, including the California CalGreen Code, City of San Francisco Green Building Code, Design for Development for the Mission Bay South Area, and the 2012 NBA Arena Design Standards – Sustainability Requirements. The project would be designed to Leadership in Energy and Environmental Design (LEED®) Gold standards using a campus approach, whereby each individual proposed structure as well as the overall site would qualify for individual Gold ratings.[10] This would be achieved through incorporation of a variety of design features and implementation of practices during construction and operation to provide energy and water conservation and efficiency, encourage alternative transportation, promote a healthy indoor environment, minimize waste, and maximize recycling opportunities.

South Plan Improvements Planned in the Vicinity of the Project Site: Terry A. François Boulevard Realignment and Public Access Improvements at Bayfront Park

Pursuant to the Mission Bay Plan and not part of the proposed project, development of Blocks 29-32 would trigger the realignment of Terry A. François Boulevard to extend adjacent to the east side of Blocks 29-32, and the construction of public access improvements at Bayfront Park east of this realigned roadway. The realigned Terry A. François Boulevard would contain four travel lanes (two northbound and two southbound) plus two parking lanes; and - on the east side of the roadway – a two-way cycletrack (bike path) separated from the roadway by a raised buffer.

Following realignment of Terry A. François Boulevard, Bayfront Park would be improved and expanded to 5.5 acres, encompassing an area roughly south of Pier 54, north of 16th Street, east of Terry A. François Boulevard, and west of the Bay shoreline. Both the realignment of Terry A. François Boulevard and Bayfront Park public access improvements would be implemented by the master developer, FOCIL-MB, LLC, prior to occupancy of buildings at the project site.

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10 The Leadership in Energy and Environmental Design (LEED®) is a program developed and administered by the U.S. Green Building Council that provides third-party verification of green building projects. LEED® uses a green building rating system designed to reduce the negative environmental impacts of buildings and improve occupant health and well-being. Building projects satisfy prerequisites and earn points to achieve different levels of certification.

Proposed Operations and Employment

Under the project, the event center at Blocks 29-32 would serve as the new venue for the Golden State Warriors home games, and provide a year-round venue for a variety of other uses, including concerts, family shows, other sporting events, cultural events, conferences and conventions. The event center would be used for up to approximately 225 events per year, with events ranging in capacity from approximately 3,000 up to about 18,500. All existing Golden State Warriors operations, including management offices and practice facility, would relocate from their existing facilities in Oakland to the new event center. The proposed office and retail facilities on Blocks 29-32 would operate year-round, independent of the event center operations. The following provides additional information for each of the proposed new operational components at Blocks 29-32.

Event Center Programming

Golden State Warriors Games. Under the project the Golden State Warriors would host two to three preseason basketball games (in mid- to late October) and 41 regular season basketball games (from late October to mid-April) at the event center. If the Golden State Warriors reach the postseason, they would host anywhere from 2 to 16 playoff games (from mid-April to mid-June). The large majority of Golden State Warriors home basketball games would start at 7:30 p.m. and conclude between 10:00 p.m. and 10:30 p.m. The home game schedule at the proposed event center would be similar to the Warriors schedule at Oracle Arena, the team's existing home venue in Oakland.

As described in Table 1, the maximum basketball seating capacity at the event center would be 18,064, less than the maximum basketball seating capacity of approximately 19,600 at Oracle Arena. The average basketball attendance levels at the proposed event center are estimated to be approximately 17,000 during the regular season, with regular season and post-season attendance reaching the maximum capacity of 18,064.

It is estimated that approximately 1,000 day-of-game non-Warriors employees[11] would be required on game days at the event center to work in various operations and jobs, including security, ushers, ticket takers, team store, food service, cleaning crew, scoreboard/video operators and other event-related operations. In addition, up to 100 Golden State Warriors' employees (e.g., representatives from Warriors sales, services, marketing and game operations) would work at the games at the event center (please see additional detail of Golden State Warriors employment under *Golden State Warriors Operations*, below).

Non-Golden State Warriors Events at the Event Center. The event center would serve as a venue for a variety of non-Golden State Warriors events throughout the year, including concerts, family shows, other sporting events, and conventions/corporate events. Approximately 160 non-Golden State Warriors game events would occur annually at the event center, that could typically include the following:

[11] This event center day-of-game employee estimate does not include Warriors employees that would occupy the management offices in the event center and employees of the proposed retail uses on the project site, both of which are described separately, below.

- *Family Shows:* It is estimated that the event center would host 55 family shows per year. Examples of family shows include Disney on Ice, Disney Live, Harlem Globetrotters, and Sesame Street Live. Family show series would typically occur over a five-day block of time (Wednesday through Sunday) during which time as many as 10 total performances would occur in the daytime and evening periods. Estimated average attendance would be approximately 5,000 patrons, and estimated maximum attendance would be approximately 8,200 patrons.

- *Full Arena Concerts:* It is estimated that the event center would host 30 full arena concerts per year. Concerts would typically occur on Friday and Saturday evenings within a 7:30 p.m. to 10:30 p.m. window. Attendance would vary depending on the artist and stage configuration. Estimated average attendance would be approximately 12,500 patrons with a maximum capacity of about 18,500.[12]

- *Arena Theater Concerts:* It is estimated that the event center would host 15 arena "theater" (cut-down arena) concerts per year. Concerts typically occur on Friday and Saturday evenings within a 7:30 p.m. to 10:30 p.m. window. Attendance would vary depending on the artist and cut-down configuration. Estimated average attendance would be approximately 3,000 patrons.[13]

- *Other Sporting Events:* It is estimated that the event center would host 30 non-Warriors sporting events per year. Examples of non-Warriors sporting events include college basketball, hockey, boxing, figure skating, arena football, gymnastics, lacrosse, tennis, and mixed martial arts. These events could be professional, collegiate, or amateur competitions. Estimated average attendance for other sporting events would be 7,000 patrons per event, and estimated maximum attendance of 18,064 (consistent with maximum seating capacity for Warriors games). These events would be distributed throughout the year and have variable start times.

- *Conventions, Conferences and other Events*: It is estimated that the event center would host 31 events annually related to conventions, conferences, cultural events, civic events, corporate events, and other gatherings, with an estimated average attendance level of 9,000 patrons and maximum attendance of 18,500 patrons. For smaller events the event center would be configured to reduce the perceived bowl volume to create a more intimate experience. These events would be distributed throughout the year and have variable start times; however, the majority of events are expected to occur during day time hours, consistent with typical events at the Moscone Convention Center.

It is estimated that day-of-event employees for non-Golden State Warriors events at the event center would range from 675 to 1,000, depending on the specific event and anticipated attendance levels.

(Please see also *Golden State Warriors Operations* and *Office and Retail Uses*, below, for a description of operations and additional employment associated with the Golden State Warriors, and for office and retail uses.)

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[12] The event center design would allow for an end-stage concert configuration that would accommodates up to 14,000 patrons. It is estimated that nearly 90 percent of concerts would use the end stage configuration. Occasionally, concerts would occur in a 360-degree center-stage configuration which would accommodate a maximum attendance of approximately 18,500 patrons. However, no more than four center-stage concerts are expected per year.

[13] The cut-down arena theater design would allow for a concert with up to 4,000 attendees.

Potential Outdoor Events at the Project Site

The proposed Third Street Plaza would provide opportunities for public gatherings and events, such as spring festivals, Cinco de Mayo celebration, summer film series, fall festival/pumpkin patch, and winter tree lighting ceremony/ice skating rink.

Golden State Warriors Operations

The Golden State Warriors organization currently includes approximately 150 full-time equivalent (FTE) employees, and associated operations are based in Oakland. Under the project, all existing Golden State Warriors employees and operations, including management offices and practice facility, would relocate to the project site at Mission Bay. Furthermore, the Golden State Warriors estimate that up to 105 additional FTE employees would be required for year-round event center and site management, for a total estimated Golden State Warriors employment of 255 FTE employees.

Office and Retail Uses

The proposed office uses on the site would be expected to operate similar to other existing office developments within Mission Bay, and is estimated to generate approximately 2,101 FTE employees.[14] The proposed retail uses, including restaurants and other food and beverage service, would operate seven days a week, year-round, independently of the event center operations. It is estimated that the uses within the retail areas would require approximately 372 FTE employees.[15]

Transportation Management Plan

As part of the project, the project sponsor would prepare and implement a Transportation Management Plan (TMP) to manage on- and off-site access for all anticipated travel modes (including vehicles, transit, pedestrians, and bicyclists) during project operation for events and activities at the project site. The TMP would identify a range of transportation control strategies for various operational scenarios at the project site, including strategies for non-event and event days; communication strategies for public outreach and wayfinding measures; transportation demand management strategies; and monitoring methods for TMP strategies to ensure effectiveness.

In addition, the project sponsor would participate in the existing Mission Bay Transportation Management Association (TMA) shuttle service program. Sponsor participation in the TMA shuttle service program would allow for potentially expanded Mission Bay TMA shuttle service, as needed during evenings and weekends.

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14 Based on San Francisco Planning Department's Transportation Impact Analysis Guidelines rate of 350/240/350 (Sit-down/QSR/In-line) gross square feet per FTE employee.

15 Based on San Francisco Planning Department's Transportation Impact Analysis Guidelines rate of 276 gross square feet per FTE employee.

Pre-Construction Testing

Prior to finalizing the project design, in order to inform design and reduce the risk of construction delays due to the potential presence of archaeological resources, the project sponsor is retaining the services of an archaeologist to develop and implement a program of archaeological testing at Blocks 29-32. The results of the archaeological testing will be used to develop a construction monitoring program to ensure potential effects on subsurface archaeological resources would be avoided or minimized prior to the commencement of ground disturbance activities, foundation excavation and pile driving. In addition, the project sponsor will conduct a pile test program at Blocks 29-32 to determine site-specific pile installation methods and requirements.

Construction

Construction of the proposed project is anticipated to begin in late 2015, and occur over an approximate 26-month period. Construction activities would include, but not be limited to: site demolition, clearing and excavation; dewatering; pile installation and foundation construction; construction of all proposed development, including event center, podium structure, office towers and plazas; installation of associated utilities; interior finishing; and exterior hardscaping and landscaping improvements. The sponsor estimates that the maximum depth of excavation on-site would be approximately 30 feet below San Francisco City Datum; this would require approximately 350,000 cubic yards of soils on-site to be excavated and removed from the site. The sponsor proposes alternative methods to pile driving for installation of piles at the project site (e.g., auger pile installation). The sponsor is also considering multiple approaches to address potential groundwater infiltration to proposed below grade facilities and potential localized flooding, including a waterproofing design and implementation of adaptive management strategies. The sponsor indicates the proposed design would preclude the need to conduct any long-term dewatering of the project site during project operation.

The majority of the construction is proposed to occur Monday through Friday, although some construction activities would occur on nights and weekends. A typical work day shift would be between 7:00 a.m. and 6:00 p.m., and a typical second shift (i.e., for below-grade and interior work within buildings) would be between 4:00 p.m. and 12:30 a.m. There would also be the potential for overnight deliveries of materials and/or equipment. All construction activities are proposed to be conducted within allowable construction requirements permitted by City code. The project would also be subject to the Mission Bay Good Neighbor Policy, which limits extreme noise-generating activities in Mission Bay to Monday to Friday from 8:00 a.m. to 5:00 p.m.[16]

[16] The Mission Bay Good Neighbor Policy specifies that pile driving or other noise generating activity (80 dBA at a distance of 100 feet) shall be limited to 8:00 am to 5:00 pm, Monday through Friday. No pile driving or other extreme noise generating activity is permitted on Saturday, Sundays and holidays. Requests for pile driving on Saturdays may be considered on a case by case basis by OCII with approval at the sole discretion of the OCII Executive Director.

B. PROJECT SETTING

B.1 Mission Bay

Before 1998, Mission Bay was characterized by low-intensity industrial development and vacant land. Since adoption of the North and South Plans in 1998, Mission Bay has undergone redevelopment into a mixture of residential, commercial (light industrial, research and development, labs and offices), retail, and educational/institutional uses and open space. As of 2014, 4,067 housing units (including 822 affordable units) of the planned 6,400 housing units within Mission Bay (roughly 64 percent) are complete, with another 900 (including 150 affordable units) under construction. Regarding office and laboratory space, approximately 1.7 million square feet of the 4.4 million square feet in the Mission Bay plan area (approximately 39 percent) is complete. Approximately 60 percent of the approved 2.65 million-square-foot UCSF research campus has been developed, including seven research buildings, a campus community center, and a university housing development. The first phase of the UCSF Mission Bay Medical Center is expected to open in early 2015. Construction of the City's new Public Safety Building at Third and Mission Rock Streets is completed and will be operational in early 2015. More than 15 acres of new non-UCSF parks and open space within Mission Bay have also been completed.

B.2 Project Site and Existing Uses

Figure 5 presents an aerial map of the project site vicinity. The approximate 11-acre project site encompasses Blocks 29, 30, 31, and 32 within the Mission Bay South Redevelopment Plan Area. The project site consists of the majority of Assessor's Block 8722, Lot 001, and all of Assessor's Block 8722, Lot 008. The project site is bounded by South Street on the north, Third Street on the west, 16th Street on the south, and by the future planned realigned Terry A. François Boulevard on the east. The City has designated the Mission Bay South Redevelopment Plan Area as a Priority Development Area (PDA). The project site is also located in the southeast corner of the City's South of Market neighborhood, and just north of the City's Potrero Hill and Dogpatch neighborhoods.

The site is relatively level, with the majority of the ground surface elevations ranging between approximately -1 foot to +3 feet San Francisco City Datum (SFD), roughly equivalent to 6½ to 10½ feet above mean sea level. Paved surface metered parking facilities currently operate in the west and north portions of the site. Lot E, accessed from 16th Street, contains 289 parking spaces; and Lot B, accessed from South Street, contains 316 parking spaces, for a total of 605 parking spaces. These parking facilities contain night lighting. Immediately east of, and adjacent to, Parking Lot B is a depressed area (measuring approximately 320 feet by 280 feet) created by an excavation and backfill associated with a prior environmental cleanup of that portion of the site. A surface swale extends west within this portion of the site to allow for drainage of surface water into the depression.[17] Chain link fencing is installed on the perimeter of the project site, and around Parking Lots B and E within the site.

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17 Langan Treadwall Rollo, *Updated Phase I Environmental Site Assessment, Mission Bay Blocks 29-32, San Francisco, California*, April 11, 2014.

SOURCE: Google Maps, ESA, 2014

OCII Case No. ER 2014-919-97; Planning Department Case No. 2014.1441E:
Event Center and Mixed-Use Development at Mission Bay Blocks 29-32

Figure 5
Aerial Photograph of Project Site Vicinity

B.3 Surrounding Uses

The University of California at San Francisco (UCSF) Mission Bay campus is located west, northwest, southwest, and partially south of the project site. Fronting on Third Street directly west of the project site is an eight-story UCSF parking structure (Third Street Garage), and new construction of the UCSF Global Health and Clinical Sciences Building (Mission Hall). To the northwest of the project site fronting along Third Street is UCSF Hearst Tower, a 14-story building containing student housing; and to the north of that, the UCSF Helen Diller Family Cancer Research building. To the southwest of the project site fronting along Third Street is new construction of the UCSF Energy Center, Betty Irene Moore Women's Hospital, Bakar Cancer Hospital and Benioff Children's Hospital. Directly south of the project site across 16th Street, between Third Street and Illinois Street, is a vacant lot recently acquired by UCSF. UCSF is currently preparing a new Long Range Development Plan to guide future campus growth and development at its facilities, including the UCSF Mission Bay campus, through 2035.

Directly south of the project site across 16th Street, between Illinois Street and Terry A. François Boulevard, is a recently-constructed six-story office building (409 Illinois Street) housing Fibrogen Life Science and other biotech/high tech companies, and south of that another recently-constructed six-story office building (499 Illinois Street). Directly north of the project site across and fronting on South Street are (from west to east) a vacant lot (recently acquired by Uber Technologies and Alexandria Real Estate Equities), a six-story parking garage (450 South Street), and a six-story office building housing the Old Navy corporate headquarters. Immediately east of the project site and west of Terry A. François Boulevard are City-owned parcels containing covered stockpiled materials. Further east of the project site across Terry A. François Boulevard is the site of the planned Bayfront Park; this area presently includes a paved trail (which constitutes a segment of the Bay Trail), surface parking lot, and unimproved open space.

Third Street, a north-south major arterial roadway defined as a Transit Important Street in the San Francisco General Plan, extends along the west project site boundary providing access to and from downtown San Francisco to the north and the Bayview neighborhood to the south. Third Street contains two vehicular travel lanes in each direction, separated by a paved median and Muni light rail tracks. Muni light rail lines K-Ingleside and T-Third Street operate along The Embarcadero, with the Muni UCSF/Mission Bay Station located at South Street and the Muni Third & Mariposa Street Station located one block south of the project site. Muni bus routes 91 and T-Owl operate along Third Street, with a Muni bus stop located north of the project site on Third Street. Campus Lane, a two-lane east-west local street, terminates at the intersection with Third Street, directly across from and west of the project site.

16th Street extends east of Third Street along a portion of the south project site boundary, terminating just east of Illinois Street. There are two vehicular travel lanes on 16th Street adjacent to the project site, increasing to four lanes west of Third Street. Bollards installed on 16th Street east of Illinois Street prevent through vehicular travel between Third Street and Terry A. François Boulevard. 16th Street is defined as a secondary arterial west of Third Street in the San Francisco General Plan. 16th Street contains a Class III bicycle route between Illinois Street and Third Street, and two Class II bike lanes west of Third Street. Illinois Street, a two-lane north-south local street, terminates at the intersection with 16th Street, directly across from and south of the project site. Illinois Street contains a Class II bicycle lanes between 16th Street and Mariposa Street.

Terry A. François Boulevard roughly follows the Bay shoreline east of the project site. There are currently two vehicular travel lanes and Class II bicycle lanes in each direction. Terry A. François Boulevard is signed as a Tsunami Evacuation Route.

South Street extends along the north boundary of the project site between Third Street and Terry A. François Boulevard. South Street contains two vehicular travel lanes in each direction. Bridgeview Way, a two-lane north-south local street, terminates at the intersection with South Street, directly across from and north of the project site.

Vehicle parking is currently provided along 16th Street and Terry A. François Boulevard adjacent to the project site.

B.4 Approvals Required

Project approvals or permits from the following agencies for construction or long-term operation are anticipated at this time:

- Approval by the OCII Executive Director of secondary use findings of consistency for the proposed event center
- Approval by the OCII Commission of a new Major Phase for Blocks 29-32
- Approval by the OCII Commission of individual Combined Basic Concept and Schematic Designs (Schematic Designs) for the project
- Approval by the OCII Commission (and any other City departments as required under the Mission Bay South Plan, OPA, Interagency Corporation Agreement, and associated documents) of: Amendments to the Mission Bay South Design for Development, and Modifications to the Mission Bay South Signage Master Plan and Mission Bay South Streetscape Plan
- Approval by Mayor, Department of Public Works Executive Director and OCII Executive Director of any non-material changes to Mission Bay South Infrastructure Plan
- Entertainment Commission approval of applicable entertainment permits, including, but not limited to, a Place of Entertainment permit
- Planning Commission approval of office building Schematic Designs related to Proposition M allocation
- Port of San Francisco staff approval of changes to waterfront infrastructure, including roadway striping
- San Francisco MTA/Department of Public Works approval for reconfiguration of adjacent streets
- San Francisco Department of Public Works and Board of Supervisors approval of subdivision map
- Governor's approval of project sponsor's Assembly Bill 900 (AB 900) application
- San Francisco Public Utilities Commission approvals for connections to infrastructure systems, including water supply, fire flow, recycled water, stormwater, and wastewater systems

C. COMPATIBILITY WITH EXISTING ZONING AND PLANS

	Applicable	*Not Applicable*
Discuss any variances, special authorizations, or changes proposed to the Planning Code or Zoning Map, if applicable.	☐	☒
Discuss any conflicts with any adopted plans and goals of the City or Region, if applicable.	☒	☐
Discuss any approvals and/or permits from City departments other than the Planning Department or the Department of Building Inspection, or from Regional, State, or Federal Agencies.	☒	☐

The SEIR will discuss the project's compatibility with existing zoning and plans.

D. SUMMARY OF ENVIRONMENTAL EFFECTS AND APPROACH TO ANALYSIS

D.1 Summary of Environmental Effects

The proposed project could potentially result in either new significant environmental effects or substantially more severe impacts than were previously identified in the Mission Bay FSEIR, as noted by the environmental factor(s) checked below. The resource areas checked below indicate topic areas to be discussed in detail in the SEIR, but all resource areas are addressed in this Initial Study. This section describes the approach to analysis for this Initial Study, and Section E, presents a more detailed checklist and discussion of each environmental factor and the associated impact assessment.

☐ Land Use	☒ Air Quality	☐ Biological Resources
☐ Aesthetics	☒ Greenhouse Gas Emissions	☐ Geology and Soils
☐ Population and Housing	☒ Wind and Shadow	☒ Hydrology and Water Quality
☐ Cultural and Paleo. Resources	☐ Recreation	☐ Hazards/Hazardous Materials
☒ Transportation and Circulation	☒ Utilities and Service Systems	☐ Mineral/Energy Resources
☒ Noise	☒ Public Services	☐ Agricultural and Forest Resources

D.2 Approach to Analysis

The following approach to analysis is used in this Initial Study to determine which topics require no additional environmental analysis beyond what is presented in the Mission Bay FSEIR and this Initial Study and which topics require more detailed analysis in the SEIR. With the exception of Aesthetics and parking, the evaluation of environmental impacts is based on potential effects of the proposed project compared to existing (2014) conditions using the significance criteria listed in the San Francisco Planning Department’s Initial Study Checklist. Significance criteria that do not apply to the proposed project, if any, are first identified, and neither the Initial Study nor the SEIR provide further discussion of those criteria; for example, since the project is not located within an airport land use plan, none of those criteria apply to this project. Environmental review of Aesthetics and parking impacts are considered pursuant to CEQA Section 21099(d) as discussed in the Aesthetics and Transportation sections of this Initial Study.

Project Impacts

For those topics determined in this Initial Study to be focused out from further analysis in the SEIR, this analysis first summarizes how these topics were addressed in the Mission Bay FSEIR as it related to Blocks 29-32, including identifying any applicable mitigation measures from the Mission Bay FSEIR and conclusions reached regarding significance of effects. Second, the Initial Study analyzes the impacts of the proposed project to determine: (1) if the proposed project, circumstances under which the project is undertaken, or new information(which could not have been ascertained at the time of the preparation of the Mission Bay FSEIR) would lead to new or more severe significant environmental effects from what was identified in the Mission Bay FSEIR; (2) if newly feasible or different mitigation measures or alternatives are available that would substantially reduce one or more significant effects of the project; and (3) if the mitigation measures identified in the Mission Bay FSEIR and/or newly added mitigation measures would reduce impacts to a less-than-significant level. The impact evaluation presents the significance determination for each impact and includes the detailed description of all mitigation measures applicable to the proposed project, whether it is the same as that specified in the Mission Bay FSEIR or an updated mitigation measure.

For those topics to be analyzed in detail in the SEIR, this Initial Study provides the checklist response identifying the potential for new significant impacts or substantially more severe impacts than those identified in the Mission Bay FSEIR. However, the summary of the Mission Bay FSEIR and the detailed analysis of the proposed project are deferred for discussion in the SEIR.

For the purposes of this Initial Study, the checklist questions in Appendix G have been modified to reflect the fact that the proposed project is a subsequent activity under the Mission Bay South Redevelopment program and that this analysis is being tiered from the certified Mission Bay FSEIR as a program EIR, consistent with CEQA Guidelines 15168(c). The four revised checklist questions used in this Initial Study are described below.

1. *Would the project result in potentially significant effects not identified in the prior EIR?* This question examines whether or not the proposed project would result in new significant or potentially significant environmental effects that were not identified in the Mission Bay FSEIR. This could include significant effects that are due to:

    - Project-specific features of the proposed event center and mixed-use development.
    - Substantial changes with respect to the circumstances under which the project would be undertaken, such as real estate development trends in the surrounding area or major projects that were previously unanticipated.
    - New information of substantial importance which was not known and could not have been known at the time the Mission Bay FSEIR was certified, such as newly available information related to climate change or sea level rise.

    If the analysis identifies a new significant or potentially significant impact, this Initial Study then determines if either previously identified mitigation measures or newly identified mitigation measures would reduce the impact to less than significant. In this event, the mitigation measures are presented in this Initial Study and no further analysis is required. On the other hand, if a new significant or potentially significant impact is identified and/or further analysis is necessary to determine if mitigation measures are available to reduce the impacts to less than significant, then this issue will be addressed in further detail in the SEIR.

2. *Would the project result in a potentially substantial increase in severity of a significant impact identified in the prior EIR?* This question examines whether or not the proposed project would result in substantially more severe environmental effects than what was identified in the Mission Bay FSEIR. This increase in severity of a significant effect could be due to:

   - Project-specific features of the proposed event center and mixed-use development.
   - Substantial changes with respect to the circumstances under which the project would be undertaken, such as real estate development trends in the surrounding area or major projects that were previously unanticipated.
   - New information of substantial importance which was not known and could not have been known at the time the Mission Bay FSEIR was certified, such as newly available information related to climate change or sea level rise.

   If the project would result in an increase in severity of a previously identified significant impact, this Initial Study then determines if either previously identified mitigation measures or newly identified mitigation measures would reduce the more severe impact to less than significant. In this event, the mitigation measures are presented in this Initial Study and no further analysis is required. On the other hand, if a more severe significant impact is identified and/or further analysis is necessary to determine if mitigation measures are available to reduce the impacts to less than significant, then this issue will be addressed in further detail in the SEIR.

3. *Does the project sponsor decline to adopt a feasible mitigation measure or alternative?* This question addresses the case in which the Initial Study identifies a new significant impact or a substantial increase in severity of a significant impact but the project sponsor has declined to adopt a feasible mitigation measure or alternative. In the event of such cases, if any, the issue will be addressed in further detail in the SEIR.

4. *Would the project result in no new or more severe significant effects?* This question addresses several possible scenarios for certain topics which the Initial Study provides the complete analysis and no further analysis is necessary in the SEIR. These scenarios include the following:

   - The Mission Bay FSEIR identified a significant impact, and the proposed project would result in the same significant impact. In addition, the same mitigation measure identified in the Mission Bay FSEIR would reduce the impact to a less-than-significant level. In this case, the previous mitigation measure as applicable to the proposed project is presented in this Initial Study.
   - The Mission Bay FSEIR identified a significant impact and the proposed project would result in the same significant impact. However, a new or revised mitigation measure is recommended to reduce the impact to a less-than-significant level, and this new measure would replace the previously identified mitigation measure. In this case, only the new mitigation measure is presented in this Initial Study, and the reader is referred to the Mission Bay FSEIR for the original mitigation measure.
   - The Mission Bay FSEIR identified a significant impact and the proposed project would result in the same impact. However, under the current approach to analysis, the impact would be considered less-than-significant due to implementation of actions required to comply with applicable regulations (e.g., hazardous materials regulations). In this case, the revised analysis would supersede the analysis in the Mission Bay FSEIR, and with

compliance with applicable regulations, no mitigation measures are required and none are presented in this Initial Study. The reader is referred to the Mission Bay FSEIR for the original mitigation measure(s).

- The Mission Bay FSEIR identified either no impact or a less-than-significant impact, and the proposed project would also result in no impact or a less-than-significant impact. In this case, no mitigation measures are required and none are presented either in the FSEIR or this Initial Study.
- The Mission Bay FSEIR did not address an environmental topic under the Planning Department's current CEQA Initial Study checklist, and the proposed project would result in a significant impact that could be reduced to less than significant with implementation of a feasible mitigation measure. In this case, the new mitigation measure is presented in this Initial Study.
- The Mission Bay FSEIR did not address an environmental topic under the current Planning Department CEQA Initial Study checklist, but the proposed project would result in either no impact or a less than significant impact. In this case, no mitigation measures are required and none are presented.
- In a few instances, the discussion of why the project is not expected to result in any new or more significant effects is deferred to the SEIR, either as part of a larger discussion (such as Transportation) or for public disclosure.

Cumulative Impacts

Similar to the project impacts, cumulative impacts are analyzed by responding to the same four revised checklist questions but with regard to the potential for the proposed project to contribute to *new* significant cumulative impacts or substantially *more severe* cumulative impacts than those identified in the Mission Bay FSEIR. The Mission Bay FSEIR used the year 2015 for the analysis of the full buildout of the Mission Bay plan as well as for the cumulative impacts analysis, and cumulative impacts were assessed on the basis of regional population and employment projections for the year 2015 as determined by the Association of Bay Area Governments.

A cumulative impact is determined to be significant if the project in combination with other planned, proposed, or probable future conditions in the project vicinity would result in environmental effects that exceed the significance criteria listed in the San Francisco Planning Department's Initial Study Checklist when compared to existing conditions. In addition, the analysis must indicate that the project's incremental effect would be a "cumulatively considerable" contribution to the significant impact. In this Initial Study, the cumulative impact analysis identifies if the proposed project would contribute to a new significant cumulative impact or if a previously-identified cumulative impact would be substantially more severe under the proposed project.

Cumulative impacts for each resource area are analyzed with respect to the appropriate geographic scope for that topic and either (1) a list of past, present, and probable future projects that in combination with the proposed project could contribute to cumulative impacts, or (2) a summary of projections contained in general plan or related planning document (CEQA Guidelines Section 15130(b)(1)). Which of the two methods used varies from topic to topic.

For topics using the list approach, in addition to those projects considered in the Mission Bay FSEIR cumulative analysis, the projects/programs listed below were not anticipated in the Mission Bay FSEIR and are considered in the cumulative impact analysis.

- **University of California at San Francisco (UCSF), 2014 Long Range Development Plan (LRDP), Mission Bay Campus.** UCSF is updating its LRDP to guide future campus growth and development over the next 20 years. The 2014 LRDP updates information that was assumed in the Mission Bay FSEIR. The existing 60.2-acre UCSF Mission Bay campus site is located adjacent to Blocks 29-32, generally bounded by Mission Bay Boulevard South to the north, Owens Street to the west, Mariposa Street to the south, and Illinois and Third Streets to the east. Under the 2014 LRDP, the development capacity for the North Campus is proposed to increase from 2,650,000 to 3,641,800 gsf. The 2014 LRDP proposes to increase the square footage of the North Campus by 1,450,300 gsf, which includes 458,500 gsf of existing remaining entitlement from the 1996 LRDP, plus 991,800 gsf of new entitlement. On the South Campus, construction of a 124,500-gsf cancer outpatient building is anticipated prior to 2035, which will complete Phase 1 of the UCSF Medical Center at Mission Bay. This will bring the total space for Phase 1 to 993,500 gsf. Phase 2 facilities will be located on the west side of the South Campus, across the Fourth Street Public Plaza. Phase 2 Medical Center at Mission Bay is planned for after 2035 as a 261-bed hospital with additional outpatient space, totaling 793,500 gsf. Development of the East Campus would accommodate 500,000 gsf. As a result, the total anticipated development through 2035 with the proposed expansion of the Mission Bay campus site (North, South, and East campuses) would be 5,135,200 gsf.

- **Eastern Neighborhoods Program.** The Eastern Neighborhoods Program included changes in zoning controls and General Plan amendments for an approximately 2,200-acre area on the eastern side of the City. It is intended to encourage new housing while preserving sufficient land for light industrial and service industry (referred to collectively as "Production, Distribution, and Repair," or "PDR," uses) in four neighborhoods: the Mission, Showplace Square/Potrero Hill, the Central Waterfront, and the eastern portion of the South of Market ("East SoMa"). In conjunction with the rezoning, the General Plan was amended to include Area Plans for the neighborhoods (including revisions to the existing Central Waterfront and South of Market Area Plans). A key goal of the rezoning process was to encourage the creation of cohesive neighborhoods, particularly where new housing is being encouraged. The plans also propose public benefits and other implementation programs, particularly the creation of affordable housing. The program introduced new zoning districts, including districts that permit at least some PDR uses in combination with commercial uses, districts mixing residential and commercial uses, and areas where only PDR uses would be permitted, with residential use prohibited to alleviate development pressure on PDR uses. The Showplace Square/Potrero Hill Area Plan is located immediately to the west of the Mission Bay Plan (across Interstate 280), the Central Waterfront Area Plan is located immediately to the south of the Mission Bay plan area (south of Mariposa Street), and the East SoMa Area Plan is located immediately to the north (across China Basin and east of Fourth Street). Projects pursuant to the Eastern Neighborhoods Program are currently under construction, including several residential and mixed-used developments south of Mariposa Street.

- **Seawall Lot 337 and Pier 48 Mixed-Use Project (Mission Rock).** This possible future project is located about one-third mile north of Blocks 29-32 on the northeast side of the Mission Bay South Plan area. The project would include a mixed-use, multi-phase waterfront development on Seawall Lot 337, rehabilitation and reuse of Pier 48, and construction of approximately 5.4 acres of net new open space, for a total of 8 acres of open space on the site. Overall, the project would involve construction of up to approximately 3.7 million gsf of residential, commercial, and retail uses, and a public parking garage on the Project Site. Both Seawall Lot 337 and Pier 48 are owned by the Port of San Francisco. The project is currently in the environmental review phase.

- **Pier 70 Mixed-Use Development**: This possible future project is located just under one-half mile south of Blocks 29-32, on 35 acres located south of 20th Street and east of Illinois Street. This project proposes up to approximately 3,040,000 gsf (excluding parking) of above-grade construction in new buildings, and improvements to historic buildings. The project allows for a flexible land use program, including a maximum residential-use and maximum commercial-use scenarios for the Pier 70 Special Use District. Option 1 - maximum residential scenario, would consist of approximately 2,000 dwelling units within 1,605,000 gsf, including up to 904,000 gsf of commercial and office space, plus up to 365,700 gsf of manufacturing, local retail, creative uses and arts which is designated as an "Innovative Industries Zone." Option 2 - maximum office scenario, would consist of approximately 1,052 dwelling units within approximately 903,616 gsf, including up to approximately 1,810,000 gsf of commercial and office space, plus up to 327,700 gsf of manufacturing, local retail, creative uses and arts which is designated as an "Innovative Industries Zone."

E. EVALUATION OF ENVIRONMENTAL EFFECTS

Topics:	*Potentially Significant Effects Not Identified in Prior EIR*	*Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR*	*Sponsor Declines to Adopt Feasible Mitigation Measures or Alternatives*	*No New or More Severe Significant Effects*
1. LAND USE AND LAND USE PLANNING—Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒
c) Have a substantial impact upon the existing character of the vicinity?	☐	☐	☐	☒

Summary of Land Use Impacts in Mission Bay FSEIR

The land use significance criteria were addressed in the Mission Bay FSEIR in the Land Use section; the Plans, Policies, and Permits section; and the Initial Study Land Use section. Relevant information from these sections is summarized below.

The Mission Bay FSEIR Land Use setting section characterized existing land uses present within and near the Mission Bay plan area at that time. The Mission Bay FSEIR indicated the land uses within Blocks 29-32 at the time of preparation of the FSEIR consisted of industrial and commercial uses, parking facilities and vacant land (see Hazards and Hazardous Materials, below, for a discussion of known historical land uses within Blocks 29-32, and additional detail on specific land uses that existed at the time of preparation of the Mission Bay FSEIR).

While the Mission Bay FSEIR provided CEQA environmental analysis for the entire Mission Bay program, it divided the plan area into subareas to facilitate the analysis. Block 29-32 was located within the East Subarea (the area bounded by existing Terry François Blvd, Mariposa Street, Third Street, and Mission Bay Boulevard South). Development of this subarea was assumed to include commercial industrial and office; entertainment-oriented, neighborhood- and City-serving retail; and public open space land uses. Buildings in the subarea would be allowable up to 90 feet in height, with 7 percent of the developable area allowable up to 160 feet high (along Third Street). Buildings along the future realigned Terry A. François Boulevard would be restricted to 90 feet in height.

The Mission Bay FSEIR Initial Study Land Use section determined that the Mission Bay plan area was a largely underutilized industrial area with no established residential community; this was the basis for the Mission Bay FSEIR finding that the Mission Bay plan would not physically disrupt or divide an established community.

The Mission Bay FSEIR Plans, Policies and Permits section compared the Mission Bay plan and its implementing plans to other City plans, policies and regulations. The Mission Bay FSEIR indicated that the Mission Bay Redevelopment Plans and Design for Development documents would constitute the regulatory land use framework for the Mission Bay plan area, and would supersede the City's Planning Code (except where indicated in those implementing documents), and furthermore, the Redevelopment Plans would be required to be found consistent with the City General Plan prior to adoption. The Mission Bay FSEIR also acknowledged that certain development activities proposed within the Mission Bay plan area would be subject to applicable regional, State and/or federal permitting authority. The Mission Bay FSEIR analyzed the physical environmental impacts of potential policy conflicts for specific environmental topics, such as transportation and noise, in the respective sections of the FSEIR.

The Mission Bay FSEIR Land Use impacts section indicated that the Mission Bay project would result in a substantial change in the type and intensification in land uses in the Mission Bay plan area, involving demolition of most existing buildings and displacement of existing uses within the Mission Bay plan area, and development of the proposed mixed-use land use program over the build-out period. The Mission Bay FSEIR reported that the Mission Bay plan would continue the trend that was occurring in other nearby areas of the City (e.g., South of Market) of redeveloping former industrial areas into residential and commercial neighborhoods. The Mission Bay FSEIR reported that the commercial industrial/retail uses proposed within the East Subarea of the Mission Bay plan area, which includes Blocks 29-32, would be compatible with the medical research and instructional uses proposed within the adjacent proposed UCSF campus subarea (located west of the Blocks 29-32 across Third Street).

The Mission Bay FSEIR also acknowledged that construction activities associated with development of the proposed uses within the Mission Bay plan area would create construction-related effects (e.g., dust, noise, traffic) that may be noticeable and annoying to new residents within the Mission Bay plan area, however, with implementation of mitigation measures identified in the respective sections of the Mission Bay FSEIR, those effects would be mitigated to a less-than-significant level. These factors provided the basis for the Mission Bay FSEIR finding that the Mission Bay plan would not have a significant impact upon the existing character of the vicinity.

In summary, the Mission Bay FSEIR identified no significant impacts on land use from the Mission Bay plan, and accordingly, did not require any mitigation measures related to land use effects.

Impact Evaluation

Physical Division of an Established Community

Impact LU-1: The proposed project would not physically divide an established community. (Less than Significant)

Surface metered parking facilities currently operate in the west and north portions of the site, and a chain-link fence restricts access to the remainder of the site. During construction of the proposed project, the existing surface parking lot uses at the project site would be removed. Although the specific construction details have not yet been determined, the project may require temporary closure of lane(s) along Third Street, South Street, 16th Street and/or Terry A. François Boulevard during construction. Since these closures would be temporary, and alternate routes would be provided as needed, project construction would not physically divide the surrounding established community.

The proposed project would result in the construction and operation of an event center, office and retail uses, parking facilities and open space areas within Blocks 29–32. The proposed project would be incorporated within the established street plan, including realignment of Terry A. François Boulevard, and would not create an impediment to the passage of persons or vehicles. The proposed project design does not include any physical barriers or obstacles to circulation that would restrict existing patterns of movement between the project site and the surrounding neighborhood. To the contrary, the project would include a number of features designed to encourage and promote public access and circulation. For example, the project would include a 20-foot setback along the 16th Street frontage that would serve as a connector to the Bayfront Park, as shown in the Mission Bay South Design for Development document.

During events, particularly at the end of basketball games or other events when the peak flow of patrons would exit the project site, the project would involve implementation of transportation management measures. These measures could result in periodic disruption or division of the physical arrangements of existing surrounding rights-of-way through event-related street or lane closures, sidewalk restrictions, or transit reallocation. These impacts would be limited to a few hours before and/or after events, and they would be intended to most efficiently facilitate the flow of people and vehicles away from the project site, thereby enhancing connections as opposed to increasing divisions.

Given that the proposed project and uses would occur within the boundaries of the existing lot lines and no physical barriers to movement through the community would be involved, the construction and operation of the proposed uses would not result in any new impacts, or increase the severity of previously-identified impacts, related to physical division of an established community.

At the time of preparation of the Mission Bay FSEIR, several buildings and facilities were located and operating on the project site. These buildings and structures were subsequently removed, and the project site has been subject to grading, some excavation, and construction of paved surface parking lots, fencing and associated utilities. This change in conditions on the project site has not altered the fact that the site is within the established street plan.

As discussed above, the Mission Bay FSEIR did not identify a significant impact related to physical division of an established community because the surrounding community contained no residential uses.

As discussed above under Section B.3, Surrounding Uses, the area surrounding the project site has been partially developed since preparation of the FSEIR. The UCSF Mission Bay campus is located west, northwest, southwest, and partially south of the project site, including the UCSF Hearst Tower, a 14-story building containing student housing located northwest of the project site. Office buildings are also located north and south of the project site. In addition, as described above under "Approach to Analysis," the updated UCSF LRDP indicates plans for further development of about 1.46 million gsf of new space at the Mission Bay campus.

These changes in land uses surrounding the project site would not affect the determination whether the proposed event center and mixed-use development within the project site would physically divide an established community. As stated above, development would be undertaken within the existing property lines, and the project would facilitate pedestrian movement through the project site. The proposed project would be adjacent to the UCSF Mission Bay campus but would not physically divide the campus. Therefore, there have been no substantial changes with respect to circumstances under which the project is undertaken nor has any new information become available that will result in new or more severe impacts associated with the proposed project.

As discussed above, the Mission Bay FSEIR did not identify any significant impacts related to physical division of an established community, and accordingly, did not require any mitigation measures. Furthermore, the Mission Bay FSEIR did not identify any alternatives to reduce impacts related to physical division. Consequently, no new or different mitigation measures or alternatives to reduce project impacts related to physical division of an established community are identified or required with respect to the currently proposed project.

On the basis of the factors discussed above, the project would not have any new or substantially more severe effects than those identified in the Mission Bay FSEIR related to physical division of an established community.

Land Use Plan or Policies

Impact LU-2: The proposed project would not conflict with any applicable land use plans, policies or regulations of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating an environmental effect. (Less than Significant)

As stated above, the Mission Bay FSEIR indicated that the Mission Bay Redevelopment Plans and Design for Development documents would constitute the regulatory land use framework for the Mission Bay plan area. The Mission Bay FSEIR analyzed the physical environmental impacts of potential policy conflicts for specific environmental topics, such as transportation and noise, in the respective sections of the FSEIR.

The proposed project would not obviously conflict with applicable land use plans or policies, including the San Francisco General Plan, with San Francisco Planning Code provisions that apply to the project, or with the Mission Bay South Redevelopment Plan, under which the proposed office and retail uses are considered primary uses, and the proposed event center is considered a secondary use. In addition, the proposed project would be generally consistent with the major development standards of the Design for Development for the Mission Bay South Project Area. However, due to the unique nature of the event center component of the project, the sponsor intends to seek OCII approval of variations or amendments to some of these standards (see above, Section B.4, Approvals Required).

The project would not substantially conflict with regional plans or policies, including *Plan Bay Area*, the 2010 Clean Air Plan, *San Francisco Bay Plan*, and the *San Francisco Basin Plan*. Aside from land use effects, the physical environmental impacts of potential policy conflicts are addressed in the applicable sections of this Initial Study, including biological resources; the SEIR will provide detailed analysis of the physical environmental impacts of potential policy conflicts for the remaining resource areas, such as transportation and noise.

As part of the project approval process, OCII, the San Francisco Planning Commission, and other relevant regulatory agencies would determine whether the proposed project is consistent with their respective plans as applicable to the proposed project. Thus, the proposed project would have a less-than-significant impact with regard to conflicts with land use plans, policies, or regulations adopted for the purpose of avoiding or mitigating an environmental effect.

Since publication of the Mission Bay FSEIR, there have been three notable changes related to the applicable land use plans or policies associated with the project site: revisions to the South Design for Development; change in jurisdictional agency; and the update to the UCSF LRDP. As discussed in Section A.2, Background, above, the Redevelopment Agency/OCII has prepared nine addenda to the Mission Bay FSEIR, between 2000 and 2013. Only the 2004 addendum addressed changes to land use plans or policies applicable to the project site at Blocks 29-32. That addendum analyzed revisions to the South Design for Development regarding towers, tower separation, and setbacks. The unique nature of the proposed event center would require the sponsor to receive OCII approval of variations or amendments to some of these standards, which would occur as part of the project approval process.

As stated in the Project Description, in accordance with California Community Redevelopment Law, when the Board of Supervisors approved the South Plan in 1998, land use and zoning approvals within Mission Bay came under the jurisdiction of the Redevelopment Agency. However, with dissolution of redevelopment agencies statewide, and subsequent state and local legislation creating the Successor Agency, OCII now has jurisdiction and approval authority over the land use and zoning of the project site. This change in jurisdiction would not result in new or more severe impacts related to conflict with land use plans.

As stated above, under Section D, Approach to Analysis, under the UCSF 2014 LRDP 1,450,300 million gsf of new space is proposed on the North Campus (north of 16th Street) which includes 458,500 gsf of existing remaining entitlement from the 1996 LRDP, plus 991,800 gsf of new entitlement. On the North Campus, the 2014 LRDP calls for the same mix of research, support, parking, and open space uses as was analyzed in the Mission Bay FSEIR, but with some land use changes to undeveloped parcels. In particular, the 2014 LRDP calls for new housing on Mission Bay Boulevard South, at Sixth Street. On the South Campus, construction of a 124,500-gsf cancer outpatient building is anticipated prior to 2035, which will complete Phase 1 of the UCSF Medical Center at Mission Bay. This will bring the total space for Phase 1 to 993,500 gsf. On the South Campus, the Mission Bay FSEIR analyzed development of the blocks south of 16th Street with commercial-industrial and retail uses. The development of these blocks with UCSF clinical uses was previously analyzed in the 2008 addendum, as stated in the Project Description.

The clinical land uses called for in the 2014 LRDP would be consistent with the uses analyzed in 2008. Development of the East Campus would accommodate 500,000 gsf, plus 500 parking spaces, and pursuant to the LRDP the site would be functionally zoned for research and parking use. The site is intended to serve as a consolidation location for UCSF, for both owned and leased properties, to reduce costs and improve efficiencies. In the Mission Bay FSEIR, this site is analyzed for development of Commercial Industrial uses to facilitate the development of research and development, biotechnical, semi-conductor research, telecommunications, business or multimedia services, and related light industrial uses. The proposed USCF uses would be consistent with that land use designation as either primary or secondary use.

None of the changes in land use proposed in the 2014 LRDP would change the regulatory controls on the Blocks 29–32 project site. Moreover, the changes in land use would be limited to specific parcels (notably, the new housing site at Sixth Street, as well as a future research site on Owens Street) that—due to their relative distance from the Blocks 29-32 project site—would not present land use conflicts with the proposed project. Implementation of the 2014 LRDP would intensify research, clinical, housing, and medical office uses east and southeast of the Blocks 29–32 project site, but this intensification would not result in new or more severe land use impacts than those analyzed in the Mission Bay FSEIR.

Therefore, there have been no substantial changes with respect to circumstances under which the project is undertaken nor has any new information become available that would result in new or more severe impacts associated with the proposed project.

As discussed above, the Mission Bay FSEIR did not identify any significant impacts related to a conflict with land use plans or policies adopted for the purpose of avoiding or mitigating an environmental effect, and accordingly, did not require any mitigation measures. Furthermore, the Mission Bay FSEIR did not identify any alternatives to reduce conflict with land use plans or policies. Consequently, no new or different mitigation measures or alternatives to reduced project impacts related to conflict with land use plans or policies are identified or required with respect to the currently proposed project.

On the basis of the factors discussed above, the project would not have any new or substantially more severe effects than those identified in the Mission Bay FSEIR related to conflict with land use plans or policies adopted for the purpose of avoiding or mitigation an environmental effect.

Existing Character of the Vicinity

Impact LU-3: The proposed project would not have a substantial impact upon the existing character of the vicinity. (Less than Significant)

As discussed above, the Mission Bay FSEIR indicated that the commercial industrial/retail uses proposed within the east subarea of the Mission Bay plan area (which includes Blocks 29-32) would be compatible with the medical research and instructional uses proposed within the adjacent proposed UCSF campus subarea (located west of the Blocks 29-32 across Third Street).

Examples of potential Mission Bay plan research/light industrial/office land uses for the project site can include research and development, biotechnical or semiconductor research, telecommunications, business services, multimedia services, related light industrial uses, and commercial offices. Potential retail uses for the site can include city-serving retail uses, and neighborhood-serving retail within ground-floor spaces. Secondary uses could include institutions and assembly and entertainment (nighttime entertainment and recreation building).

The proposed project would result in the construction and operation of an event center, office and retail uses, parking facilities and open space areas within the project site. The retail and office uses would be generally consistent with the previously proposed uses for the site, such that no new or more severe conflicts with land use character would occur.

The proposed event center uses are considered "nighttime entertainment uses" and would be similar to the secondary "nighttime entertainment" uses previously analyzed in the Mission Bay FSEIR. On event days, the project's event component would attract spectators/attendees, as well as additional visitors to the other restaurant and retail uses. Although this entertainment use was addressed in the FSEIR, the size and intensity of the event center use was not previously analyzed.

Once completed, the proposed project would function as a destination site, with an intensification of use during events. Attendance at these events would alter the overall land use character of the project site from that analyzed in the FSEIR. As discussed in the Project Description, Golden State Warriors basketball games, large concerts, other sporting events and conventions would have average attendance ranging between approximately 7,000 and 18,000 people. Basketball games and concerts would typically occur during the evening hours, and conventions would generally occur during daytime hours. The facility would also host family shows, and smaller concerts with attendance ranging between 3,000 and 8,200 people during the daytime and evening hours. The outdoor plaza would be used for occasional outdoor gatherings and events.

The presence of event spectators/attendees on streets and sidewalks in the vicinity of existing uses would be noticeable compared to existing conditions. Events would also attract people to local restaurant, retail, and open space uses of the wider neighborhood. Similar to operation of such uses in proximity to AT&T Park during a Giants game, local restaurants, retail businesses, and open spaces would be more heavily patronized than under existing conditions, but they would continue to operate as intended.

Although the presence of these attendees on streets and sidewalks in the vicinity of medical research, clinic, and office uses in the surrounding Mission Bay neighborhood would be noticeable compared to existing conditions, these additional people would not impede the operation of those existing uses such that adverse land use impacts would occur. Each use would continue to function as intended. The effects of event center operation on the local transportation network, noise, and air emissions on the surrounding neighborhood will be addressed in the SEIR.

Basketball games and other planned events such as concerts would occur generally after commercial and medical office hours of nearby uses. Although the UCSF Medical Center would be a 24-hour use, hospital uses are generally more intensive during standard medical office hours. Moreover, there is nothing about the event center that would preclude operation of those uses. Therefore, although event center operations are expected to result in an incremental increase in localized traffic, noise, and air pollutant emissions, the uses in the project site vicinity would continue to function as intended.

On the basis of the factors discussed above, the project would not have any new or substantially more severe effects than those identified in the Mission Bay FSEIR related to conflict with existing land use character.

At the time of preparation of the Mission Bay FSEIR, the project site vicinity was occupied by a mix of warehouses used for light industrial, commercial, and office uses, as well as truck terminals, truck yards, gravel processing facilities, and expanses of undeveloped land. On the nearby waterfront were the Port's Maintenance Operations Facilities at Pier 50, the public boat launch ramp between Piers 52 and 54, yacht and boat clubs at Piers 50½, 52, and 54, and Agua Vista Park north of 16th Street.

Since preparation of the Mission Bay FSEIR, large portions of the Mission Bay plan area have been built out. The UCSF Mission Bay campus is located west, northwest, southwest, and partially south of the project site, and it currently includes a mix of parking structures, office buildings, research buildings, student housing, and hospital buildings. Other office buildings and vacant lots are located north and south of the site, and immediately east of the site are City-owned parcels containing covered stockpiled materials. The area of the proposed Bayfront Park currently includes a paved trail, surface parking lot, and unimproved open space.

These changes in conditions in land use character surrounding the project site would not result in new or more severe impacts on the existing character of the vicinity. Operation of the proposed office, entertainment, and retail uses would not conflict with the changed land use character. To the contrary, as stated above, the proposed project would be compatible with the existing character of the medical campus, office, and research-and-development uses in the project site vicinity. Therefore, there have been no substantial changes with respect to circumstances under which the project is undertaken nor has any new information become available that will result in new or more severe land use impacts associated with the proposed project.

As discussed above, the Mission Bay FSEIR did not identify any significant impacts upon the existing character of the vicinity, and accordingly, did not require any mitigation measures. Furthermore, the Mission Bay FSEIR did not identify any alternatives to reduce impacts upon the existing character of the vicinity. Consequently, no new or different mitigation measures or alternatives to reduced project impacts to land use character are identified or required with respect to the currently proposed project.

On the basis of the factors discussed above, the project would not have any new or substantially more severe impacts upon the existing character of the vicinity.

Cumulative Impacts

Impact C-LU-1: The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not result in significant cumulative impacts to land use. (Less than Significant)

The geographic scope for potential cumulative impacts related to land use generally includes the South Mission Bay Plan Area, as well as the immediately adjacent Eastern Neighborhoods Plan areas (i.e., the Central Waterfront and Showplace Square/Potrero Hill Area Plans), Seawall Lot 337/Pier 48 Mixed-Use project, and Pier 70 project (as discussed above under Section D, Approach to Analysis). Other reasonably foreseeable projects within the project vicinity with the potential to contribute to cumulative, land use impacts would be required to undergo separate environmental review, as necessary, and to identify mitigation measures for any significant impacts. Cumulative impacts on land use could result if the proposed project, in combination with other reasonably foreseeable projects in the vicinity, would collectively increase the potential for significant impacts.

Other projects within the Mission Bay South Plan Area would be built consistent with the Mission Bay South Plan and Mission Bay South Design for Development within the lot lines of existing streets, within an area of the City with a low residential population, and therefore would not be expected to physically divide an established community. Projects built pursuant to the Eastern Neighborhoods Area Plans would generally be constructed in areas with a mix of uses and higher residential population than the Mission Bay South Plan Area, but these projects would also be constructed within the existing street grid, and their operation would not physically divide an established community. The Pier 70 project, which is encompassed within the boundaries of the Eastern Neighborhoods Central Waterfront Area Plan, would be built entirely east of Illinois Street, as well as primarily south of 20th Street. The project would result in the construction of new streets and the extension of existing streets, as well as new parks and open space for pedestrian and cyclist access. Similarly, the Seawall Lot 337 and Pier 48 Mixed-Use Project would be built within existing lot lines east of Third Street, and create new access routes through the site. These projects would not physically divide an established community.

Cumulative developments in the Mission Bay South Plan Area would be required to generally conform to the Mission Bay South Plan land use designations and Mission Bay South Design for Development height, bulk, and developable area standards. Similarly, cumulative developments in the Showplace Square / Potrero Hill and Central Waterfront Plan Areas (including the Pier 70 project), would be required to conform to the land use controls of the Eastern Neighborhoods Rezoning and Area Plans. The Seawall Lot 337 and Pier 48 Mixed-Use Project would be subject to the Port of San Francisco land use controls, including the Waterfront Land Use Plan, and the Bay Conservation and Development Commission's San Francisco Bay Plan.

The Seawall Lot 337 and Pier 48 Mixed-Use Project is located about one-half mile north of Blocks 29-32 on the northeast side of the Mission Bay South Plan area. The project would include a mixed-use, multi-phase waterfront development on Seawall Lot 337, rehabilitation and reuse of Pier 48, and construction of approximately 5.4 acres of net new open space, for a total of 8 acres of open space on the site. Overall, the project would involve construction of up to approximately 3.7 million gsf of residential, commercial, and retail uses, and a public parking garage on the Project Site. Both Seawall Lot 337 and Pier 48 are owned by the Port of San Francisco. The project is currently in the environmental review phase. Therefore, in combination, these projects would not be anticipated to substantially conflict with land use plans and policies adopted for the purpose of avoiding an environmental effect.

Build-out of the remainder of the Mission Bay South Plan Area, the Eastern Neighborhoods Area Plans, the Seawall Lot 337 and Pier 48 Mixed-Use Project, and the Pier 70 project would result in an overall intensification and diversification of land uses in this area of the City. In particular, the Mission Bay South area and its surroundings is currently partially developed and partially occupied by vacant or underutilized parcels. New higher-density residential, commercial office, research-and-development, and medical uses in the Mission Bay South Plan Area, as well as in parcels south of the plan area, would complement the commercial office, research-and-development, and medical office developments completed to date. The land use impacts of buildout of the Mission Bay South Plan Area were included in the cumulative impacts analysis of the Eastern Neighborhoods EIR. Regarding projects in the Eastern Neighborhoods plan areas, introduction of more residential, commercial, and mixed-use buildings in the Central Waterfront and Showplace Square / Potrero Hill plan areas, would alter the land use character of these areas. The effects of these land use changes have been analyzed and disclosed in the Eastern Neighborhoods EIR. The Pier 70 project and Seawall Lot 337 and Pier 48 Mixed-Use Project would introduce new commercial office, residential, and retail spaces, as well as recreational open spaces. The land use impacts of these projects will be analyzed in each project's environmental review, currently under way.

These projects would combine with the proposed commercial office, retail, entertainment, and open space uses at Block 29–32 to create a wider mix of uses than currently exists in this portion of the City. Although this would represent a change in land use character, the combined effect would not be adverse. Each use would still function as intended, and many of the uses would be complementary. Thus, the proposed project in combination with existing and planned future developments in the vicinity would not combine to result in significant adverse cumulative effects to land use character.

Therefore, cumulative land use impacts would be less than significant.

Topics:	*Potentially Significant Effects Not Identified in Prior EIR*	*Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR*	*Sponsor Declines to Adopt Feasible Mitigation Measures or Alternatives*	*No New or More Severe Significant Effects*
2. AESTHETICS—Would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and other features of the built or natural environment which contribute to a scenic public setting?	☐	☐	☐	☒
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☐	☒
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area or which would substantially impact other people or properties?	☐	☐	☐	☒

Senate Bill 743 and CEQA Public Resources Code Section 21099

On September 27, 2013, Governor Brown signed Senate Bill (SB) 743 (Chapter 386 of the 2013 California Legislation Session), which became effective on January 1, 2014.[18] Among other provision, SB 743 amends the California Environmental Quality Act (CEQA) by adding Public Resources Code Section 21099 regarding analysis of aesthetics (and parking) impacts for urban infill projects.

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[18] SB 743 can be found on-line at: *http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB743*.

Aesthetics (and Parking) Analysis

Public Resources Code Section 21099(d), effective January 1, 2014, provides that, "aesthetics and parking impacts of a residential, mixed- use residential, or employment center project on an infill site located within a transit priority area shall not be considered significant impacts on the environment." Accordingly, aesthetics and parking are no longer to be considered in determining if a project has the potential to result in significant environmental effects for projects that meet the following three criteria:

- The project is in a transit priority area;[19] and
- The project is on an infill site;[20] and
- The project is residential, mixed-use residential, or an employment center.[21]

The proposed project meets each of the above three criteria because it (1) is located in proximity to several transit routes; (2) is located on an infill site that has previously been developed with industrial and commercial uses and is surrounded by areas of either recently completed or planned urban development; and (3) would be an employment center supporting a range of commercial uses, located in proximity to several transit routes, and in an urban area on a site already developed and zoned for commercial uses with a floor area ration (FAR) greater than 0.75.[22] Thus, this Initial Study and the SEIR do not consider aesthetics (or parking) in determining the significance of project impacts under CEQA.

Nevertheless, Public Resources Code Section 21099(d)(2)(A) states: "This subdivision does not affect, change, or modify the authority of a lead agency to consider aesthetic impacts pursuant to local design review ordinances or other discretionary powers provided by other laws or policies." Consequently, all applicable City urban design standards and guidelines governing the project site and proposed project, including the Mission Bay South Redevelopment Plan, Mission Bay South Design for Development, and Mission Bay South Signage Plan would apply to the proposed project. Furthermore, the project would be subject to all applicable design review approvals, including Major Phase approval by OCII, and Schematic Designs for each building and private open spaces, which would consider relevant design and aesthetic issues.

Public Resources Code Section 21099(d)(2)(B) states: "For the purposes of this subdivision, aesthetic impacts do not include impacts on historical or cultural resources." Please refer to Cultural Resources, below, for an assessment of potential project impacts on historic and cultural resources. Environmental effects of lighting on birds are addressed under Biological Resources.

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[19] Public Resources Code Section 21099(a) defines a "transit priority area" as an area within one-half mile of an existing or planned major transit stop. A "major transit stop" is defined in Section 21064.3 of the California Public Resources Code as a rail transit station, a ferry terminal served by either a bus or rail transit service, or the intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning and afternoon peak commute periods.

[20] Public Resources Code Section 21099(a) defines an "infill site" as a lot located within an urban area that has been previously developed, or a vacant site where at least 75 percent of the perimeter of the site adjoins, or is separated only by an improved public right-of-way from, parcels that are developed with qualified urban uses.

[21] Public Resources Code Section 21099(a) defines an "employment center" as a project located on property zoned for commercial uses with a floor area ratio of no less than 0.75 and located within a transit priority area.

[22] San Francisco Planning Department, Transit-oriented Infill Project Eligibility Checklist, November 10, 2014.

Topics:	Potentially Significant Effects Not Identified in Prior EIR	Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR	Sponsor Declines to Adopt Feasible Mitigation Measures or Alternatives	No New or More Severe Significant Effects
3. POPULATION AND HOUSING—Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing housing units or create demand for additional housing, necessitating the construction of replacement housing?	☐	☐	☐	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Summary of Population and Housing Impacts in Mission Bay FSEIR

The Mission Bay FSEIR Business Activity, Employment, Housing and Population setting section characterized existing business and employment conditions that were present within the Mission Bay plan area, nearby areas, the City as a whole, and the region at that time. The Mission Bay FSEIR indicated there were approximately 95 existing establishments within the Mission Bay plan area providing jobs for an estimated 1,670 workers at the time of preparation of the Mission Bay FSEIR. There were no residential units or permanent residents within the Mission Bay plan area at that time.

The Mission Bay FSEIR Business Activity, Employment, Housing and Population impacts section estimated employment by land use within the Mission Bay plan area at build-out. The Mission Bay FSEIR projected that total employment associated with the Mission Bay plan would generate approximately 30,000 jobs at build-out. Of that, uses proposed under the UCSF Long Range Development Plan were estimated to account for 30 percent of the future employment within the Mission Bay plan area; office uses would account for 29 percent; research and development would account for 22 percent; retail would account for 14 percent; and hotel, public facilities, housing and other miscellaneous uses would account for the remaining 6 percent. The Mission Bay FSEIR also indicated construction related to the Mission Bay plan would be a source of construction jobs for many years, estimated at an average of approximately 1,000 full-time construction jobs per year.

The Mission Bay FSEIR determined that development proposed under the Mission Bay plan could displace certain existing businesses. However, it noted that virtually all remaining existing businesses operating within Mission Bay plan area at that time were either on short-term leases or on a long-term lease that would expire soon. Furthermore, the Mission Bay FSEIR determined that most of those businesses would be able to relocate to alternative locations either elsewhere in or outside the City.

The Mission Bay FSEIR estimated that the Mission Bay plan would create approximately 6,100 housing units and 5,900 households and increase population by 10,900 (no housing was proposed within Blocks 29-32), and create approximately 6,900 employed residents within the Mission Bay plan area at build-out. The Mission Bay FSEIR estimated that the housing demand created by the planned employment growth of the Mission Bay plan would exceed the housing supply proposed within the Mission Bay plan area by approximately 3,700 units. The Mission Bay FSEIR estimated this offset would be accommodated by housing elsewhere in and outside the City. The Mission Bay FSEIR addressed the potential for the plan's jobs/housing imbalance to result in environmental impacts (e.g., transportation and air quality effects from longer commute distances), to be addressed in the corresponding sections in the FSEIR.

In summary, the Mission Bay FSEIR identified no significant impacts to business activity, employment, housing and population from the Mission Bay plan, and accordingly, did not require any mitigation measures related to plan effects on population and housing.

Impact Evaluation

Construction Impacts

Impact PH-1: Construction of the proposed project would not induce substantial growth in the area, either directly (for example, by constructing new homes or businesses) or indirectly (for example, through extension of roads or other infrastructure. (Less than Significant)

Project construction is estimated to last approximately 26 months**.** Several hundred construction workers would be required to construct the entire project, although the number of construction workers present on-site daily would range considerably, depending on the specific construction activities being performed and overlap between construction phases.

San Francisco and the five-county subregion of San Francisco, Alameda, Contra Costa, Marin and San Mateo Counties experienced persistently high unemployment in recent years. The construction sector was particularly affected by the 2007-2008 mortgage crisis and subsequent recession. Between 2007 and 2010, construction jobs in the five-county region declined by nearly 38,000 jobs, or about a third, over this period. However, the trend for the five counties as a whole began to reverse in 2011, with a net increase of about 520 construction jobs in the five-county region that year. Construction job growth has continued, and between 2010 and July 2014, more than 22,700 construction jobs were added in the five-county region. Therefore, as of July 2014, the net loss in construction employment in the five-county region since 2007 stands at about 15,000 jobs.[23]

Given the continuing population of unemployed construction workers, as well as the project being subject to OCII's workforce development program (which includes goals to hire local workers for construction), nearly all project construction labor needs would readily be met by current residents of San Francisco and the rest of the five-county region. Therefore, the project would not result in any new significant construction-related impacts, or increase the severity of previously-identified construction impacts, to population growth. Furthermore, there have been no substantial changes with respect to circumstances under which the project is undertaken nor has any new information become available that will result in new or more severe construction-related impacts to population growth associated with the proposed project.

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[23] California Employment Development Department, Labor Market Information, California Regional Economies Employment Series (CREE), 2014.

The Mission Bay FEIR and FSEIR did not specifically address potential indirect impacts to population growth related to extension of roads or other infrastructure. However, the project would not involve the extension of roads or other infrastructure except to the project site itself, at a location already well served by roads and other infrastructure, including previously approved improvements to roads and infrastructure associated with overall Mission Bay plan development. Consequently, the construction-related indirect impacts on population growth associated with the proposed project would be less than significant.

The Mission Bay FSEIR did not identify any significant construction-related impacts to population growth, and accordingly, did not require any mitigation measures for this impact. Furthermore, the Mission Bay FSEIR did not identify any alternatives to reduce construction-related impacts to population growth. Consequently, no new or different mitigation measures or alternatives to reduce project construction impacts to population growth are identified or required with respect to the currently proposed project.

Impact PH-2: Construction of the proposed project would not displace existing housing units or create substantial demand for additional housing. (Less than Significant)

No housing existed on Blocks 29-32 at the time the Mission Bay FSEIR was prepared, and no housing was planned for the project site under the Mission Bay plan. Consequently, implementation of the Mission Bay plan did not displace any existing housing units on the project site, and the proposed project on Blocks 29-32 would not change that condition. Furthermore, there are no circumstances under which the project would be undertaken that would change that condition, and the project's impacts on displacement of housing units or creation of substantial demand for additional housing would be less than significant.

The Mission Bay FSEIR did not identify any significant construction-related impacts to housing demand, and accordingly, did not require any mitigation measures for this impact. Furthermore, the Mission Bay FSEIR did not identify any alternatives to reduce construction-related impacts to displacement of housing. Consequently, no new or different mitigation measures or alternatives to reduce project construction impacts to housing demand are identified or required with respect to the currently proposed project.

Impact PH-3: Construction of the proposed project would not displace substantial numbers of people, necessitating the construction of replacement housing elsewhere. (Less than Significant)

As was anticipated by the Mission Bay FSEIR, all commercial and industrial uses that existed on the project site at the time of preparation of the Mission Bay FSEIR have since been removed, and their associated businesses displaced and/or relocated to other locations. Presently, the only business operating on the project site are two metered parking lots (Lots B and E) that were developed subsequent to the removal of the prior land uses. These parking facilities use fully-automated pay stations, so no workers are required for daily lot operations (other than potential daily pass-bys that may occur from employees servicing the pay stations). Consequently, the project is not expected to displace any on-site workers, or necessarily result in any reduction of employment for the parking company that owns and operates the parking lots, and impacts would be less than significant.

Therefore, project construction would not result in any new significant impacts, or increase the severity of previously-identified construction impacts, to displacement of people or need for replacement housing. Furthermore, there have been no substantial changes with respect to circumstances under which the project is undertaken nor has any new information become available that will result in new or more severe construction-related impacts to displacement of people or need for replacement housing associated with the proposed project.

The Mission Bay FSEIR did not identify any significant construction-related impacts to displacement or people or need for replacement housing, and accordingly, did not require any mitigation measures. Furthermore, the Mission Bay FSEIR did not identify any alternatives to reduce construction-related impacts to displacement or people or need for replacement housing. Consequently, no new or different mitigation measures or alternatives to reduce project construction impacts to displacement or people or need for replacement housing are identified or required with respect to the currently proposed project.

Operational Impacts

Impact PH-4: Operation of the proposed project would not induce substantial population growth in the area, either directly (for example, by constructing new homes or businesses) or indirectly (for example, through extension of roads or other infrastructure). (Less than Significant)

Table 2 summarizes the estimated permanent jobs that would result from project implementation. The Golden State Warriors, and office and retail development would employ an estimated 2,728 FTE workers at the project site. Of these, approximately 150 FTE employees would be existing Warriors staff who are currently employed in the Bay Area (Oakland); their jobs would therefore not be considered new Bay Area employment generated by the project. Thus, about 2,578 FTE workers would be employed at new jobs attributable to the project. In addition, the jobs for day-of-game/event staff at the event center are conservatively assumed to be all new.[24] Depending on the type of game/event at the event center, between 675 and 1,000 non-Warriors workers would be needed to staff the event center. Thus, the project would create a total of up to approximately 3,578 new jobs.

The estimated total 3,578 new jobs created by the project would incrementally further increase the jobs/housing imbalance that was described for the Mission Bay plan area in the Mission Bay FSEIR. However, similar to that discussed in the Mission Bay FSEIR, the estimated slight increase in this offset created by the project would be accommodated by housing elsewhere in and outside the City.

It should be noted there were 27,900 unemployed workers living in San Francisco in 2013 and 154,700 unemployed workers in the five-county region, out of a total labor force of about 487,000 and 2.35 million, respectively. The approximately 3,578 total new jobs generated by the project would represent about 0.7 percent of San Francisco's current labor force and 0.2 percent of the labor force in the five-county region.

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[24] It is noted that a certain percentage of the day-of-game/event jobs would be expected to be relocate from existing employment at the Oracle Arena in Oakland to the proposed event center. However, because Oracle Arena would continue to serve as an event venue, and furthermore, that simultaneous events would occur at Oracle Arena and the proposed new event center, there would be a net increase in event-day employment. For purposes of a conservative analysis, all day-of-game/event jobs at the proposed event center are considered net new.

TABLE 2
PROJECT EMPLOYMENT POPULATION

Project Component	Existing FTE[a]	New FTE[a]	Day-of-Game/Event Workers	Total
Golden State Warriors Staff	150	105	--[b]	255
Event Center Non-Warriors Day-of-Game Staff	--	--	1,000[c]	1,000
Office Staff	--	2,101	--	2,101
Retail Staff	--	372	--	372
Subtotal FTE Employees	150	2,578		2,728 FTE Employees
Subtotal Day-of-Game Staff			1,000	1,000 Day-of Game Staff
Total	**150**	**2,578**	**1,000**	**3,728 Total Workers (3,578 New Workers)**

NOTES:
a FTE = full-time equivalent
b Approximately 100 Golden State Warriors employees would work at Warriors games, however, they are accounted for in the estimate of Golden State Warriors FTE staff.
c Non-Warriors event center staffing level for a Golden State Warriors game is assumed in this analysis; lower non-Warriors staffing levels (675 – 775 workers) at the event center are anticipated for events such as concerts, family shows, other sporting events and other rentals.
d See text for assumptions regarding day-of-game/event workers.

SOURCE: Golden State Warriors, 2014

The new jobs would represent about 12.8 percent of the unemployed labor force in San Francisco and about 2.3 percent of unemployed workers in the five-county region. These new jobs would also represent about 1.9 percent of the new jobs that are projected by ABAG to be added in San Francisco by 2040.

Considering current unemployment levels in the City and region, and that the great majority of new jobs would not involve specialized skills, knowledge, or experience that could not be provided by individuals within the local or regional labor force, employment demand generated by project implementation is expected to be readily met by the local work force currently living in San Francisco or the five-county region.

Given that population or employment growth that would result from operation of the proposed project is substantially less than the population and employment growth forecasted to occur in the City, and because employment generated by the project could be met by the local and regional labor force, the project impact related to direct growth inducement would be less than significant.

Based on all these factors, project operation would not result in any new significant operational-related impacts, or substantially increase the severity of previously-identified operational impacts, to population growth. Furthermore, there have been no substantial changes with respect to circumstances under which the project is undertaken nor has any new information become available that will result in new or more severe operational-related impacts to population growth associated with the proposed project.

As discussed under Impact PH-1 regarding project construction, project operation would not involve the extension of roads or other infrastructure except to the project site itself, at a location already well served by roads and other infrastructure, including previously approved improvements to roads and infrastructure associated with overall Mission Bay plan development. Therefore the indirect impacts on population growth of project operation would be less than significant.

The Mission Bay FSEIR did not identify any significant operational-related impacts to population growth, and accordingly, did not require any mitigation measures for this impact. Furthermore, the Mission Bay FSEIR did not identify any alternatives to reduce operational-related impacts to population growth. Consequently, no new or different mitigation measures or alternatives to reduce project operational impacts to population growth are identified or required with respect to the currently proposed project.

Impact PH-5: Operation of the proposed project would not displace existing housing units or create substantial demand for additional housing. (Less than Significant)

As discussed above under Impact PH-2, no existing housing is located at the project site, and consequently, the project would not displace any existing housing units. As discussed under Impact PH-4, it is expected that employment needs for project operations would be met by residents already living in San Francisco or the rest of the five-county region. Therefore, project implementation would not create substantial demand for additional housing, and the impact would be less than significant.

Impact PH-6: Operation of the proposed project would not displace substantial numbers of people, necessitating the construction of replacement housing elsewhere. (No Impact)

As described under Impact PH-3, the construction of the project would not result in a displacement of population. Given that no impact would occur, project operations would similarly have no impact related to the displacement of people.

Cumulative Impacts

Impact C-PH-1: The proposed project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative impacts on population and housing. (Less than Significant)

The geographic context for analysis of potential cumulative population and housing impacts is San Francisco. Forecasts of reasonably foreseeable future development are based on the City and County of San Francisco's most recent Pipeline Report.[25] The Pipeline Report describes the development projects that would add residential units or commercial space, applications for which have been formally submitted to the Planning Department or the Department of Building Inspection. Pipeline projects encompass various stages of proposed development, from applications filed to entitlements secured, building permits issued to projects under construction.[26] In addition, the UCSF 2014 LRDP anticipates the addition of approximately 1.46 million gsf of new space on UCSF's North Campus (north of 16th Street), as well as approximately 918,000 gsf on the South Campus (south of 16th Street). (UCSF projects are not included in the City's Pipeline Report because the university is not under City jurisdiction.)

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[25] San Francisco Planning Department, *San Francisco Pipeline Report Quarter 2, 2014*, September 2014.

[26] However, the Pipeline Report does not include projects undergoing preliminary Planning Department review or projections based on area plan analysis.

Project Construction

As discussed under Impact PH-1, project construction is expected to generate several hundred construction jobs phased over a duration of approximately 26 months. Because construction employment is temporary, it would not combine with past or future construction projects to contribute to a cumulative impact related to construction employment. Project construction could be occurring concurrently with a considerable amount of other construction activity within San Francisco, however. The City's current Pipeline Report indicates that development proposals for a total of 18,482,800 square feet of commercial development and residential development totaling 50,700 units have been filed with the City, are under review, or are under construction. Some of these projects, potentially also including development pursuant to the UCSF 2014 LRDP, would be under construction at the same time as the proposed project. Despite the current robust level of construction activity in the City, however, considering the substantial job losses in the region experienced by the construction industry until recently, the construction labor force in San Francisco and the surrounding region is expected to accommodate demand for construction labor. Therefore, the cumulative impact of project construction in combination with other concurrent construction projects within the City would be less than significant.

Project Operation

Operation of the proposed project at Blocks 29-32 would add a total of up to 3,578 new jobs at the project site, as discussed under Impact PH-4. The project would not create a residential population, and consequently would not contribute to cumulative population and related housing impacts.

ABAG provides longer-term population, housing, and employment projections for San Francisco. The current projections were prepared, with MTC, in conjunction with development of Plan Bay Area.[27] Employment in San Francisco is expected to increase by 190,780 jobs between 2010 and 2040. The anticipated new commercial development discussed in the City's pipeline report would generate approximately 43,500 net new jobs (based on an average City employee density estimates for the proposed land uses). If this development were fully built out, combined with the project's estimated 3,578 new jobs, the cumulative employment increase would be 47,078 jobs. This would represent approximately 25 percent of employment growth estimated to occur in the City by 2040. Additional employment would be attributed to development pursuant to the UCSF 2014 LRDP—about 11,430 new jobs across all UCSF campuses. The same ABAG projections forecast that San Francisco will gain approximately 101,000 households by 2040, an increase of approximately 35 percent from the 2010 total. Given that the combined new employment would not exceed San Francisco's currently projected employment and housing growth for 2040, the cumulative increase in employment associated with the project in combination with other foreseeable nonresidential development would not result in a significant cumulative impact on the City's population and housing resources, and the impact would be less than significant.

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[27] ABAG and MTC, Plan Bay Area: Final Forecast of Jobs, Population and Housing, July 2013.

Topics:	Potentially Significant Effects Not Identified in Prior EIR	Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR	Sponsor Declines to Adopt Feasible Mitigation Measures or Alternatives	No New or More Severe Significant Effects
4. CULTURAL AND PALEONTOLOGICAL RESOURCES—Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5, including those resources listed in Article 10 or Article 11 of the San Francisco *Planning Code*?	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☐	☐	☒
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☐	☒

Summary of Cultural Resource Impacts in Mission Bay FSEIR

The cultural resources significance criteria were addressed in the Mission Bay FSEIR in the Visual Quality and Urban Design section and the Initial Study Cultural Resources section. Relevant information from these sections is summarized below.

Summary of Historic Architectural Resources in Mission Bay FSEIR

The Mission Bay FSEIR Visual Quality and Urban Design section summarized information from the 1990 Mission Bay FEIR on historic architectural resources present within or adjacent to the Mission Bay plan area. The Mission Bay FSEIR reported that former Fire Station 30, located at Third Street and Mission Rock Street within the Mission Bay plan area, was potentially eligible for the National Register of Historic Places (NRHP); and the Lefty O'Doul and Peter Maloney Bridges, located at China Basin Channel adjacent to but outside of the Mission Bay plan area, were determined to be eligible for listing on the NRHP.[28] These historic architectural resources are not located within, or in proximity to, the Blocks 29 to 32 site.

The Mission Bay FSEIR Visual Quality and Urban Design Impacts section determined that the proposed demolition of former Fire Station 30 would be a significant impact to this historic architectural resource, however, with implementation of Mitigation Measures D.2 identified in the Mission Bay FSEIR, this impact would be reduced to a less than significant level. The Mission Bay FSEIR further determined that since the Lefty O'Doul and Peter Maloney Bridges were located outside the Mission Bay plan area, and those structures and their setting would not be modified under the Mission Bay plan, impacts to those historic architectural resources would be less than significant.

In summary, the Mission Bay FSEIR determined the Mission Bay plan would result in a significant impact to historic architectural resources, and identified mitigation measures to reduce the impact to a less than

[28] In 1989, the Lefty O'Doul Bridge was designated City Landmark No. 194.

significant level. However, this impact and associated mitigation measures are not applicable to the Blocks 29-32 site.

Historic and Prehistoric Archaeological Resources in Mission Bay FSEIR

The Mission Bay FSEIR Initial Study Cultural Resources section summarized information from the 1990 Mission Bay FEIR on historic and prehistoric resources within the Mission Bay plan area, including information from a Cultural Resources Evaluation conducted in 1987 by David Chavez & Associates, and supplemented with an archaeological resources review conducted in 1997 also by David Chavez & Associates. The Mission Bay FSEIR Initial Study indicated that in 1997 the overall potential for prehistoric Native American sites within the Mission Bay plan area was considered to be low. However, there was potential for historic-period archaeological resources to be present within the Mission Bay plan area associated with the use of the area for industrial purposes and as a City landfill in the 19th and early 20th centuries. The Mission Bay FSEIR Initial Study presented mapping of areas within the Mission Bay plan area that had the most notable potential for subsurface historic and prehistoric cultural resources; this included the portion of the Mission Bay plan area south of and including 16th Street, which is located immediately south of and adjacent to the project site at Blocks 29-32.[29] No substantial potential for archeological resources was identified in most areas composed of filled land in the former Mission Bay, including the project site, with the exception of the opposite (north) margin of Mission Bay, which was used as the City dump in the late 19th century. At the time of publication of the FSEIR, no substantial potential for archeological resources was identified in most areas composed of filled land in the former Mission Bay, including the project site, with the exception of the opposite (north) margin of Mission Bay, which was used as the City dump in the late 19th century.

The Mission Bay FSEIR Initial Study concluded that development and associated construction under the Mission Bay plan could disturb potentially significant subsurface historic resources in six historic resource areas within the overall plan area and that the entire Mission Bay plan area has some sensitivity for the presence of unknown historic or prehistoric archaeological resources. However, with implementation of Mitigation Measures D.3, D.4, D.5, and D.6 identified in the Mission Bay FSEIR, these impacts would be reduced to a less-than-significant level.

In summary, the Mission Bay FSEIR determined that the Mission Bay plan would result in potentially significant impacts to subsurface prehistoric or historic archaeological resources within the Mission Bay plan area, including potential impacts within the vicinity of Blocks 29-32, and identified mitigation measures to reduce those impacts to a less-than-significant level.

[29] Potential historic-period resources in this area were identified as being associated with 19th century shipbuilding activities at Potrero Point (Point San Quentin), which extended northward into the southeast corner of Mission Bay nearly to 16th Street, and with a nearby glass factory.

Impact Evaluation

Historic Architectural Resources

Impact CP-1: The project would not cause a substantial adverse change in the significance of a historical resource as defined in §15064.5, including those resources listed in Article 10 or Article 11 of the San Francisco Planning Code. (Less than Significant)

The proposed project would result in the construction and operation of an event center, retail uses, office buildings, parking facilities and open space areas within the project site. However, as discussed above, the Mission Bay FSEIR did not identify any historic architectural resources within or in proximity of the project site, and correspondingly, did not identify any significant impacts to historic architectural resources within the project site. Given the absence of historic architectural resources within or in proximity to the project site, the construction and operation of the proposed uses would not result in any new impacts, or increase the severity of previously-identified impacts, to historic architectural resources.

At the time of preparation of the Mission Bay FSEIR, several buildings and facilities were located and operating on the project site. These buildings and structures were subsequently removed, and the project site has been subject to grading, some excavation, and construction of paved surface parking lots, fencing and associated utilities on portions of the site. This change in conditions on the project site has not altered the fact that the site contains no historic architectural resources, as those facilities that were removed from the project site did not have any historic architectural status or importance, nor would it alter the effects of the project with respect to impacts on historic architectural resources.

Pursuant to mitigation identified in the Mission Bay FSEIR, the sole historic architectural resource located within the Mission Bay plan area (former Fire Station 30) was evaluated and determined to be eligible for the NRHP.[30] This change in conditions for this resource, however, has no effect on conditions regarding the absence of historic architectural resources at or in the vicinity of the project site. There are no other new historic architectural resources, including City Landmarks and/or historic districts, which have been identified within the Mission Bay plan area, beyond those previously addressed in the Mission Bay FSEIR. Therefore, there have been no substantial changes with respect to circumstances under which the project is undertaken nor has any new information become available that will result in new or more severe impacts associated with the proposed project.

As discussed above, the Mission Bay FSEIR did not identify any significant impacts to historic architectural resources within the project site, and accordingly, did not require any mitigation measures for historic architectural resources that were applicable to the project site. Furthermore, the Mission Bay FSEIR did not identify any alternatives to reduce impacts to historic architectural resources within the project site. Consequently, no new or different mitigation measures or alternatives to reduce project impacts to historic architectural resources at the project site are identified or required with respect to the currently proposed project.

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30 Former Fire Station 30 has since been rehabilitated consistent with the *Secretary of the Interior's Standards for the Treatment of Historic Properties,* converted to provide a community meeting room and house the Arson Task Force, and integrated with the newly-constructed Public Safety Building.

On the basis of the factors discussed above, the project would not have any new or substantially more severe effects than those identified in the Mission Bay FSEIR on historical resources as defined in §15064.5, including those resources listed in Article 10 or Article 11 of the *Planning Code*.

Archaeological Resources

Impact CP-2: The project could cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5. (Less than Significant with Mitigation)

As discussed above, the Mission Bay FSEIR determined in 1998 that the Mission Bay plan would result in potentially significant impacts to subsurface prehistoric- or historic-era archaeological resources within the Mission Bay plan area, and identified mitigation measures to reduce those impacts, including within Blocks 29 to 32, to a less-than-significant level.

The proposed project would result in the construction and operation of an event center, retail uses, office buildings, parking facilities and open space areas within the project site. Construction activities would require foundation excavation to about 30 feet below San Francisco datum, pile driving to depths below that, and grading all of the site, which could disturb potentially significant subsurface historic and prehistoric archaeological resources, should such resources be present. These types of subsurface construction activities were anticipated and analyzed in the Mission Bay FSEIR, and there is nothing specific to the proposed subsurface construction activities at the project site that would result in new significant impacts or substantially increase the severity of previously-identified significant impacts to archaeological resources. Thus, impacts of the proposed project on archaeological resources would be potentially significant, but impacts could be reduced to less than significant with identified mitigation measures.

The FSEIR presented detailed mitigation measures for archaeological resources testing, monitoring, and exploration for identified historic resource areas within the Mission Bay plan area (see Mission Bay FSEIR Mitigation Measures D.3 and D.4). These historic resource areas were identified based on historic land uses in the area, such as early shipbuilding activities in the 1860s to 1880s, and pre-construction archaeological testing and construction monitoring is recommended to reduce potential impacts to less than significant. In addition, the FSEIR identified Mitigation Measure D.6 to mitigate for accidental discovery of archaeological resources anywhere in the plan area.

The FSEIR indicated that Blocks 29-32 is not located within any of the identified historic resource areas, which would imply that Mitigation Measures D.3 and D.4 are not specifically applicable to the project site, although one of the identified historic resource areas is located directly south of the Blocks 29-32 project site. FSEIR Mitigation Measure D.5 applies specifically to the area bordered by Berry, Fifth, and Seventh Streets (location of the 19th century), and does not apply to the project site. FSEIR Mitigation Measure D.6 is applicable to the project site, as discussed further below.

As described in the Project Description, the project sponsor has indicated that in order to minimize the risk of construction delays due to the potential presence of archaeological resources, the project sponsor would retain the services of an archaeologist to develop and implement a program of archaeological testing as part of the preliminary site evaluation and planning program for the proposed development at Blocks 29-32. This program would be similar to Mitigation Measures D.3 and D.4 previously identified in the FSEIR, and the results would be used to inform the construction activities, with the intent to avoid or minimize effects on subsurface archaeological resources prior to the commencement of foundation excavation and pile driving. The project sponsor would use the results of the archaeological testing to develop a construction monitoring program for protection of archaeological resources during construction while still achieving the Warriors' scheduling objectives. Nevertheless, while this component of the proposed project would provide additional protection for potentially present archaeological resources, due to the as yet unknown details of the proposed testing program, there remains the potential for project construction activities to adversely affect archaeological resources, if encountered, and the impact would be potentially significant.

Implementation of Mitigation Measures M-CP-2a (Archaeological Testing, Monitoring and/or Data Recovery Program) and M-CP-2b (Accidental Discovery of Archaeological Resources) would reduce this impact to less than significant. Mitigation Measures M-CP-2a would formalize the project sponsor's commitment to conduct archaeological testing and monitoring (as well as data recovery, if warranted), and would require that the project sponsor's archaeological testing and monitoring program be consistent with the City's standard protocols; this measure would in effect implement the requirements of FSEIR Mitigation Measures D.3 and D.4.

Mitigation Measure M-CP-2b replaces and implements FSEIR Mitigation Measure D.6. This replacement does not infer that there would be a new more severe significant impact or an impact of greater severity than was analyzed and disclosed in the FSEIR. Consistent with the conclusions of the FSEIR, FSEIR Mitigation Measure D.6, as implemented through Mitigation Measure M-CP-2b, would reduce the proposed project’s impact to a less-than-significant level. As such, the proposed project would not result in any new or substantially more severe impacts on archaeological resources than were analyzed and disclosed in the FSEIR.

The Mission Bay FSEIR identified feasible mitigation measures to reduce potentially significant impacts to subsurface prehistoric or historic archaeological resources within the Mission Bay plan area, including the project site, to a less than significant level. The Mission Bay FSEIR did not identify any alternatives to reduce archaeological resources at the project site. While there are no new or different mitigation measures or alternatives required to reduce project impacts to archaeological resources beyond those previously identified in the Mission Bay FSEIR, the City has since updated its standard mitigation measures for accidental discovery of archaeological resources, which would augment and replace the FSEIR Mitigation D.6, as specified below.

As discussed under Historic Architectural Resources, above, since preparation of the Mission Bay FSEIR, the project site has been subject to subsurface disturbance from grading, some excavation activities, and construction of paved surface parking lots. In addition, geotechnical investigations at the project site have indicated the top of the Colma Formation geologic unit underlying the site was at depths ranging from 19 to 70 feet below ground surface.[31] This geologic unit is known to be associated with the presence of archaeological resources. This information is corroborated by other geotechnical reports for development in

[31] Langan Treadwell Rollo, 2014. Preliminary Geotechnical Evaluation, Block 29-32 Mission Bay, San Francisco, California, Project No. 731617202. March 28, 2014.

the Mission Bay area that has occurred since publication of the Mission Bay FSEIR. No new historic or prehistoric archaeological resources have been identified at Blocks 29-32 since publication of the Mission Bay FSEIR.[32] However, this change in conditions on the project site and additional information would not create the potential for the project to result in new or more severe impacts to potentially significant subsurface historic and prehistoric archaeological resources that may be present on the site.

Thus, with implementation of Mitigation Measures M-CP-2a (Archaeological Testing, Monitoring and/or Data Recovery Program) and M-CP-2b (Accidental Discovery of Archaeological Resources), the proposed project would not result in any new or more severe significant effects on archaeological resources than were previously identified in the FSEIR.

Mitigation Measure M-CP-2a: Archaeological Testing, Monitoring and/or Data Recovery Program

Based on a reasonable presumption that archaeological resources may be present within the project site, the following measures shall be undertaken to avoid any potentially significant adverse effect from the proposed project on buried or submerged historical resources. The project sponsor shall retain the services of an archaeological consultant approved by OCII or its designated representative such as those from the rotational Department Qualified Archaeological Consultants List (QACL) maintained by the Planning Department archaeologist. The project sponsor shall contact the Department archaeologist to obtain the names and contact information for the next three archaeological consultants on the QACL. The archaeological consultant shall undertake an archaeological testing program as specified herein. In addition, the consultant shall be available to conduct an archaeological monitoring and/or data recovery program if required pursuant to this measure. The archaeological consultant's work shall be conducted in accordance with this measure at the direction of OCII or its designated representative. All plans and reports prepared by the consultant as specified herein shall be submitted first and directly to OCII or its designated representative for review and comment, and shall be considered draft reports subject to revision until final approval by OCII or its designated representative. Archaeological monitoring and/or data recovery programs required by this measure could suspend construction of the project for up to a maximum of four weeks. At the direction of the OCII or its designated representative, the suspension of construction can be extended beyond four weeks only if such a suspension is the only feasible means to reduce to a less than significant level potential effects on a significant archaeological resource as defined in CEQA Guidelines Sect. 15064.5 (a)(c).

***Consultation with Descendant Communities*:** On discovery of an archaeological site[33] associated with descendant Native Americans, the Overseas Chinese, or other descendant group an appropriate representative[34] of the descendant group and OCII or its designated representative shall be contacted. The representative of the descendant group shall be given the opportunity to

32 The "Prehistoric Native American Shell Middens on Mission Bay, San Francisco" archaeological district, recently determined eligible for the National Register, is located in the South of Market neighborhood (in the vicinity of the original northern shoreline of the Mission Bay), and consequently, is not located in proximity to the project site, and moreover, is completely outside the Mission Bay plan area.

33 By the term "archaeological site" is intended here to minimally include any archaeological deposit, feature, burial, or evidence of burial.

34 An "appropriate representative" of the descendant group is here defined to mean, in the case of Native Americans, any individual listed in the current Native American Contact List for the City and County of San Francisco maintained by the California Native American Heritage Commission and in the case of the Overseas Chinese, the Chinese Historical Society of America. An appropriate representative of other descendant groups should be determined in consultation with the Department archaeologist.

monitor archaeological field investigations of the site and to consult with OCII or its designated representative regarding appropriate archaeological treatment of the site, of recovered data from the site, and, if applicable, any interpretative treatment of the associated archeological site. A copy of the Final Archaeological Resources Report shall be provided to the representative of the descendant group.

Archaeological Testing Program. The archaeological consultant shall prepare and submit to OCII or its designated representative for review and approval an archaeological testing plan (ATP). The archaeological testing program shall be conducted in accordance with the approved ATP. The ATP shall identify the property types of the expected archaeological resource(s) that potentially could be adversely affected by the proposed project, the testing method to be used, and the locations recommended for testing. The purpose of the archaeological testing program will be to determine to the extent possible the presence or absence of archaeological resources and to identify and to evaluate whether any archaeological resource encountered on the site constitutes an historical resource under CEQA.

At the completion of the archaeological testing program, the archaeological consultant shall submit a written report of the findings to OCII or its designated representative. If based on the archaeological testing program the archaeological consultant finds that significant archaeological resources may be present, OCII or its designated representative in consultation with the archaeological consultant shall determine if additional measures are warranted. Additional measures that may be undertaken include additional archaeological testing, archaeological monitoring, and/or an archaeological data recovery program. No archaeological data recovery shall be undertaken without the prior approval of OCII or its designated representative. If OCII or its designated representative determines that a significant archaeological resource is present and that the resource could be adversely affected by the proposed project, at the discretion of the project sponsor either:

A. The proposed project shall be re-designed so as to avoid any adverse effect on the significant archaeological resource; or

B. A data recovery program shall be implemented, unless OCII or its designated representative determines that the archaeological resource is of greater interpretive than research significance and that interpretive use of the resource is feasible.

Archaeological Monitoring Program. If OCII or its designated representative in consultation with the archaeological consultant determines that an archaeological monitoring program shall be implemented the archaeological monitoring program shall minimally include the following provisions:

- The archaeological consultant, project sponsor, and OCII or its designated representative shall meet and consult on the scope of the AMP reasonably prior to any project-related soils disturbing activities commencing. OCII or its designated representative in consultation with the archaeological consultant shall determine what project activities shall be archaeologically monitored. In most cases, any soils- disturbing activities, such as demolition, foundation removal, excavation, grading, utilities installation, foundation work, driving of piles (foundation, shoring, etc.), site remediation, etc., shall require archaeological monitoring because of the risk these activities pose to potential archaeological resources and to their depositional context;
- The archeological consultant shall advise all project contractors to be on the alert for evidence of the presence of the expected resource(s), of how to identify the evidence of the expected

resource(s), and of the appropriate protocol in the event of apparent discovery of an archaeological resource;

- The archaeological monitor(s) shall be present on the project site according to a schedule agreed upon by the archaeological consultant and OCII or its designated representative until OCII or its designated representative has, in consultation with project archaeological consultant, determined that project construction activities could have no effects on significant archaeological deposits;

- The archaeological monitor shall record and be authorized to collect soil samples and artifactual/ecofactual material as warranted for analysis;

- If an intact archaeological deposit is encountered, all soils-disturbing activities in the vicinity of the deposit shall cease. The archaeological monitor shall be empowered to temporarily redirect demolition/excavation/pile driving/ construction activities and equipment until the deposit is evaluated. If in the case of pile driving activity (foundation, shoring, etc.), the archaeological monitor has cause to believe that the pile driving activity may affect an archaeological resource, the pile driving activity shall be terminated until an appropriate evaluation of the resource has been made in consultation with OCII or its designated representative. The archaeological consultant shall immediately notify the OCII or its designated representative of the encountered archaeological deposit. The archaeological consultant shall make a reasonable effort to assess the identity, integrity, and significance of the encountered archaeological deposit, and present the findings of this assessment to OCII or its designated representative.

Whether or not significant archaeological resources are encountered, the archaeological consultant shall submit a written report of the findings of the monitoring program to the OCII or its designated representative.

Archaeological Data Recovery Program. The archaeological data recovery program shall be conducted in accord with an archaeological data recovery plan (ADRP). The archaeological consultant, project sponsor, and OCII or its designated representative shall meet and consult on the scope of the ADRP prior to preparation of a draft ADRP. The archaeological consultant shall submit a draft ADRP to OCII or its designated representative. The ADRP shall identify how the proposed data recovery program will preserve the significant information the archaeological resource is expected to contain. That is, the ADRP will identify what scientific/historical research questions are applicable to the expected resource, what data classes the resource is expected to possess, and how the expected data classes would address the applicable research questions. Data recovery, in general, should be limited to the portions of the historical property that could be adversely affected by the proposed project. Destructive data recovery methods shall not be applied to portions of the archaeological resources if nondestructive methods are practical.

The scope of the ADRP shall include the following elements:

- *Field Methods and Procedures*. Descriptions of proposed field strategies, procedures, and operations.

- *Cataloguing and Laboratory Analysis*. Description of selected cataloguing system and artifact analysis procedures.

- *Discard and Deaccession Policy*. Description of and rationale for field and post-field discard and deaccession policies.

- *Interpretive Program*. Consideration of an on-site/off-site public interpretive program during the course of the archaeological data recovery program.
- *Security Measures*. Recommended security measures to protect the archaeological resource from vandalism, looting, and non-intentionally damaging activities.
- *Final Report*. Description of proposed report format and distribution of results.
- *Curation*. Description of the procedures and recommendations for the curation of any recovered data having potential research value, identification of appropriate curation facilities, and a summary of the accession policies of the curation facilities.

Human Remains and Associated or Unassociated Funerary Objects. The treatment of human remains and of associated or unassociated funerary objects discovered during any soils disturbing activity shall comply with applicable State and Federal laws. This shall include immediate notification of the Coroner of the City and County of San Francisco and in the event of the Coroner's determination that the human remains are Native American remains, notification of the California State Native American Heritage Commission (NAHC) who shall appoint a Most Likely Descendant (MLD) (Pub. Res. Code Sec. 5097.98). The archaeological consultant, project sponsor, OCII or its designated representative, and MLD shall make all reasonable efforts to develop an agreement for the treatment of, with appropriate dignity, human remains and associated or unassociated funerary objects (CEQA Guidelines. Sec. 15064.5(d)). The agreement should take into consideration the appropriate excavation, removal, recordation, analysis, custodianship, curation, and final disposition of the human remains and associated or unassociated funerary objects.

Final Archaeological Resources Report. The archeological consultant shall submit a Draft Final Archaeological Resources Report (FARR) to OCII or its designated representative that evaluates the historical significance of any discovered archaeological resource and describes the archaeological and historical research methods employed in the archaeological testing/monitoring/data recovery program(s) undertaken. Information that may put at risk any archaeological resource shall be provided in a separate removable insert within the final report.

Once approved by OCII or its designated representative, copies of the FARR shall be distributed as follows: California Archaeological Site Survey Northwest Information Center (NWIC) shall receive one (1) copy and OCII or its designated representative shall receive a copy of the transmittal of the FARR to the NWIC. As requested by OCII, the Environmental Planning division of the Planning Department shall receive one bound, one unbound and one unlocked, searchable PDF copy on CD of the FARR along with copies of any formal site recordation forms (CA DPR 523 series) and/or documentation for nomination to the National Register of Historic Places/California Register of Historical Resources. In instances of high public interest in or the high interpretive value of the resource, OCII or its designated representative may require a different final report content, format, and distribution than that presented above.

Mitigation Measure M-CP-2b: Accidental Discovery of Archaeological Resources (Implementing FSEIR Mitigation D.6)

The following mitigation measure is required to avoid any potential adverse effect from the proposed project on accidentally discovered buried or submerged historical resources as defined in *CEQA Guidelines* Section 15064.5(a)(c). The project sponsor shall distribute the Planning Department archaeological resource "ALERT" sheet to the project prime contractor; to any project subcontractor (including demolition, excavation, grading, foundation, pile driving, etc. firms); or utilities firm involved in soils disturbing activities within the project site. Prior to any soils disturbing activities being undertaken each contractor is responsible for ensuring that the "ALERT" sheet is circulated to all field personnel, including machine operators, field crew, pile drivers, supervisory personnel, etc. The project sponsor shall provide OCII officer or its designated representative with a signed affidavit from the responsible parties (prime contractor, subcontractor(s), and utilities firm) confirming that all field personnel have received copies of the Alert Sheet.

Should any indication of an archaeological resource be encountered during any soils disturbing activity of the project, the project Head Foreman and/or project sponsor shall immediately notify OCII officer or its designated representative and shall immediately suspend any soils disturbing activities in the vicinity of the discovery until OCII officer or its designated representative has determined what additional measures should be undertaken.

If OCII officer or its designated representative determines that an archaeological resource may be present within the project site, the project sponsor shall retain the services of an archaeological consultant from the pool of qualified archaeological consultants maintained by the Planning Department archaeologist. The archaeological consultant shall advise OCII officer or its designated representative as to whether the discovery is an archaeological resource, retains sufficient integrity, and is of potential scientific/historical/cultural significance. If an archaeological resource is present, the archaeological consultant shall identify and evaluate the archaeological resource. The archaeological consultant shall make a recommendation as to what action, if any, is warranted. Based on this information, OCII officer or its designated representative may require, if warranted, specific additional measures to be implemented by the project sponsor.

Measures might include: preservation in situ of the archaeological resource; an archaeological monitoring program; or an archaeological testing program. If an archaeological monitoring program or archaeological testing program is required, it shall be consistent with the Environmental Planning (EP) division guidelines for such programs. OCII officer or its designated representative may also require that the project sponsor immediately implement a site security program if the archaeological resource is at risk from vandalism, looting, or other damaging actions.

The project archaeological consultant shall submit a Final Archaeological Resources Report (FARR) to OCII officer or its designated representative that evaluates the historical significance of any discovered archaeological resource and describing the archaeological and historical research methods employed in the archaeological monitoring/data recovery program(s) undertaken. Information that may put at risk any archaeological resource shall be provided in a separate removable insert within the final report.

Copies of the Draft FARR shall be sent to OCII officer or its designated representative for review and approval. Once approved by OCII officer or its designated representative, copies of the FARR shall be distributed as follows: California Archaeological Site Survey Northwest Information Center (NWIC) shall receive one (1) copy and OCII officer or its designated representative shall receive a copy of the transmittal of the FARR to the NWIC. OCII and the Environmental Planning division of the Planning Department shall each receive one bound copy, one unbound copy and one unlocked, searchable PDF copy on CD three copies of the FARR along with copies of any formal site recordation forms (CA DPR 523 series) and/or documentation for nomination to the National Register of Historic Places/California Register of Historical Resources. In instances of high public interest or interpretive value, OCII officer or its designated representative may require a different final report content, format, and distribution than that presented above.

Paleontological Resources

Impact CP-3: The project would not directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. (Topic Not Previously Analyzed; Less than Significant)

Paleontological resources, or fossils, are the remains, imprints, or traces of once-living organisms preserved in rocks and sediments. Paleontological resources are lithologically dependent; that is, deposition and preservation of paleontological resources are related to the lithologic unit in which they occur. If the rock types representing a deposition environment conducive to deposition and preservation of fossils are not favorable, fossils will not be present. Rock types that may contain fossils include sedimentary and volcanic formations.

The Mission Bay FEIR and FSEIR did not specifically address potential impacts on paleontological resources within the Mission Bay Plan area, including the project site. However, excavation for the project would encounter only artificial fill and Holocene-aged Bay Mud, and there are no unique geologic features within the site.

The artificial fill is not naturally occurring and therefore does not likely contain significant fossil remains. There have been no vertebrate or invertebrate fossils identified in Holocene-aged sediments throughout the Bay Area, and the only plant fossils found in sediments of this age have been at Mount Lake in the Presidio.[35] While Bay Mud contains some invertebrate remains such as gastropods and bivalves, these are typically not yet fossilized, not yet extinct, and are likely to occur throughout similar deposits around the bay. Such remains are therefore not considered a significant paleontological resource, and these materials are considered to have a low paleontological potential per the Society of Vertebrate Paleontology criteria.[36]

Proposed project construction activities would require pile driving activities, which were assumed in the Mission Bay FSEIR to occur in the Mission Bay plan area, including within the project site. There is nothing specific to the proposed subsurface construction activities at the project site that would be substantially different from those analyzed in the Mission Bay FSEIR.

The proposed installation of piles at the project site would involve limited disruption of the underlying geologic units. As noted above, excavation at the project site would encounter only artificial fill and Bay Mud. In addition, the project would not involve excavation of exposed rock outcrops that would destroy

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35 University of California Museum of Paleontology Specimens, UCMP Specimen Search, http://ucmpdb.berkeley.edu/. Accessed on September 8, 2014.

36 The SVP has established guidelines for the identification, assessment, and mitigation of adverse impacts on nonrenewable paleontological resources. Many federal, state, county, and city agencies have either formally or informally adopted the SVP's standard guidelines for the mitigation of adverse construction-related impacts on paleontological resources. The SVP has helped define the value of paleontological resources and, in particular, indicates that geologic units of high paleontological potential are those from which vertebrate or significant invertebrate or significant suites of plant fossils have been recovered in the past (i.e., are represented in institutional collections). Areas that contain potentially datable organic remains older than the Recent era, including deposits associated with nests or middens, and areas that may contain new vertebrate deposits, traces, or trackways, are also classified as significant. Geologic units of low paleontological potential are those that are not known to have produced a substantial body of significant paleontological material. As such, the sensitivity of an area with respect to paleontological resources hinges on its geologic setting and whether significant fossils have been discovered in the area or in similar geologic units. Society of Vertebrate Paleontology (SVP), *Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources: Standard Guidelines*, *http://vertpaleo.org/The-Society/Governance-Documents/Conformable-Impact-Mitigation-Guidelines-Committee.aspx*. Accessed on September 8, 2014.

a unique geologic feature. Therefore, because there is a low potential to encounter paleontological resources during construction, impacts related to paleontological resources and geologic features would be less than significant, and no mitigation is required.

Human Remains

Impact CP-4: The proposed project would not disturb any human remains, including those interred outside of formal cemeteries. (Topic Not Previously Analyzed; Less than Significant)

The Mission Bay FEIR and FSEIR did not specifically address impacts associated with potential disturbance of human remains within the Mission Bay Plan area, including the project site. However, to date, no known human burial locations have been identified within the project site, though the possibility of such a discovery cannot be entirely discounted. Project construction could result in direct impacts to previously undiscovered human remains during earthmoving activities.

Under State law, human remains and associated burial items may be significant resources in two ways: they may be significant to descendant communities for patrimonial, cultural, lineage, and religious reasons; and human remains may also be important to the scientific community, such as prehistorians, epidemiologists, and physical anthropologists. The specific stake of some descendant groups in ancestral burials is a matter of law for some groups, such as Native Americans (CEQA Guidelines Section 15064.5 (d), Public Resources Code Section 5097.98). In other cases, the concerns of the associated descendent group regarding appropriate treatment and disposition of discovered human burials may become known only through outreach. Beliefs concerning appropriate treatment, study, and disposition of human remains and associated burial items may be inconsistent and even conflict among descendent and scientific communities.

If encountered, the treatment of human remains and of associated or unassociated funerary objects discovered during any soils disturbing activity shall comply with applicable State and Federal Laws, including immediate notification of the Coroner of the City and County of San Francisco and in the event of the Coroner's determination that the human remains are Native American remains, notification of the California State Native American Heritage Commission (NAHC) who shall appoint a Most Likely Descendant (MLD) (Pub. Res. Code Sec. 5097.98).

The project sponsor would be required to retain a qualified archaeological consultant, who in conjunction with the project sponsor, OCII (or its designated representative), and the MLD, shall make all reasonable efforts to develop an agreement for the treatment of, with appropriate dignity, human remains and associated or unassociated funerary objects (CEQA Guidelines. Sec. 15064.5(d)). The agreement should take into consideration the appropriate excavation, removal, recordation, analysis, curation, possession, and final disposition of the human remains and associated or unassociated funerary objects.

These requirements are consistent with provisions listed in Mitigation Measure M-CP-2a, Archaeological Testing, Monitoring and/or Data Recovery Program.

Therefore, because the project would be required to comply with the regulations described above and to implement the measures specified under those regulations, impacts related to disturbance of human remains would be less than significant.

Cumulative Impacts

Impact C-CP-1: The proposed project, in combination with past, present, and reasonably foreseeable projects, could result in significant impacts to cultural resources. (Less than Significant with Mitigation)

The geographic scope for potential cumulative impacts related to cultural resources generally includes the Mission Bay area. Other reasonably foreseeable projects within the project vicinity with the potential to contribute to cumulative, cultural resources impacts would be required to undergo separate environmental review, as necessary, and to identify mitigation measures for any significant impacts. Cumulative impacts on cultural resources could result if the proposed project, in combination with other reasonably foreseeable projects in the vicinity, would collectively increase the potential for significant impacts, even with implementation of project-specific mitigations.

As the proposed project would have no impacts to historic architectural resources, it therefore would not contribute to any such cumulative impact. Similarly, as the proposed project would have less than significant impacts on paleontological resources as described in Impact CP-3, other projects in the vicinity would also be expected to have a less than significant impact on these resources because they are all located on similar underlying geologic units (i.e., artificial fill and Bay Mud) that have low potential for presence of paleontological resources. Therefore, the cumulative impact would also be considered less than significant.

Similar to the proposed project as described under Impacts CP-2 and CP-4, the cumulative projects in the Mission Bay area could have a significant impact on both recorded and unrecorded archaeological resources, including human remains interred outside of formal cemeteries, given the substantial amount of construction-related ground disturbance that could occur. The potential impacts of the proposed project when considered together with similar impacts from other reasonably foreseeable projects in the project vicinity could contribute to a significant cumulative impact to buried archaeological resources. However, implementation of measures required by regulation to address human remains and of Mitigation Measures M-CP-2a and M-CP-2b, as standard City-required mitigation, would also apply to cumulative projects based on each project's potential to affect archaeological resources. These measures would require implementation of legally-required appropriate treatment of human remains as well as archaeological testing, monitoring and/or data recovery programs, which would reduce cumulative impacts to archaeological resources to a less-than-significant level. Therefore, with implementation of Mitigation Measures M-CP-2a and M-CP-2b, the proposed project's contribution to cumulative impacts would be less than significant with mitigation.

> **Mitigation Measure M-CP-2a: Archaeological Testing, Monitoring and/or Data Recovery Program** (see Impact CP-2 above)

> **Mitigation Measure M-CP-2b: Accidental Discovery of Archaeological Resources** (see Impact CP-2 above)

Topics:	*Potentially Significant Effects Not Identified in Prior EIR*	*Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR*	*Sponsor Declines to Adopt Feasible Mitigation Measures or Alternatives*	*No New or More Severe Significant Effects*
5. TRANSPORTATION AND CIRCULATION—Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☒	☐	☐
b) Conflict with an applicable congestion management program, including but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☐	☒	☐	☐
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location, that results in substantial safety risks?	☒	☐	☐	☐
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses?	☐	☒	☐	☐
e) Result in inadequate emergency access?	☒	☐	☐	☐
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☒	☐	☐

The SEIR will provide a summary of the transportation impacts from the Mission Bay FSEIR relevant to the project site. It will also include an updated, detailed analysis of transportation impacts associated with the proposed project, including explanation of the checklist items indicated above. The SEIR will include a complete description of the existing transportation setting, impact evaluation of project and cumulative impacts relative to existing conditions, and current mitigation measures, as appropriate.

With regard to the analysis of parking impacts of the proposed project, see discussion above under Aesthetics regarding Public Resources Code Section 21099. As stated above, parking is no longer to be considered in determining if a project has the potential to result in significant environmental effects for projects that meet all of the identified criteria. However, because parking conditions may be of interest to the public and the decision makers, the SEIR will present a parking demand analysis for informational purposes and will consider any secondary physical impacts associated with constrained supply (e.g., queuing by drivers waiting for scarce onsite parking spaces that affects the public right-of-way) as applicable in the transportation analysis.

Topics:	Potentially Significant Effects Not Identified in Prior EIR	Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR	Sponsor Declines to Adopt Feasible Mitigation Measures or Alternatives	No New or More Severe Significant Effects
6. NOISE—Would the project:				
a) Result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☒	☐	☐
b) Result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☒	☐	☐
c) Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☒	☐	☐
d) Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☒	☐	☐
e) For a project located within an airport land use plan area, or, where such a plan has not been adopted, in an area within two miles of a public airport or public use airport, would the project expose people residing or working in the area to excessive noise levels?	☐	☐	☐	☒
f) For a project located in the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
g) Be substantially affected by existing noise levels?	☐	☐	☐	☒

The proposed project is not located within an airport land use plan area, within two miles of a public airport, or within the vicinity of a private airstrip. Therefore, criteria E.6(e) and 6(f) are not applicable to the proposed project and are not discussed further in this Initial Study or in the SEIR. The proposed event center, and office and retail land uses would not be considered noise sensitive receptors, similar to the commercial industrial/retail land uses that were envisioned for Blocks 29-32 under the Mission Bay FSEIR. Consequently, the proposed project would not be substantially affected by existing noises levels, and criterion E.6(g) is therefore not discussed further in this Initial Study or in the SEIR.

The SEIR will provide a summary of the noise impacts from the Mission Bay FSEIR relevant to the project site. It will also include an updated, detailed analysis of noise impacts associated with the proposed project, including explanation of the checklist items indicated above related to a potentially substantial increase in severity of significant impacts identified in the Mission Bay FSEIR. The SEIR will include a complete description of the existing noise setting (2014), impact evaluation of project and cumulative impacts relative to existing conditions, and current mitigation measures, as appropriate.

Topics:	Potentially Significant Effects Not Identified in Prior EIR	Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR	Sponsor Declines to Adopt Feasible Mitigation Measures or Alternatives	No New or More Severe Significant Effects
7. AIR QUALITY—Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☒	☐	☐
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☒	☐	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal, state, or regional ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☒	☐	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☒	☐	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☒

The Mission Bay FSEIR did not address odor impacts associated with development of the Mission Bay plan. However, the proposed project would result in the construction and operation of urban land uses at the project site, similar to the types of uses completed or planned in the Mission Bay redevelopment area, and none of these uses would create or generate objectionable odors. Therefore, the proposed project would not result in any new or significant odor impacts, and significance criterion E.7(e) is not discussed further in this Initial Study or in the SEIR.

The SEIR will provide a summary of the air quality impacts from the Mission Bay FSEIR. It will also include an updated, detailed analysis of air quality impacts associated with the proposed project, including explanation of the checklist items indicated above related to a potentially substantial increase in severity of significant impacts identified in the Mission Bay FSEIR. The SEIR will include a complete description of the existing air quality setting (2014), impact evaluation of project and cumulative impacts relative to existing conditions, and current mitigation measures, as appropriate.

Topics:	Potentially Significant Effects Not Identified in Prior EIR	Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR	Sponsor Declines to Adopt Feasible Mitigation Measures or Alternatives	No New or More Severe Significant Effects
8. GREENHOUSE GAS EMISSIONS— Would the project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☒	☐	☐	☐
b) Conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☒	☐	☐	☐

The Mission Bay FSEIR did not address greenhouse gas (GHG) emissions as a distinct environmental topic. The SEIR will include an updated, detailed analysis of GHG impacts associated with the proposed project, including explanation of the checklist items indicated above. The SEIR will include a complete description of the existing GHG setting (2014), impact evaluation of cumulative GHG impacts, and current mitigation measures, as appropriate.

Topics:	*Potentially Significant Effects Not Identified in Prior EIR*	*Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR*	*Sponsor Declines to Adopt Feasible Mitigation Measures or Alternatives*	*No New or More Severe Significant Effects*
9. WIND AND SHADOW—Would the project:				
a) Alter wind in a manner that substantially affects public areas?	☐	☒	☐	☐
b) Create new shadow in a manner that substantially affects outdoor recreation facilities or other public areas?	☐	☒	☐	☐

The SEIR will provide a summary of the wind and shadow impacts from the Mission Bay FSEIR relevant to the project site. It will also include an updated, detailed analysis of wind and shadow impacts associated with the proposed project, including explanation of the checklist items indicated above related to a potentially substantial increase in severity of significant impacts identified in the Mission Bay FSEIR. The SEIR will include a complete description of the existing wind and shadow setting (2014), impact evaluation of project and cumulative impacts relative to existing conditions, and current mitigation measures, as appropriate.

Topics:	*Potentially Significant Effects Not Identified in Prior EIR*	*Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR*	*Sponsor Declines to Adopt Feasible Mitigation Measures or Alternatives*	*No New or More Severe Significant Effects*
10. RECREATION—Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facilities would occur or be accelerated?	☐	☐	☐	☒
b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☐	☒
c) Physically degrade existing recreational resources?	☐	☐	☐	☒

Summary of Recreation Impacts in Mission Bay FSEIR

The Mission Bay FSEIR Community Services and Utilities setting section summarized information on existing recreational uses that were present within the Mission Bay plan area at that time. The Mission Bay FSEIR identified the nearest existing public recreational facility to Blocks 29-32 as Agua Vista Park (a small landscaped area and fishing pier), located southeast of the project site across Terry A. François Boulevard.

The Mission Bay FSEIR Community Services and Utilities impacts section reported that residential and commercial development proposed within the Mission Bay plan area would generate a residential and employee demand, respectively, for parks. The Mission Bay FSEIR indicated 47 acres of open space was proposed within the Mission Bay plan area, of which more than 15 acres of new, non-UCSF parks and open space have been completed. Within the Mission Bay east subarea, this included an approximate 6-acre park to be developed as a bayfront linear park east of a realigned Terry A. François Boulevard (across from Blocks 30 and 32) from 16th Street north to Mission Rock Street; and a neighborhood park located along the west side of Terry A. François Boulevard south of 16th Street. In addition, the Mission Bay plan proposed a number of bicycle and pedestrian paths to connect parks and open spaces within the Mission Bay plan area, including a 20-foot wide setback to accommodate a pedestrian path along 16th Street (adjacent to Blocks 31 and 32) between Terry A. François Boulevard and Owens Street. The FSEIR noted that in addition to the proposed public open space, private open space would be developed within the Mission Bay plan area.

The Mission Bay FSEIR determined that the proposed areas of commercial development within the Mission Bay plan area would be located within a recommended 900 feet distance of open space. The Mission Bay FSEIR also determined that all proposed residential development within the Mission Bay plan area would be located within the recommended one-quarter mile distance of neighborhood parks for passive recreation, and would be generally within that distance for active recreation uses. The Mission Bay FSEIR added that the open space would be constructed with each phase of Mission Bay development, in the amount of at least 0.46 acres of open space for each 1.0 acre of developable area until all open space is developed. The Mission Bay FSEIR concluded that given the open space proposed near the development in each phase, that the provision of open space over the course of the Mission Bay plan area development build-out would be adequate.

In summary, the Mission Bay FSEIR identified no significant impacts to recreation from the Mission Bay plan, and accordingly, did not require any mitigation measures related to recreation.

Impact Evaluation

Existing Recreational Resources and Facilities

Impact RE-1: The proposed project would not increase the use of existing parks and recreational facilities such that substantial physical deterioration of the facilities would occur or otherwise result in physical degradation of existing recreational resources. (Less than Significant)

The San Francisco General Plan Recreation and Open Space Element (ROSE) indicates that a half mile is commonly accepted as the distance that can be comfortably walked in 10 minutes, and this distance is what most people are willing to walk to access community uses, including recreational facilities. However a 5-minute walk is more appropriate for activities that involve small children. The ROSE identifies "high needs areas" where the City should prioritize acquisition and renovation of recreational facilities based on walking distance. According to the ROSE, all of Mission Bay is within half-a-mile of passive recreational uses, and a portion of the neighborhood is within half-a-mile of active recreational uses, such as sports fields. However, much of Mission Bay is not within a quarter mile of a playground. The ROSE indicates that the planned open spaces in Mission Bay would shorten these walking distances.

The ROSE also identified high needs areas, based on population density, concentration children and senior citizens, household income, and areas of potential growth. Most of the Mission Bay neighborhood, including the project site, is generally identified as having a "lesser need." Areas along the waterfront east and northeast of the project site are identified as having a lesser need or a moderate need.

The proposed project would result in the construction and operation of an event center, office and retail uses, parking facilities, as well as 3.2 acres of open space areas within the approximate 11-acre project site. The increase in demand for recreational facilities generated by the project would generally be consistent with that described in the Mission Bay FSEIR for the entire Plan area and would be readily met by planned parks and open space areas developed as part of the Mission Bay Plan, as well as by existing facilities in the project vicinity. In particular, in addition to the 3.2-acres of open space to be constructed as part of the project, future employees and visitors to the project site would have convenient access to the planned 6-acre Bayfront Park east of a realigned Terry A. François Boulevard (across from the project site) and a neighborhood park located along the west side of Terry A. François Boulevard south of 16th Street. Moreover, the 3.2 acres proposed as part of the project would provide some of the planned open space in the Mission Bay area that allowed it to be classified as an area of "lesser need" in the first place. The commercial uses proposed under the project would be located within the recommended 900-foot distance of open space, pursuant to the Mission Bay Plan. Furthermore, the project would not impede residential developments under the Plan from meeting the recommended quarter-mile distance from a neighborhood-serving park.

Therefore, the project would not substantially increase the use of existing parks and recreational facilities and would not lead to physical deterioration of existing recreational resources. Project impacts on recreational resources would be less than significant, and the project would not result in any new or substantially more severe impacts than those previously identified in the FSEIR.

As described in the Mission Bay FSEIR, proposed development within the Plan area would be located within recommended distances to open space and recreational facilities, and that open space areas within the Plan area would be constructed commensurate with each phase of Mission Bay development. Since publication of the FSEIR, in general, development has evolved in the Mission Bay area consistent with this approach and no substantial changes or conditions have occurred at the project site and vicinity that would result in new or more severe impacts than those described in the FSEIR.

Therefore, impacts on existing parks and recreational facilities would be less than significant.

Construction or Expansion of Recreational Facilities

Impact RE-2: The proposed project would not require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment. (Less than Significant)

As described above, the proposed project would include 3.2-acres of open space, which would directly serve the project demand for recreational facilities, and would be located in proximity to planned future parks under the Mission Bay plan area. Consequently, the project would not require the construction or expansion of recreational facilities beyond that already included under the project and under the Mission Bay plan, and the project's effect on new or expanded recreational facilities that might have an adverse effect on the environment would be less than significant. There have been no changes in conditions or new information available since publication of the Mission Bay FSEIR that would result in new or more severe impacts than those disclosed in the FSEIR.

Cumulative Impacts

Impact C-RE-1: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative recreation impacts. (Less than Significant)

The geographic scope of potential cumulative impacts on recreational resources encompasses the recreational facilities in the Mission Bay Plan area. Based upon the analysis provided above, the proposed project would have a less than significant impact regarding substantial physical deterioration or degradation of existing recreational resources. The project could have a significant cumulative impact if the project in combination with past, present, and future projects in this area would increase the use of existing parks and recreational facilities such that substantial physical deterioration of the facilities would occur or otherwise result in physical degradation of existing recreational resources. However, as a program EIR, the Mission Bay FSEIR has addressed the cumulative impacts of overall development of the Mission Bay plan area on recreational resources, and the FSEIR identified no significant impacts to recreation from the Mission Bay plan, given that the plan includes substantial public open space that has been, and will continue to be constructed in phases in tandem with development of other uses called for in the plan. Thus, based on the analysis in the FSEIR, there would be no significant adverse cumulative effects on recreational resources.

Topics:	*Potentially Significant Effects Not Identified in Prior EIR*	*Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR*	*Sponsor Declines to Adopt Feasible Mitigation Measures or Alternatives*	*No New or More Severe Significant Effects*
11. UTILITIES AND SERVICE SYSTEMS— Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☒	☐	☐
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☒	☐	☐
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☒	☐	☐
d) Have sufficient water supply available to serve the project from existing entitlements and resources, or require new or expanded water supply resources or entitlements?	☐	☐	☐	☒
e) Result in a determination by the wastewater treatment provider that would serve the project that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☒	☐	☐
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☐	☒

Topics:	Potentially Significant Effects Not Identified in Prior EIR	Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR	Sponsor Declines to Adopt Feasible Mitigation Measures or Alternatives	No New or More Severe Significant Effects
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☒

Summary of Utilities and Service System Impacts in Mission Bay FSEIR

Water Supply

The Mission Bay FSEIR Community Services and Utilities setting section discussed water supply service to the Mission Bay plan area that existed at the time of preparation of the Mission Bay FSEIR. This Mission Bay FSEIR indicated the San Francisco Water Department (which has now been incorporated as part of the San Francisco Public Utilities Commission [SFPUC]) supplied water to the Mission Bay plan area, and existing water consumption in the Mission Bay plan area at that time was approximately 0.097 million gallons per day (mgd). The Mission Bay FSEIR mapped water mains that existed within the Mission Bay plan area at that time, including low pressure water lines within Third Street and 16th Street adjacent to Blocks 29-32, and bisecting Blocks 29-32 from west to east. The Mission Bay FSEIR also described the City's Auxiliary Water Supply System (AWSS) used for firefighting, and mapped an AWSS high pressure line within Third Street adjacent to Blocks 29-32.

The Mission Bay FSEIR Community Services and Utilities impacts section estimated the Mission Bay plan would require approximately 2.9 mgd of water at build-out. The Mission Bay FSEIR also described proposed water line improvements within the Mission Bay plan area proposed as part of the Mission Bay plan, including new low pressure water lines within South Street and Terry A. François Boulevard adjacent to the project site; and recycled water (referred to in the FSEIR as "reclaimed water") lines within Third Street, South Street, Terry A. François Boulevard and 16th Street adjacent to Blocks 29-32. The Mission Bay FSEIR determined that there was adequate water supply to serve the Mission Bay plan water demand, and that with the proposed water system improvements and implementation of water conservation measures proposed as part of the plan and included as Mitigation Measures M.2a through M.02g, the plan effects on water supply would be less than significant.

The Mission Bay FSEIR also determined that with implementation of Mitigation Measure M.3, which would improve and extend the high pressure auxiliary water supply system (AWSS) within the plan area, that plan effects on emergency water supply would be less than significant.

Wastewater/Stormwater Collection and Treatment

The Mission Bay FSEIR Community Services and Utilities setting section described existing wastewater collection and treatment services serving the Mission Bay plan area at that time. The Mission Bay FSEIR reported the existing sewage generation from the Mission Bay plan area (based on the 1990 FEIR) was approximately 0.072 mgd. The Mission Bay FSEIR also mapped sewer lines that existed within the Mission Bay plan area at that time. The Blocks 29-32 site was mapped as having an existing sanitary sewer line extending south and connecting to an existing combined sewer line; existing combined sewer lines were also mapped in Third Street and 16th Street adjacent to Blocks 29-32. (see Section E.15, Hydrology and Water Quality, below, for additional information on the City's combined sewer system and treatment plant capacity).

Mission Bay Plan Impacts at Buildout. The Mission Bay FSEIR Community Services and Utilities impacts section estimated that the Mission Bay plan would generate approximately 2.5 million mgd of wastewater at build-out (average dry weather flow). The Mission Bay FSEIR also described major sewer upgrades that were proposed as part of the Mission Bay plan within the Mission Bay plan area. The Mission Bay FSEIR indicated that the northern portion of the Blocks 29-32 (as part of the proposed Central/Bay sub-basin) would be served by proposed separate sanitary-sewer-only and storm drainage–only lines. The southern portion of Blocks 29-32 (as part of the proposed reconfigured Mariposa sub-basin) would continue to be served by the existing combined sewer system, but augmented with additional new sewer extensions (including within 16th Street east of Illinois Street adjacent to Blocks 31 and 32). (See Hydrology and Water Quality section, below, for additional detail on the proposed Mission Bay plan sewer system improvements.) The Mission Bay FSEIR determined that with the sewer system improvements proposed as part of the plan, the Mission Bay plan would accommodate the projected increases in wastewater generation and stormwater flows, and Mission Bay plan effects on wastewater and stormwater collection and treatment facilities would be less than significant.

Mission Bay Plan Interim Impacts during Phased Development. The Mission Bay FSEIR Community Services and Utilities Impacts section reported that infrastructure development of the proposed separated sewer system for the Central/Bay Basin would occur with each phase, but would not necessarily be immediately operational. The Mission Bay FSEIR indicated that as part of the Mission Bay plan and included as Mitigation Measure M.5, all stormwater runoff from newly developed areas in the Bay Basin would be conveyed to the combined sewer system prior to completion of the initial-flow diversion system, to ensure potential impacts to water quality during this interim period would remain less than significant.

Solid Waste

The Mission Bay FSEIR Community Services and Utilities setting section estimated that at the time of preparation of the FSEIR, the Mission Bay plan area generated approximately 2,700 tons of solid waste annually at that time. The Mission Bay FSEIR Community Services and Utilities impacts section estimated the Mission Bay plan would generate approximately 19,000 tons annually, of which between 12,000 and 9,700 tons annually would be disposed annually at Altamont Landfill assuming diversion rates of between 35 percent (1996 levels) and 50 percent (AB 939-required diversion rate for Year 2000), respectively). The Mission Bay FSEIR reported that the solid waste generation estimates for the Mission Bay plan were included in the landfill capacity projections for the Altamont Landfill, and concluded that the Mission Bay plan would not substantially affect the lifespan of the landfill.

Impact Evaluation

Water Supply

Impact UT-1: The City's water service provider would have sufficient water supply available to serve the project from existing entitlements and resources, and would not require new or expanded water supply resources or entitlements. (Less than Significant)

A water demand memorandum prepared by the sponsor for the proposed project indicates that estimated water demand for the currently proposed development at Blocks 29-32 would be 0.100 mgd as adjusted for water conservation measures as required under the Green Building Requirements in Chapter

13C of the 2010 San Francisco Building Code.[37] For outdoor water use, the project would be required to comply with further water conservation measures under the San Francisco Water Efficient Irrigation Ordinance. These requirements specify water efficiency and conservation measures for indoor and outdoor use, including establishing standards for low flow plumbing fixtures and water efficiency standards for landscape irrigation.

The project's estimated demand of 0.100 mgd is conservatively estimated to be entirely for potable water demand, although the project proposes to use recycled water for select non-potable water uses. The project sponsor has indicated that the project would have about 0.094 mgd in non-potable water demands (such as for toilets/urinals, irrigation, cooling tower, or commercial laundry).[38] In the future, when recycled becomes available, some of the estimated water demand could be met with recycled water for non-potable uses, which could reduce the project's potable water demand to less than 0.100 mgd.

On July 9, 2013, the SFPUC approved and adopted the Water Supply Assessment for the proposed Event Center and Mixed-Use Development Project at Piers 30-32 and Seawall Lot 330.[39] This Water Supply Assessment was conducted for an earlier design of the proposed project at another location in San Francisco about 1.5 miles north of the current project site. The Water Supply Assessment concluded that there are adequate water supplies in the regional water system to serve an estimated 0.109 mgd of water demand for the project and cumulative demands during normal years, single dry years, and multiple dry years from 2015 through 2035. The Water Supply Assessment also indicated that the demand of this project is encompassed within the overall San Francisco retail water demands being used for current water supply planning. Since the estimated water demand for the proposed project of 0.100 mgd is less than the 0.109 mgd identified in the Water Supply Assessment, the water demands of the project would not require new or expanded water supply resources or entitlements.

Therefore, as confirmed by the SFPUC, existing water supplies serving the City would be sufficient to meet the projected water demand of the proposed project, and the project would not trigger the need for new or expanded water supply resources or entitlements. Impacts on water supply would be less than significant, and no mitigation is necessary.

This impact determination is similar to the analysis in the Mission Bay FSEIR, which concluded that at build-out, the entire Mission Bay plan would require approximately 2.9 mgd of water supply from the SFPUC's regional water system. The SFPUC (referred to as the San Francisco Water Department in the FSEIR) determined at the time that there were adequate water supply resources to serve the Mission Bay plan area, provided that Mission Bay water users utilize reasonable water-conserving measures, as listed in FSEIR Mitigation Measure M.2. However, currently, compliance with the Green Building Requirements in Chapter 13C of the San Francisco Building Code would override and supersede FSEIR

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[37] BKF Engineers, 2014. *Mission Bay Blocks 29-32—Water Demand Memorandum*. Technical Memorandum to Clarke Miller, Strada Investment Group from Sravan Paladugu, P.E. and Jacob Nguyen, P.E. BKF No. 20136004-20, November 14, 2014.

[38] BKF, 2014. Golden State Warriors, Mission Bay Blocks 29-32, On-site Alternate Water Sources. Technical Memorandum to Clarke Miller, Strada Investment Group, from Jacob Nguyen, P.E. BKF No. 20136004, October 22, 2014.

[39] SFPUC, 2013. Water Supply Assessment for the Event Center and Mixed-Use Development Project at Piers 30-32 and Seawall Lot 330. July 1, 2013.

Mitigation Measure M.2 with respect to required water efficiency and conservation measures, and therefore FSEIR Mitigation Measure M.2 no longer applies to the proposed project.

Thus, the proposed project would not result in new or more severe impacts on water supply than previously identified in the FSEIR.

Since publication of the Mission Bay FSEIR, no substantial changes have occurred or new information has become available that would result in new or more severe impacts on water supply. However, it should be noted that the SFPUC has revised its assessment of water supply reliability since 1998, as required and documented in an urban water management plan (UWMP), which is updated every 5 years in compliance with the Urban Water Management Planning Act. The UWMP describes the SFPUC's long-term plan for its water supplies to meet the existing and future demands of its customers during normal, dry, and multiple dry years. The SFPUC's current 2010 UWMP was issued in 2011,[40] and the 2015 UWMP will be issued in 2016. During this interim period, the SFPUC developed a 2013 Water Availability Study[41] to document the SFPUC's current and projected retail water supplies[42] when compared to projected retail water demands. Future water supply sources include one recycled water project on the eastside of San Francisco, which in contrast to the assumption in the FSEIR that recycled water would be available to the plan area by 2011, is still in the planning stages, but is projected to eventually serve non-potable uses such as irrigation and toilet flushing for portions of the eastside of the City including the project site.

Impact UT-2: The proposed project would not require or result in the construction of new water treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects. (Less than Significant)

As discussed in Impact UT-1, the proposed project would not result in new or more severe impacts on water supply than previously identified in the Mission Bay FSEIR. Furthermore, the SFPUC has determined in the Water Supply Assessment, that the estimated water demand for the proposed project is already encompassed within the overall San Francisco retail water demands, for which the associated regional water treatment and transmission facilities have been established.

As described above in the Section A.2, Background, the Mission Bay master developer, FOCIL-MB, LLC, is required to provide the infrastructure serving the South Plan Area. Water delivery infrastructure has been completed on the north and west sides of the project site and there are existing water mains located along Third and South Streets. In addition, there are several existing service laterals extending from the utility mains along South Street that can presumably be used to service the project site. The master developer would be required to install new water mains along 16th Street and Terry A. François Boulevard, for both domestic water and recycled water, during the major phase development associated with the proposed project, and additional service laterals extending from the utility mains along South

40 SFPUC, 2011. *2010 Urban Water Management Plan for the City and County of San Francisco*, June 2011.

41 SFPUC, 2013. *Water Availability Study for the City and County of San Francisco*, May 2013.

42 The SFPUC provides water supply services to both wholesale and retail customers. The City and County of San Francisco, including the Mission Bay area, is part of SFPUC's retail customers.

Street that can presumably be used to service the project site. Additional service laterals are proposed along 16th Street and the future Terry A. François Boulevard frontage.

As part of the standard permit review process, the Mission Bay master developer, in coordination with the project sponsor, would be required to request a hydraulic analysis of the SFPUC water distribution system to confirm that the existing and planned water distribution system is adequate to meet the project's water distribution demands, including fire suppression system pressure and flow demands. If the water distribution system as approved under the Mission Bay Infrastructure Plan is inadequate to meet the project's demand, the project sponsor would be responsible for funding the construction of required new water mains and appurtenances. The construction of the new water mains and appurtenances would require excavation, trenching, soil movement, and other activities typical of construction of development projects in San Francisco, and similar to those activities analyzed in the Mission Bay FSEIR for the various infrastructure improvements. Activities required to install new water mains, if determined to be required, would be similar to those associated with construction of the project, and these activities would not result in new or more severe environmental impacts than those previously disclosed in the Mission Bay FSEIR.

This impact determination is similar to the analysis in the Mission Bay FSEIR, although the FSEIR also included Mitigation Measure M.3 recommending that the AWSS be extended into the project area as determined by the San Francisco Fire Department and Department of Public Works. However, since publication of the FSEIR, the SFPUC's City Distribution Division currently owns and operates the AWSS (not the San Francisco Fire Department), and a number of infrastructure improvements needed to serve the project site have already been completed, including a high pressure water main along Third Street, bordering the project site. As described above, the Mission Bay master developer, in coordination with the project sponsor would be required to request a hydraulic analysis of the SFPUC water distribution system to confirm that the water distribution system as approved under the Mission Bay Infrastructure Plan is adequate to meet the project's fire suppression system pressure and flow demands; and if the analysis determines the system to be inadequate, the project sponsor would be responsible for the costs of construction of required new water mains and appurtenances. Thus, FSEIR Mitigation Measure M.3 has been superseded by the completion of the high pressure water main in Third Street and does not apply to the proposed project.

Therefore, the proposed project would not require or result in the construction of new or expanded water mains that would cause significant environmental effects, and this impact would be less than significant. The proposed project would not result in new or more severe impacts associated with construction of new water facilities or pipelines than previously identified in the FSEIR.

Solid Waste

Impact UT-3: The proposed project would be served by landfills with sufficient permitted capacity to accommodate the project's solid waste disposal needs. (Less than Significant)

Under the proposed project, as shown in **Table 3**, the proposed project would generate approximately 2,211 tons of solid waste per year.

TABLE 3
ESTIMATED ANNUAL PROJECT-GENERATED SOLID WASTE

Proposed Use[1]	Square Footage	Solid Waste Generation Rate[2]	Solid Waste Generation (tons/yr)
Event Center	750,000	1.29 tons/1000 sf-yr	968
Retail	125,000	2.0 lb/100 sf-d	456
Office	605,000	1 lb/100 sf-d	787
Total			**2,211**

NOTES:
1 See Table 1 of this Initial Study.
2 Solid waste generation factor for the event center based on rates used in the Sacramento Entertainment and Sports Center & Related Development EIR, 2013. Generation rates for retaila and office based on rates used in the Mission Bay FSEIR, Table L.2. Retail assumed to operate 365 days a year; Office uses assumed to operate 260 days a year.

Since publication of the Mission Bay FSEIR, a number of changes have occurred with respect to solid waste disposal in the City, as described below, all of which would serve to reduce the total volume of solid waste to be disposed of in a landfill.

In 2002, the City adopted a Zero Waste Goal, which included a 75 percent landfill diversion goal citywide by 2010 and the goal of achieving zero waste to landfill by 2020, such that all discarded materials be diverted from landfills through recycling, composting or other means. The City achieved its 75 percent landfill diversion goal by 2008 through implementation of numerous programs and efforts. In 2006, the City adopted the Construction and Demolition Waste Ordinance mandating the recycling of construction and demolition debris. Effective since 2007, the City's Food Service Waste Reduction Ordinance prohibits any establishment that serves food prepared in San Francisco from using polystyrene foam containers, and requires any containers to be either recyclable or compostable. In 2009, the City adopted a Mandatory Recycling and Composting Ordinance, which requires all San Francisco residents and commercial landlords to separate their refuse into recyclables, compostables, and trash, thereby minimizing solid waste disposal and maximizing recycling. In addition, Chapter 13B of the San Francisco Building Code requires that all construction and demolition debris in amounts of one cubic yard or greater must be managed by a registered facility for recovery of the materials.

The Mission Bay FSEIR estimated that total solid waste generated by development under the Mission Bay plan at buildout would be approximately 19,000 tons per year for the entire plan area. However, compliance with all of the above changes in requirements for solid waste disposal since publication of the FSEIR would reduce the volume of solid waste requiring disposal in a landfill. Thus, given these changes, it would be expected that the current annual volume of solid waste would be less than what was projected in the FSEIR, thereby *reducing* the severity of the impact described in the FSEIR.

In addition, the Mission Bay FSEIR indicated that solid waste generated by development under the Mission Bay plan at buildout could be accommodated by the Altamont Landfill. However, the City's contract with the Altamont Landfill, which is based on volume of material disposed of, is anticipated to expire in 2015.

The City is currently conducting solid waste planning efforts and participating in the environmental review process for a potential future landfill contract to a Recology subsidiary for shipment of solid waste by truck and rail to the Recology Ostrom Road Landfill in Yuba County. This facility currently can accept 3,000 tons per day. It has an expected closure date of 2066 with a total design capacity of more than 41 million cubic yards. The City is also conducting environmental review of a short-range plan to haul solid waste to the Recology Hay Road Landfill in Solano County. The Recology Hay Road Landfill is permitted to accept up to 2,400 tons per day of solid waste and has capacity to accommodate solid waste until approximately 2050.

Despite these change in circumstances relative to disposal of solid waste generated by the Mission Bay plan at buildout, the proposed project would not result in new or substantially more severe impacts than those identified in the Mission Bay FSEIR. Compliance with the multiple City ordinances requiring reduction in solid waste for landfill disposal as well as the ongoing commitment of the City to secure a long-term landfill contract at an alternate location from the Altamont Landfill would ensure that the project would be served by landfills with sufficient permitted capacity to accommodate the project's solid waste disposal needs. Furthermore, the project would be designed to achieve a LEED Gold certification, which may be achieved through commitment to specific waste-reduction measures. These actions would reduce the volume of long-term waste generated by the proposed project. Therefore, this impact would be less than significant and no mitigation would be required.

Impact UT-4: The proposed project would comply with federal, state, and local statutes and regulations related to solid waste. (Less than Significant)

The Mission Bay FSEIR did not specifically address compliance with solid waste regulations. However, as discussed below, potential impacts associated with this issue would be less than significant.

The California Integrated Waste Management Act of 1989 required municipalities to adopt an integrated waste management plan to divert 75 percent of waste by 2010. The City of San Francisco achieved a 77-percent landfill diversion rate for 2008, exceeding the plan's goal by two years. Under Senate Bill 1016, the City's per resident disposal target rate is 6.6 pounds per person per day (PPD), and its per employee disposal target rate is 10.6 PPD. Both of these targeted disposal rates were met, with San Francisco generating about 2.9 pounds/resident/day and about 4.4 pounds/per employee/per day.

San Francisco Ordinance No. 27-06 requires a minimum of 65 percent of all construction and demolition debris to be recycled and diverted from landfills, and Chapter 13B of the San Francisco Building Code requires that all construction and demolition debris in amounts of one cubic yard or greater must be managed by a registered facility for recovery of the materials. Furthermore, the project would be required to comply with City Ordinance 100-09, the Mandatory Recycling and Composting Ordinance, which requires everyone in San Francisco to separate their refuse into recyclables, compostables, and trash. The Altamont and Recology Ostrom and Hay Road Landfills are required to meet federal, state and local solid waste regulations. The proposed project would be required to adhere to these regulations. Implementation of the proposed project would not impede the City from meeting solid waste regulations, and the impact would be less than significant.

Cumulative Impacts

Impact C-UT-1: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative utilities and service systems impacts. (Less than Significant)

The geographic contexts for impacts to utilities and service systems are the service areas for the applicable service providers. The proposed project, when combined with past, present, and reasonably foreseeable future development, would increase demand for water and solid waste disposal services of these providers.

Water Supply. As described in Impact UT-1, the SFPUC has adopted a Urban Water Management Plan (2010) that addresses the future water supply needs of its entire service area, as well as a 2013 Water Availability Study that addresses the future water supply for its retail customers, primarily the City and County of San Francisco. As stated above, the SFPUC has indicated that the water supply service to the proposed development at the site has already been incorporated into its water supply planning when considering the existing and future water demands for its entire service area. Therefore, the project would not contribute to a cumulative impact on water supply.

Solid Waste. As stated above, the City and County of San Francisco intends to achieve zero waste to landfill by 2020. Increased waste generation from the project and cumulative development would be partially offset by existing San Francisco ordinances and policies regarding waste reduction. Therefore, the increased generation of solid waste from these developments would not exceed permitted landfill capacity.

As such, the proposed project would not contribute to significant cumulative impacts on water supply and solid waste utilities and service systems.

Issues to be analyzed in the SEIR

The impact evaluation above explains why the proposed project would not result in new significant impacts or substantially increase the severity of impacts on water supply and solid waste utilities and service systems—with respect to criteria E.11 (b), (d), (f), and (g), and no further analysis is required on these subjects. However, with respect to criteria E.11(a), (b), (c), and (e) as they pertain to wastewater facilities, additional evaluation of the proposed project is necessary for both project and cumulative impacts related to wastewater and stormwater collection and treatment. In concert with the further analysis of hydrology and water quality issues, the SEIR will include a detailed analysis of:

- The potential for wastewater and/or stormwater generated by the project to result in exceedances of wastewater treatment requirements of the RWQCB
- The potential for wastewater and/or stormwater generated by the project to require the construction of new or expanded wastewater treatment or stormwater drainage facilities, the construction of which could cause environmental effects. This analysis will also discuss the applicability of FSEIR Mitigation Measure M.5 regarding stormwater management.
- The potential for the project to result in a determination by the SFPUC that it has inadequate capacity to serve the project demand for wastewater treatment.

Topics:	Potentially Significant Effects Not Identified in Prior EIR	Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR	Sponsor Declines to Adopt Feasible Mitigation Measures or Alternatives	No New or More Severe Significant Effects
12. PUBLIC SERVICES— Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of, or the need for, new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any public services such as schools, parks, or other services?	☐	☐	☐	☒
b) Result in substantial adverse physical impacts associated with the provision of, or the need for, new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any public services such as fire protection or police protection?	☐	☒	☐	☐

Issues related to parks, which is referred to in criterion E.12 (a), are addressed above in Section E.10, Recreation.

Summary of Public Services Impacts in Mission Bay FSEIR

Fire and Police Protection

The Mission Bay FSEIR Community Services and Utilities setting section characterized existing fire and police protection services serving the Mission Bay plan area and surrounding area at that time. The Mission Bay FSEIR noted that there were no San Francisco Fire Department (SFFD) fire stations operating within the Mission Bay plan area at that time, however, the plan area was served by up to six surrounding fire stations. The Mission Bay FSEIR also reported that the Mission Bay South area was located within the San Francisco Police Department's Bayview District, whose police station was located over 2½ miles south of the plan area.

The Mission Bay FSEIR Community Services and Utilities impacts section determined that the Mission Bay plan would potentially significantly increase demand for fire protection services in the Mission Bay plan area, and that a new fire station and additional fire department personnel and equipment, including a Hazardous Materials Unit, would be required in the Mission Bay South plan area at build-out in order to facilitate access in the event of a major emergency, and maintain adequate levels of service. The FSEIR also indicated the Mission Bay plan would increase demand for a new police station and additional police protection personnel.

The Mission Bay plan included the provision of land at the corner of Third Street and Mission Rock Street in the Mission Bay plan area for a new police/fire station. The Mission Bay FSEIR determined that with implementation of Mitigation Measures M.6a (Construct New Fire Station) and M.6b (Provide New Engine Company) to ensure funding for additional fire protection personnel, equipment and fire station, impacts to fire protection services would be less than significant. Furthermore, the Mission Bay FSEIR determined that the new police station proposed under the Mission Bay plan would increase community involvement and lower crime rates in the Mission Bay plan area and ensure impacts to police protection services would be less than significant. Potential impacts associated with the construction and operation of the new police/fire station itself were included in the overall analysis of the Mission Bay plan in the FSEIR.

Public Schools

The Mission Bay FSEIR Community Services and Utilities setting section described existing San Francisco Unified School District (SFUSD) school services, and noted that there were no public schools operating in the Mission Bay plan area at the time of preparation of the Mission Bay FSEIR.

The Mission Bay FSEIR Community Services and Utilities impacts section indicated the Mission Bay plan residential population would increase the demand on the San Francisco Unified School District (SFUSD). The Mission Bay FSEIR estimated that at full build-out, the Mission Bay plan residential uses would create approximately 1,615 school-age children residing in the Mission Bay plan area, including approximately 730 students of elementary school age, and approximately 75 percent of these students would be expected to attend public schools.

The Mission Bay plan included the transfer of land within the plan area for a new 500-student elementary school to the SFUSD prior to issuance of building permits for the Mission Bay plan residential units. On this basis, the Mission Bay FSEIR concluded that Mission Bay plan impacts to public schools would be less than significant. Potential impacts associated with the construction and operation of the new school were included in the overall analysis of the Mission Bay plan in the Mission Bay FSEIR.

The Mission Bay FSEIR also determined the proposed school site within the Mission Bay plan area would not be large enough to house a middle school or high school, or all of the potential new elementary school students, and consequently, that additional classroom space would need to be developed by SFUSD outside of the Mission Bay plan area, most likely for all grade levels. The Mission Bay FSEIR concluded it was too speculative to identify impacts from construction of additional school facilities, although any new facilities that would be proposed by SFUSD would be subject to appropriate environmental review for site-specific physical environmental impacts.

Other Public Services

The Mission Bay FSEIR Community Services and Utilities section and Initial Study determined that Mission Bay plan effect on public health services, childcare services, library services, street maintenance services, and emergency medical services would be less than significant, and consequently, the Mission Bay FSEIR did not require any mitigation measures for these topics.

Impact Evaluation

Schools and Other Services

Impact PS-1: The proposed project would not result in substantial adverse physical impacts associated with the provision of or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for schools or other services. (Less than Significant)

The proposed project does not include any residential uses, and therefore would not increase the demand for schools. Thus, the project would have no effect on public schools. Similarly, because the project does not include any residential uses, the project's effect on demand on other services (such as public health, childcare, library, street maintenance, and emergency medical) would be within the assumptions analyzed in the Mission Bay FSEIR for the entire plan area. The project would not result in any new or substantially more severe impacts on schools or other services than those previously identified in the FSEIR. Further, no substantial changes or conditions have occurred at the project site and vicinity that would result in new or more severe impacts than those described in the FSEIR.

Cumulative Impacts

Impact C-PS-1: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative impacts on schools or other services. (Less than Significant)

The geographic scope of potential cumulative impacts on schools and other services encompasses the Mission Bay plan area. As a program EIR, the Mission Bay FSEIR has addressed the cumulative impacts of overall development of the Mission Bay plan area on schools and other services, and the FSEIR identified no significant impacts from the Mission Bay plan. Thus, based on the analysis in the FSEIR, there would be no significant adverse cumulative effects on schools and other services.

Issues to be Addressed in the SEIR

Further discussion of potential impacts on law enforcement and fire protection services associated with construction and operation of the event center and associated development at the project site will be included in the SEIR, including the applicability of FSEIR Mitigation Measures M.6a (Construct New Fire Station) and M.6b (Provide New Engine Company). Although construction of the new Public Safety Building at Third and Mission Rock Streets is completed and will be operational in early 2015, and satisfies the requirements of these mitigation measures, the SEIR will provide a project-specific analysis of the impacts on law enforcement and fire protection services and adequacy of these mitigation measures to reduce project impacts to less than significant.

Topics:	Potentially Significant Effects Not Identified in Prior EIR	Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR	Sponsor Declines to Adopt Feasible Mitigation Measures or Alternatives	No New or More Severe Significant Effects
13. BIOLOGICAL RESOURCES— Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☐	☒
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☐	☒
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☐	☒
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

There are no applicable adopted habitat conservation plans, natural community conservation plans, or other approved habitat conservation plans that apply to the project site. Therefore, criterion E.13(f) does not apply to the proposed project, and this topic is not discussed further in this Initial Study or in the SEIR.

Summary of Biological Resource Impacts in Mission Bay FSEIR

The biological resources significance criteria were addressed in the Mission Bay FSEIR in the Initial Study Biology section and the China Basin Channel Vegetation and Wildlife section. Relevant information from these sections is summarized below.

The Mission Bay FSEIR Initial Study Biology section evaluated biological resource conditions present in the Mission Bay plan area at that time. The Mission Bay FSEIR Initial Study reported that the upland portion of Mission Bay South was mostly disturbed and sparsely vegetated, and did not contain substantial numbers of mature or scenic trees. Vegetative mapping of the Mission Bay plan area included in the Mission Bay FSEIR indicates Blocks 29-32 did not contain any notable vegetative habitat. The Mission Bay FSEIR Initial Study determined no state-listed threatened, endangered or rare plants, or rare, threatened or endangered animal species were known to occur in the upland portion of the Mission Bay plan area, as confirmed by biological field surveys. Consequently, the Mission Bay FSEIR identified no significant project impacts to upland plant and wildlife in the Mission Bay plan area, and accordingly, did not require any mitigation measures related to these resources.

Although not within the Blocks 29-32 vicinity, the Mission Bay FSEIR also analyzed potential impacts to aquatic and wetland habitats of China Basin Channel. The Mission Bay FSEIR China Basin Channel Vegetation and Wildlife section determined that significant impacts resulting from disturbance and removal of salt marsh wetland habitat resulting from installation of rip-rap and utilities in the Channel would be mitigated to a less than significant level through preparation and implementation of a salt marsh habitat mitigation plan in accordance with the Section 404 permit process of the U.S. Army Corps of Engineers. In addition, the Mission Bay FSEIR determined that significant impacts to herring reproduction from turbidity in the water of the Channel or Bay would be mitigated to a less than significant level by avoiding construction activities affecting turbidity during the herring spawning season, and, at other times, use of shallow-draft tugboats and barges with enforced speed limits and implementing a plan for minimizing turbidity during removal of existing piles.

Please see also, Hydrology and Water Quality, below, for discussion of potential Mission Bay plan effects on aquatic biota from treated wastewater and stormwater discharge, and sediment; and Hazards and Hazardous Materials, for a discussion of potential Mission Bay plan effects on aquatic biota from the presence of chemicals in construction dust.

Impact Evaluation

Special Status Species

Impact BI-1: The proposed project would not have a substantial adverse effect, either directly or through habitat modification, on any special status species. (Less than Significant)

A qualified biologist conducted a site reconnaissance on August 28, 2014. The reconnaissance visit consisted of a pedestrian survey within the project site's boundary and visual observations of the adjacent environments to identify suitable habitat or supportive communities for special-status[43] plant and wildlife species. General habitat conditions were noted and incidental species observations were recorded. Prior to the reconnaissance survey, a review of database queries was conducted for special-status species occurrences documented in the regional project vicinity (i.e. San Francisco County, San Francisco North and San Francisco South 7.5-minute U.S. Geological Survey quadrangles) including the California Department of Fish and Wildlife's (CDFW[44]) California Natural Diversity Database (CNDDB), U.S. Fish and Wildlife Service (USFWS), and California Native Plant Society (CNPS). Lists compiled of sensitive plant and animal species from these databases document 34 sensitive plant species

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43 The term "special-status" species includes those species that are listed and receive specific protection defined in federal or state endangered species legislation, as well as species not formally listed as Threatened or Endangered, but designated as "Rare" or "Sensitive" on the basis of adopted policies and expertise of state resource agencies or organizations, or local agencies such as counties, cities, and special districts. A principal source for this designation is the California "Special Animals List".

44 The California Department of Fish and Game (CDFG) changed its name on January 1, 2013 to the California Department of Fish and Wildlife (CDFW). In this document, references to literature published by CDFW prior to Jan. 1, 2013 are cited as 'CDFG, [year]'. The agency is otherwise referred to by its new name, CDFW."

and 41 animal species within the regional vicinity of the project site. Of these 75 special-status species, none were determined to have a moderate or high potential to occur on the proposed project site due to the lack of suitable habitat or supportive vegetation communities which these species require for sustained use (see Appendix A of this Initial Study).

The project site is located in a dense urban setting and currently does not contain desirable habitat that could support sensitive species. The project site currently contains two paved parking lots in the north and west portions of the site, and the remainder of the site consists of an undeveloped ruderal lot largely covered in gravel and surrounded by chain link fencing. Vegetation within the ruderal lot is sparse and dominated by non-native annual grasses and opportunistic weedy species which thrive in such ruderal environments and include, foxtail brome (*Bromus madritensis*), ripgut brome (*Bromus diandrus*), soft brome (*Bromus hordeaceus*), Italian rye grass (*Festuca perennis*), rattail sixweeks grass (*Festuca myuros*), Bermuda grass (*Cynodon dactylon*), fennel (*Foeniculum vulgare*), pampas grass (*Cortaderia jubata*), bristly ox tongue (*Helminthotheca echioides*), black mustard (*Brassica nigra*), stinkwort (*Dittrichia graveolens*), white sweetclover (*Melilotus albus*), cut leaf plantain (*Plantago coronopus*), and cheeseweed (*Malva parviflora*). Native prostate coyote bush (*Baccharis pilularis*) was also prevalent throughout the site. Birds commonly found in such areas with limited habitat value are seed-eating and include non-native species such as English sparrow (*Passer domesticus*) and European starling (*Sturnus vulgaris*) as well as birds native to the area, including house finch (*Haemorhous mexicanus*), lesser goldfinch (*Spinus psaltria*), Brewer's blackbird (*Euphagus cyanocephalus*), and rock pigeon (*Columba livia*). Evidence of Canada goose (*Branta canadensis*) is present on the site.

As discussed in the Section A, Project Description, on the project site, immediately east of, and adjacent to, Parking Lot B, is a depression (measuring approximately 320 feet by 280 feet) created by excavation and backfill associated with prior environmental cleanup of that portion of the site. Site reconnaissance revealed the deepest part of the excavation within this area contains standing water with a mixture of ruderal vegetation described above, and wetland plants, including alkali bullrush (*Bolboschoenus maritimus*), brass buttons (*Cotula coronopifolia*), fat-hen (*Atriplex prostrata*), and saltgrass (*Distichlis spicata*), present around its perimeter. The standing water supports common wildlife as evidenced by a snowy egret (*Egretta thula*) hunting at the water's edge and a black phoebe (*Sayornis nigricans*) sallying insects from a vegetative perch. These features are discussed in further detail under Impact BI-3.

Based on the data above and similar to the conclusions of the Mission Bay FSEIR for the entire plan area, the proposed project would not have a substantial adverse effect on special status species due to the lack of suitable habitat, as summarized in Appendix A. This impact would be less than significant, and no mitigation is required. Thus, the project would not result in any new impacts, or increase the severity of previously-identified impacts, to special-status species.

At the time of preparation of the Mission Bay FSEIR, the project site contained several buildings and facilities and was noted as lacking any notable vegetative habitat, with no state-listed threatened, endangered or rare plants, or rare, threatened or endangered animal species known to occur in the upland portion of the Mission Bay plan area, including the project site. Subsequent to that time, the project site has been subject to building removal, grading, excavation, and construction of paved surface parking lots, fencing and utilities on portions of the site. Other than the creation of the depression as a result of remediation actions, no other changes in the site since the preparation of the FSEIR have altered the characteristics of the site in relation to biological habitat. These changes in conditions on the project site have not altered the fact that the site provides no suitable habitat for any sensitive or special-status species due to the sparse and ruderal nature of onsite vegetation, as well as the site's location in a densely urbanized environment, as confirmed through the reconnaissance survey and database review of special-status species occurrences within the vicinity of the project site. In addition, there have been no substantial changes with respect to the circumstances under which the project would be undertaken, nor has any new information become available that demonstrates new or more severe impacts associated with the proposed project.

On the basis of the factors discussed above, the project would not have any new or substantially more severe effects than those identified in the Mission Bay FSEIR on special status species. Furthermore, the Mission Bay FSEIR did not identify any alternatives to reduce impacts to special-status species. Consequently, no new or different mitigation measures or alternatives to reduce project impacts to special-status species are identified or required with respect to the currently proposed project.

Sensitive Natural Communities

Impact BI-2: The proposed project would not have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations. (No Impact)

As described in Impact BI-1, above, the project site currently does not contain riparian habitat or other sensitive natural community, which is consistent with the description in the Mission Bay FSEIR of no notable vegetative habitat in the project area. Thus, the project would have no impact on any riparian or other sensitive natural community. No changes in conditions at the project site or any new information has become available that would result in new or more severe impacts associated with the proposed project with respect to sensitive natural communities.

Wetlands

Impact BI-3: The proposed project would not have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act or navigable waters as defined in Section 10 of the Rivers and Harbors Act through direct removal, filling, hydrological interruption, or other means. (Less than Significant)

As described above in Impact BI-1, the deeper excavation and surrounding shallow depressions within the project site are features that exhibit the hydrology and vegetation characteristics of wetlands. Hydric soil is presumed present due to the year-round inundation and presence of some obligate wetland plants. The deeper excavation is at a sufficient depth to intersect groundwater and a review of aerial imagery reveals water within the deeper excavation year round, while the shallow depressions appear to be seasonally wetted.[45] Vegetation composition within the deeper excavation differ from the upland, ruderal portions of the site and include several species that commonly occur in wetlands such as alkali bulrush,

45 Google aerial imagery, 2007-2014.

brass buttons, and fat-hen. Vegetation within the shallow depressions included a combination of saltgrass and Bermuda grass which can be found in both upland and wetland communities.

The jurisdictional status of the deeper excavation and surrounding shallow depressions has not been determined. This topic was addressed in a technical report prepared by the project sponsor's biological consultant[46], which discussed the origin of these features and how they conform to criteria for jurisdiction under the federal Clean Water Act. The report concluded that the noted features may be exempt from regulatory jurisdiction under the Clean Water Act due to their creation incidental to construction activities[47], even if they meet some technical criteria for jurisdictional wetlands. Specifically, the report states that the deeper excavation and shallow depressions within the project site may fall under the following exemption:

> "*Water-filled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States.*"[48]

Alternatively, because it contains ponded areas and supports wetlands plants, the excavation feature could be determined to be waters of the U.S. and/or waters of the state. Isolated ponded areas, even if artificially created, could also be determined to be waters of the state under the San Francisco RWQCB's Basin Plan as they can provide beneficial cover or foraging habitat for wildlife.[49]

The overall value of Blocks 29-32 to support or sustain wildlife is limited due to the sparse and ruderal nature of onsite vegetation, as well as the site's location in a densely urbanized environment. While several bird species were observed foraging and hunting onsite, these species are common to San Francisco and would continue to be supported by vegetation communities and water features found in the project vicinity. Because the excavation depressions on the site are small, isolated features resulting from recently completed hazardous materials remediation activities and are surrounded by paved areas and urban development, these features do not provide the important biological habitat functions and values that are typically associated with federally protected wetlands. As such, the proposed removal of these features would not constitute a significant adverse impact on wetland habitat resources.

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46 WRA, 2014. *Construction Related Depressions at Golden State Warriors Mission Bay Site,* San Rafael, CA. Prepared for Golden State Warriors, October 1.

47 The report discusses that under Regional Water Quality Control Board (RWQCB) Order R2-2005-0028, a portion of the project site underwent construction activities associated with the remediation of hazardous materials. The report describes that following excavation of the portion of the project site subject to remediation activities in 2005 and 2006, groundwater monitoring was required by the RWQCB between 2007 and 2013 to ensure the affected area met applicable standards for remediation. The report notes that partial backfilling of the excavated area occurred during the period of groundwater monitoring of the project site, however, a proposal to develop an office building with partial basement on the project site (that would have necessitated re-excavation of backfill materials from the excavation area), and unfavorable economic conditions, halted further backfilling of the excavated area. Based on post-remediation groundwater monitoring, RWQCB issued Order No. R2-2014-0022 attaining site closure.

48 Preamble to the CWA Regulations (33 CFR Parts 320 through 330), published in the Federal Register on November 13, 1986 (51 Fed. Reg. 41206):

49 California Regional Water Quality Control Board (RWQCB), 2013. Water Quality Control Plan (Basin Plan) for the San Francisco Bay Basin. Oakland, CA.

In the event that regulatory agencies determine that one or more of these features are jurisdictional, as part of the permitting process they may require mitigation to achieve "no net loss" of the function and values of the features. To achieve this performance standard, the following mitigation options could be implemented as compensation for project-related impacts to jurisdictional waters:

- Purchase of appropriate amount of credits at an approved wetlands mitigation bank;
- Payment into an approved in-lieu fee program to preserve or restore wetlands in the same watershed; or
- Provision of off-site mitigation.

The discussion above is consistent with the conclusions of the Mission Bay FSEIR for the entire plan area. The proposed project would not have a substantial adverse effect on identified federally protected wetlands as defined by Section 404 of the Clean Water Act, or navigable waters as defined in Section 10 of the Rivers and Harbors Act, or beneficial uses of wetlands according to the Basin Plan. This impact would be less than significant, and no mitigation is required. Thus, the project would not result in any new significant impacts, or increase the severity of previously-identified impacts, to wetlands.

Wildlife

Impact BI-4: The proposed project could interfere substantially with the movement of native resident or migratory wildlife species resident or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites. (Less than Significant with Mitigation)

The Mission Bay FSEIR did not specifically address the issue of migratory wildlife species. However, as discussed below, potential impacts associated with this issue would be mitigated to less than significant with implementation of standard mitigation measures.

Breeding Birds. Migratory and resident birds which breed locally in San Francisco have the potential to nest in shrub vegetation observed within the project site. While overall habitat is of marginal quality due to its urban context and disturbed soils, the composition of non-native vegetation can be attractive to seed eating birds, and the presence of native coyote bush, alkali bulrush and non-native pampas grass can provide cover and nesting substrate for smaller passerine species. Migratory birds are protected under the Migratory Bird Treaty Act and native resident nongame birds and their nests are protected from take under the California Fish and Game Code. Breeding birds which may nest within the project site could be adversely affected by project construction. Implementation of **Mitigation Measure M-BI-4a, Preconstruction Surveys for Nesting Birds,** would avoid disrupting or destroying active nests which could occur within the proposed project site during bird breeding season, and would reduce this impact to less than significant.

Avian Collisions with Buildings and Night Lighting. The project site is located within the Pacific Flyway along the western shoreline of San Francisco Bay. The waters of the Bay provide valuable stopover habitat for migratory birds. Open space, even in highly urbanized areas, creates potential bird habitat, and open space such as the open Bay in proximity to the proposed new buildings may increase the risk of bird collisions over that posed by existing structures, particularly from large amounts of reflective or artificially lighted surfaces. Many bird collisions are induced by artificial night lighting. The tendency of birds to move towards lights at night when migrating, and their reluctance to leave the sphere of light influence for hours or days once encountered, has been well documented.[50] Development of the proposed project would increase the amount of light and glare generated at the project site and vicinity, including from building facades, internal night lighting sources visible through windows of building exteriors, new streetlights and pedestrian lights within and adjacent to the site, nighttime lighting of building exteriors and signs, potential video screens, and headlights from project-generated traffic.

Similar to the conclusion reached for the Bay Bridge Lighting project,[51] due to the surrounding urban setting, the proposed project is not expected to appreciably increase the overall amount of lighting along the San Francisco waterfront as a whole (considering existing nighttime lighting conditions within Mission Bay, at AT&T Park and other shoreline locations). In addition, the project sponsor proposes to incorporate bird-safe measures that would reduce the potential effects of the project on birds. Nevertheless, given the preliminary nature of the project development, it cannot be concluded at this time that the proposed project building and associated lighting design would not have the potential to negatively affect birds.

The San Francisco Planning Department adopted *Standards for Bird-Safe Buildings* in 2011, adding Planning Code Section 139.[52] These standards guide the use and types of glass and façade treatments, wind generators and grates, and lighting treatments. The standards include requirements for bird-safe glazing and lighting in structures or at sites that represent a hazard to birds. While development within the Mission Bay plan area, including the project site, is not subject to the *Standards for Bird-Safe Buildings* or Planning Code Section 139, given the preliminary nature of the project design, and the remaining potential for the proposed building and/or lighting design to result in potential bird hazards, implementation of bird safe practices consistent with the City's *Standards for Bird-Safe Buildings* and Planning Code Section 139 is included as mitigation for the proposed project (**Mitigation Measure M-BI-4b, Bird Safe Building Practices).**

With implementation **Mitigation Measures M-BI-4a, Preconstruction Surveys for Nesting Birds, and M-BI-4b, Bird Safe Building Practices**, the project would not result in any new or substantially more severe significant impacts on resident or migratory bird species than those identified in the FSEIR.

Mitigation Measure M-BI-4a: Preconstruction Surveys for Nesting Birds

To the extent practicable, vegetation removal and grading of the site in advance of new site construction shall be performed between September 1 and January 31 in order to avoid breeding and nesting season for birds. If these activities cannot be performed during this period, a preconstruction survey of onsite vegetation for nesting birds shall be conducted by a qualified biologist.

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50 Gauthreaux, S.A., Belser, C.G., 2006, Effects of Artificial Night Lighting on Migrating Birds, In: Rich, C. and Longcore, T., Ecological Consequences of Night Lighting, Island Press, Covelo, CA, pp. 67–93.

51 H.T. Harvey and Associates. 2012. Final Assessment of the Potential Impacts of the Bay Bridge Lighting Project on Birds and Fish (HTH #3305-01). Letter report to Meryka Plumer, David J. Powers & Associates, Inc., 5 April, 2012.

52 San Francisco Planning Department, *Standards for Bird-Safe Buildings*, available: http://www.sf-planning.org/ftp/files/publications_reports/bird_safe_bldgs/Standards%20for%20Bird%20Safe%20Buildings%20-%2011-30-11.pdf., 2011.

In coordination with the OCII or its designated representative, pre-construction surveys of onsite vegetation shall be performed during bird breeding season (February 1 – August 31) no more than 14 days prior to vegetation removal, grading, or initiation of construction in order to locate any active passerine nests within 250 feet of the project site and any active raptor nests within 500 feet of the project site. Surveys shall be performed in accessible areas within 500 feet of the project site and include suitable habitat within line of sight as access is available. If active nests are found on either the project site or within the 500-foot survey buffer surrounding the project site, no-work buffer zones shall be established around the nests. Buffer distances will consider physical and visual barriers between the active nest and project activities, existing noise sources and disturbance, as well as sensitivity of the bird species to disturbance. Modification of standard buffer distances, 250 feet for active passerine nests and 500 feet for active raptor nests, will be determined by a qualified biologist in consultation with the California Department of Fish and Wildlife (CDFW). No vegetation removal or ground-disturbing activities including grading or new construction shall occur within a buffer zone until young have fledged or the nest is otherwise abandoned as determined by the qualified biologist.

If construction work during the nesting season stops for 14 days or more and then resumes, then nesting bird surveys shall be repeated, to ensure that no new birds have begun nesting in the area.

Mitigation Measure M-BI-4b: Bird Safe Building Practices

The project sponsor shall design and implement the project consistent with the San Francisco *Standards for Bird-Safe Buildings* and Planning Code Section 139, as approved by OCII. OCII shall consult with the Planning Department and the Zoning Administrator concerning project consistency with Planning Code Section 139.

Biological Resources Polices or Ordinances

Impact BI-5: The proposed project would not conflict with any applicable local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. (Less than Significant)

The Mission Bay FSEIR did not specifically address potential conflicts or compliance with local policies or ordinance protection biological resources. However, as discussed below, potential impacts associated with this issue would be less than significant, and no mitigation is required. Therefore, there would be no new or substantially more severe significant impacts than those identified in the FSEIR.

The City's Urban Forestry Ordinance protects San Francisco's street trees, significant trees and landmark trees regardless of species. There are no mature trees within the project site, including landmark trees, significant trees, or street trees. Although the Mission Bay FSEIR did not specifically address this issue, this impact would be less than significant because no tree removal is proposed as part of the project. Furthermore, the project would not preclude the ability of the City to plant trees in a sidewalk or public right-of-way along the project site perimeter, and the project would not conflict with this ordinance. There are no other applicable local policies or ordinances that apply to this site.

Thus, the project would not conflict with applicable local policies or ordinances protecting biological resources, and this impact would be less than significant.

Cumulative Impacts

Impact C-BI-1: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative impacts on biological resources. (Less than Significant)

The geographic scope of potential cumulative impacts on biological resources encompasses the species occurrences, habitats, and sensitive natural communities within the regional vicinity of the project site, including the portion of the Pacific Flyway along the City's Bay shoreline. Cumulative impacts are considered in the context of past, present and reasonably foreseeable project in this area—such as those listed above under Approach to Analysis—that could contribute to impacts on biological resources.

As described above in Impacts BI-1, BI-2, BI-3, and BI-4, the project site currently consists of either paved or undeveloped ruderal areas, with one notable depressed area containing some standing water, and overall habitat supportive of sensitive wildlife and plants is of marginal quality. With the exception of birds, the project, like other projects within the City's urbanized waterfront area, would have little or no potential to affect sensitive plants or wildlife, and therefore would not contribute to cumulative impacts on biological resources in the project area.

The proposed project could potentially result in adverse effects on various bird species through disruption of nests, collisions with buildings, or disorientation from night lighting. These impacts, in combination with other projects along the San Francisco waterfront, could potentially result in cumulative impacts to birds. However, other projects in San Francisco would be subject to the same environmental review requirements to provide mitigation for birds protected under the Migratory Bird Treaty Act and California Department of Fish and Game Code. Implementation of **Mitigation Measures M-BI-4a, Preconstruction Surveys for Nesting Birds, and M-BI-4b, Bird Safe Building Practices,** would not only reduce the project's impacts to less than significant, it would also reduce the project's contribution to any cumulative impact to less than significant.

Topics:	*Potentially Significant Effects Not Identified in Prior EIR*	*Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR*	*Sponsor Declines to Adopt Feasible Mitigation Measures or Alternatives*	*No New or More Severe Significant Effects*
14. GEOLOGY AND SOILS—Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	☐	☒
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? (Refer to Division of Mines and Geology Special Publication 42.)	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒

Topics:	Potentially Significant Effects Not Identified in Prior EIR	Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR	Sponsor Declines to Adopt Feasible Mitigation Measures or Alternatives	No New or More Severe Significant Effects
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☒
c) Be located on geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☐	☐	☒
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code, creating substantial risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒
f) Change substantially the topography or any unique geologic or physical features of the site?	☐	☐	☐	☒

The Mission Bay FSEIR did not specifically address having soils capable of supporting the use of septic tanks or alternative waste disposal systems. However, the proposed event center and other proposed developments would connect to the combined sewer system, and would not use septic tanks or other on-site land disposal systems for sanitary sewage. Therefore, criterion E.14(e) is not applicable to the proposed project.

Summary of Geology and Soils Impacts in Mission Bay FSEIR

The geology and soils significance criteria were addressed in the Mission Bay FSEIR in the Seismicity section and the Initial Study Geology/Topography section. Relevant information from these sections is summarized below.

The Mission Bay FSEIR Seismicity setting section characterized existing soil and geologic conditions in the Mission Bay plan area, and discussed existing seismic and geologic hazards. The Mission Bay FSEIR indicated the Mission Bay plan area is underlain by artificial fill, silty clay (Bay Mud), sandy alluvium, and stiff marine Old Bay Clay that overly the Franciscan bedrock located at depth of 30 to 130 feet below sea level. The Mission Bay FSEIR noted the Mission Bay plan area is not located within an Alquist-Priolo Fault Zone, but is within a Seismic Hazards Zone for liquefaction as defined in the City's Community Safety Element.

The Mission Bay FSEIR Seismicity impacts section indicates the Mission Bay plan area is susceptible to earthquake-related groundshaking that would be strong enough to damage buildings and infrastructure, and could cause associated ground failure, such as liquefaction, all of which pose risks of injury or loss of life to people in or near the affected structure. The Mission Bay FSEIR noted that the San Francisco Building Code would require seismically-resistant construction in the Mission Bay plan area to reduce risks to people and structures during earthquakes. The Building Code requires that all new development in the Mission Bay plan area be preceded by special site-specific investigations to determine the type and degree of hazards present, and include site-specific modeling to accurately estimate seismic forces that could act on a structure. In accordance with the Building Code, the resultant measures must be incorporated into the plans and specifications for a building to ensure an appropriate engineering design that would ameliorate the identified seismic hazards. To address the potential for liquefaction-related damage, the Mission Bay FSEIR noted that the major structures within the Mission Bay plan area would be constructed on foundations supported by piles driven into competent geologic materials such as dense sands, stiff clays, or bedrock. The Mission Bay FSEIR concluded that compliance with the Building Code and construction of pile-supported structures would reduce seismic hazards to an acceptable level.

The Mission Bay FSEIR Seismicity impacts section also notes that concrete piles are commonly used to penetrate the artificial fill and Bay Mud and that a sulfate-resistant mix of cement would be used to protect the concrete and reinforcing steel from the corrosive effects of the fill and young Bay Mud. To ensure compliance with this, the FSEIR includes Mitigation Measure H.7 requiring testing of the soil for sulfate and chloride content.

The Mission Bay FSEIR Initial Study Geology/Topography section reported that there are no known unique geologic features in the Mission Bay plan area. The FSEIR Initial Study estimated that up to 300,000 cubic yards of fill would be added to the Mission Bay plan area over the course of construction; this included the proposed addition of between 1 and 1.5 feet of new fill in low spots east of Third Street. The Mission Bay FSEIR Initial Study determined that this additional fill would cause no substantial change in the largely flat character of the site's topography. Given these factors, the Mission Bay FSEIR concluded the Mission Bay plan's effect on changes in topography and unique geologic features would be less than significant.

The Mission Bay FSEIR Initial Study Geology/Topography section concluded that the potential for settlement when a new structure is constructed is high because of the irregular nature of the artificial fill used to create the underlying land and the compressibility of the underlying Bay Mud. The Mission Bay FSEIR reported the alluvium, Old Bay Clay, and Franciscan Bedrock underlying these units are more competent and suitable for foundation support. The Initial Study concluded that utilizing foundations with piles supported in these materials would ameliorate the effects of settlement once the structure is constructed.

Impact Evaluation

Earthquake and Landslide Hazards

Impact GE-1: The proposed project would not expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, seismic groundshaking, seismically-induced ground failure, or landslides. (Less than Significant)

The preliminary geotechnical evaluation for the project[53] identified similar geologic materials to those identified in the Mission Bay FSEIR, including artificial fill, young Bay Mud, dense sands of the Colma Formation, and Old Bay Clay that overly the Franciscan Bedrock encountered at a depth of 32 to 130 feet beneath the project site. As analyzed in the Mission Bay FSEIR, no active faults cross the project site so the

53 Langan Treadwell Rollo, *Preliminary Geotechnical Evaluation, Block 29-32 Mission Bay, San Francisco, California*. March 28, 2014.

potential for fault rupture is low. The structures proposed under the project would be subject to strong groundshaking in the event of an earthquake on one of the regional faults, and the site is also located in a liquefaction potential zone identified by the California Department of Conservation under the Seismic Hazards Mapping Act of 1990. However, as determined in the Mission Bay FSEIR, these impacts would be less than significant with implementation of a site-specific geotechnical investigation and seismic analysis, and incorporation of the recommendations in these studies into the building design as required by the California and San Francisco Building Codes. The proposed structures would be supported on piles driven into competent materials beneath the artificial fill and young Bay Mud.

Potential hazards associated with lateral spreading and seismically-induced settlement in the event of a major earthquake were not specifically addressed in the Mission Bay FSEIR. However, for the proposed project, these effects would also be addressed through implementation of site-specific geotechnical studies and adherence to the California and San Francisco Building Codes. On the basis of the preliminary geotechnical evaluation for the project,[54] recommended measures for addressing these effects include improving the soil to resist liquefaction and lateral spreading as well as use of flexible utility connections, utility hangers, and hinged slabs to address differential settlement. The Mission Bay FSEIR also did not discuss the potential for earthquake-induced landslides. However, the project site is relatively flat and is not located in a landslide-potential zone identified by the California Department of Conservation under the Seismic Hazards Mapping Act of 1990.[55] Therefore, there is no project impact related to earthquake-induced landslides.

As indicated by the project-specific geotechnical evaluation, no substantial changes have occurred nor has new information become available that would result in new or more severe project impacts related to seismic hazards including fault rupture, seismic groundshaking, seismically induced ground failures, or landslides. No new or different mitigation measures or alternatives would be required to reduce this impact to a less-than-significant level.

Erosion or Loss of Top Soil

Impact GE-2: The project would not result in substantial erosion or loss of top soil. (Topic Partially Analyzed Previously; Less than Significant)

The Mission Bay FSEIR addressed erosion impacts relevant to the project site but not impacts related to loss of top soil. However, both impacts would be less than significant, as described below.

Erosion

Soil movement for foundation excavation could create the potential for wind- and water-borne soil erosion during construction site. However, the project site is relatively flat; therefore, substantial erosion and loss of soil would not be expected to occur during site preparation and construction.

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54 Langan Treadwell Rollo, *Preliminary Geotechnical Evaluation, Block 29-32 Mission Bay, San Francisco, California*. March 28, 2014.

55 California Department of Conservation, Division of Mines and Geology. *State of California Seismic Hazard Zones, City and County of San Francisco, Official Map*, November 17, 2000.

The Mission Bay FSEIR addressed erosion impacts in the Hydrology and Water Quality section under construction activity pollutants. As discussed below in Section E.15, Hydrology and Water Quality, of this Initial Study (Impact HY-1), project construction would be required to comply with the General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, Order No. 2009-0009-DWQ (Construction General Stormwater Permit). This permit, adopted by the State Water Resources Control Board in 2009 subsequent to publication of the FSEIR, requires implementation of erosion and sedimentation controls for construction activities associated with ground disturbance. Once the project is constructed, the entire project site would be covered with structures, paved areas, or landscaping and the potential for erosion would be low. Therefore, impacts related to soil erosion during and after construction would be less than significant.

The project would not result in new or more severe significant impacts than those identified in the Mission Bay FSEIR. No new or different mitigation would be required.

Loss of Top Soil

Top soil is a fertile soil horizon that typically contains a seed base. The Mission Bay FSEIR did not specifically address loss of top soil. However, the project site was previously built out with commercial and industrial uses which have since been removed, and the site has been subject to subsequent grading, some excavation, and construction of paved surface parking lots, fencing and associated utilities. Prior development and other ground disturbance would have involved removal of any top soil on the project site. Therefore, the proposed project would have no impact related to loss of top soil.

Settlement

Impact GE-3: The project would not be located on a geologic unit or soil that is unstable, or that could become unstable as a result of the project. (Topic Partially Analyzed Previously; Less than Significant)

The Mission Bay FSEIR addressed settlement issues related to differential settlement of the underlying geologic materials that are relevant to the project site, but it did not address impacts related to settlement associated with excavation or dewatering. However, these impacts would all be less than significant, as described below.

Differential Settlement

Similar to the analysis in the Mission Bay FSEIR Initial Study Geology/Topography section, the proposed project could result in settlement once the project is constructed due to differential settlement of the artificial fill and compressibility of the Bay Mud. However, as part of the project and similar to the discussion in the Mission Bay FSEIR, the proposed event center and other proposed buildings and structures would be constructed with a foundation using piles supported in dense sands of the Colma Formation or in bedrock of the Franciscan Complex. The project would be designed in accordance with the recommendations of the site-specific geotechnical investigation that would be required under the California and San Francisco Building Codes. Furthermore, no substantial changes have occurred at the project site or new information become available that would result in new or more severe impacts related to settlement. On the basis of the factors discussed above, the project would not have any new or substantially more severe effects than those identified in the Mission Bay FSEIR related to settlement, and no new mitigation measures or alternatives are required to reduce this impact to a less-than-significant level.

Settlement due to Excavation or Dewatering

Construction of the proposed project could also induce ground settlement as a result of excavation for construction of subsurface parking, construction dewatering, and heave during installation of piles. As discussed in the Project Description, following completion of construction, permanent, long-term dewatering would not be required. The Mission Bay FSEIR did not specifically address settlement as a result of these activities. Therefore, these potential settlement effects are described below, followed by San Francisco Department of Building Inspection (DBI) established procedures which would ensure that unstable conditions do not result from project construction.

Excavation. Construction of proposed subsurface facilities, including but not limited to, below-grade event center features and underground parking, could require excavation to a depths of up to 30 feet below San Francisco datum, and isolated deeper excavation could be required at the building cores. During excavation, artificial fill and Bay Mud would be removed and the surrounding soils could become unstable, potentially causing settlement of adjacent structures, including buildings, sidewalks, streets, and utilities. However, the project would be required to comply with the California and San Francisco Building Codes' specifications for shoring, such as conventional soldier pile and lagging, a deep soil mixed cutoff wall,[56] or rigid and water-tight internally braced secant walling.[57] Implementation of these required measures would prevent this soil from becoming unstable.

Further, the DBI would require a monitoring program utilizing an inclinometer to monitor for movement at the face of the excavation. The monitoring program would include a baseline survey and frequent surveying of the excavation as construction progresses to evaluate the effects of construction and ensure that the soil does not become unstable. DBI would review the final building plans and determine if an excavation monitoring plan would be required.

Construction Dewatering. Groundwater at the project site is relatively shallow (encountered at a depth of about 6½ to 7 feet below ground surface). Therefore, the proposed 30-foot excavation depth would extend up to approximately 23 feet beneath the groundwater table, and there is the potential for substantial water inflow into the excavation during construction, which would require dewatering to maintain dry construction conditions. Dewatering could potentially result in settlement of adjacent structures, including buildings, sidewalks, streets, and utilities. Although a water tight shoring system such as a deep soil mixed cutoff wall or secant walling could be used during excavation for structures, dewatering of excavations for installation of utilities and compaction of soil could be required. To address the potential for settlement as a result of excavation dewatering, DBI could require a site-specific dewatering plan to identify necessary

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56 A deep mixed soil cutoff wall is constructed by advancing augers or a cutting tool and pumping cement through the tips of the auger or cutting tool during drilling. The cement is mixed with the soil in place, forming a solidified column or panel of soil and cement that provides stability to the excavation sidewall and restricts groundwater inflow to the excavation.

57 A secant wall, in simplified form, is built by drilling a series of holes and filling them with concrete, resulting in a continuous series of concrete cylinders that form a water-tight barrier that retains soil behind it.

measures to minimize the risk of settlement. DBI would review the final building plans and determine if a dewatering plan would be required.

Discharge of any groundwater removed during construction dewatering would also be subject to requirements of the City's Sewer Use Ordinance (Article 4.1 of the Public Works Code; added by Ordinance No. 19-92, amended by Ordinance No. 116-97), as supplemented by Department of Public Works Order No. 158170, requiring a permit from the Wastewater Enterprise Collection System Division of the SFPUC. A permit may be issued only if an effective pretreatment system is maintained and operated. The permit for discharge would specify water quality standards and may require the project sponsor to install and maintain meters to measure the volume of the discharge to the combined sewer system.

In addition, if the subsequent project-specific geotechnical investigation determines that dewatering wells would likely be needed to draw the groundwater down below the planned depths of excavation, any dewatering wells would be subject to the requirements of the City's Soil Boring and Well Regulation Ordinance (Article 12B of the Health Code; added by Ordinance No. 113-05), requiring a project sponsor to obtain a permit from the Department of Public Health prior to constructing a dewatering well. A permit may be issued only if the project sponsors use construction practices that would prevent the contamination or pollution of groundwater during the construction or modification of the well or soil boring.

Heave as a Result of Pile Driving. The proposed event center and other proposed buildings and structures would be supported by foundations using piles. The piles may be drilled or driven into place, and the appropriate installation method would be determined on the basis of the site-specific geotechnical investigation implemented in accordance with the California and San Francisco Building Codes. In addition, noise and vibration concerns could limit the use of driven piles.

If driven piles are used, pile driving during project construction may cause the ground to heave up to several inches, and the heave could adversely affect adjacent structures. To address this, the DBI may require a preconstruction survey and monitoring during pile driving. DBI would review the final building plans and determine if a preconstruction survey and subsequent monitoring would be required to address the potential for heave.

DBI Requirements. DBI would require a site-specific geotechnical report for the project prior to issuing a building permit, and would review the report to ensure that the potential settlement effects of excavation, pile driving, and dewatering are appropriately addressed in accordance with Section 1704.15 of the San Francisco Building Code. DBI would also require that the report include a determination as to whether a lateral movement and settlement survey should be done to monitor any movement or settlement of surrounding buildings and adjacent streets during construction. If a monitoring survey were recommended, DBI would require that a Special Inspector be retained by the project sponsor to perform this monitoring. Groundwater observation wells could be required to monitor potential settlement and subsidence during dewatering.

If, in the judgment of the Special Inspector, unacceptable movement were to occur during construction, corrective actions would be used to halt this settlement. Groundwater recharge could be used to halt settlement due to dewatering. Further, DBI would review the final building plans and determine if additional site-specific reports would be required.

With implementation of the recommendations provided in project-specific detailed geotechnical study, subject to review and approval by DBI, and monitoring by a DBI Special Inspector (if required), impacts related to the potential for settlement and subsidence due to construction on soil that is unstable, or could become unstable as a result of such construction, would be less than significant.

Problematic Soils

Impact GE-4: The project would not create substantial risks to life or property as a result of location on expansive soils or other problematic soils. (Topic Partially Analyzed Previously; Less than Significant)

The Mission Bay FSEIR addressed issues related to corrosive soils, but it did not address impacts related to expansive soils. However, these impacts would all be less than significant, as described below.

Corrosive Soils

The event center and other proposed buildings and structures would be constructed with foundations supported on concrete piles driven into competent geologic materials beneath the artificial fill and young Bay Mud. As discussed above, the Mission Bay FSEIR stated that a sulfate-resistant mix of cement would be used to protect the concrete and reinforcing steel from the corrosive effects of the fill and young Bay Mud. To ensure compliance with this, the Mission Bay FSEIR includes Mitigation Measure H.7 requiring testing of the soil for sulfate and chloride content.

However, the site-specific geotechnical investigation conducted in accordance with the California and San Francisco Building Codes would address the potential for corrosion of the concrete piles where they are in contact with the artificial fill and young Bay Mud, and would include specifications for the concrete to ensure that the piles would not be adversely affected by corrosion.

Therefore, this impact is adequately addressed by the existing building code and implementation of Mitigation Measure H.7 of the Mission Bay FSEIR is no longer necessary to reduce impacts related to corrosive soil to a less-than-significant level.

Expansive Soils

Expansive soils are typically very fine grained with a high to very high percentage of clay. They are characterized by their ability to undergo significant volume change (i.e., to shrink and swell) due to variations in soil moisture content which typically result from factors such as rainfall, landscape irrigation, utility leakage, and roof drainage. The Mission Bay FSEIR did not specifically address the effects of expansive soil on newly constructed structures. However, the presence of expansive soils is not an issue at the project site because the artificial fill beneath the site is sandy and would not be expansive, and because the young Bay Mud beneath the site is generally below the groundwater table, and thus is permanently saturated. Further, any backfill materials used for the project would have a low expansion potential in accordance with the recommendations of the geotechnical report for the project, completed in accordance with the California and San Francisco Building Codes. Therefore, impacts related to expansive soils would be less than significant.

Topography or Unique Geologic Features

Impact GE-5: The project would not substantially change the topography or any unique geologic or physical feature of the project site. (Less than Significant)

The Mission Bay FSEIR Initial Study reported that there are no unique geologic features in the Mission Bay plan area and that the addition of limited amounts of new fill in low spots east of Third Street would not result in a substantial change in topography. Similarly, the project site is generally flat and there are no unique topographic, geologic, or physical features within the site. Construction of the proposed project would not involve the placement of fill and would not alter the topography of the site. No changes have occurred at the project site or new information has become available that would affect this impact. Therefore, the project would not result in any new impacts or increase the severity of previously identified impacts related to alteration of topography or damage to unique geologic features and this impact would be less than significant.

Cumulative Impacts

Impact C-GE-1: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in a considerable contribution to cumulative impacts related to geologic hazards. (Less than Significant)

Geologic impacts are usually restricted to the immediate vicinity, and potential geologic impacts resulting from the proposed project that could contribute to a cumulative impact are limited to seismic effects and the potential for creation of an unstable geologic unit. Seismic effects could occur in the project vicinity, including the south of Market area. Therefore, this area is considered the geographic scope for seismic effects. The creation of unstable geologic units is a local effect; therefore, the geographic scope for this cumulative impact is the project area and immediate vicinity. This analysis is based on past, present, and reasonably foreseeable future projects in this area, including those listed above in Section D, Approach to Analysis.

Seismic Safety. Several cumulative projects would contribute to an increase in the number of persons potentially exposed to seismic risks in the south of Market area, which could result in a potential cumulative impact. However, as noted in Impact GE-1, the project site is not subject to fault rupture because there are no known earthquake faults that cross the site or vicinity. The proposed project and any development within the Mission Bay area would be subject to very strong groundshaking and could experience liquefaction effects in the event of an earthquake on a nearby fault. However, the project and any new buildings would be constructed in accordance with the most current building code requirements for seismic safety, providing for increased life-safety protection of residents and workers. These requirements would reduce potential cumulative impacts to a less-than-significant level, and the proposed project's compliance with these requirements would ensure that it would not make a cumulatively considerable contribution to cumulative impacts related to seismic safety.

Unstable Geologic Unit. As discussed in Impact GE-3, implementation of the proposed project could result in ground settlement from excavation for construction of the below-ground parking, construction dewatering, and pile driving. Any nearby project that could contribute to cumulative impacts related to an unstable geologic unit in the immediate vicinity would be required to implement the DBI procedures described above, including preparation of a detailed geotechnical report and site-specific reports as needed to address the potential settlement and subsidence impacts of excavation and dewatering; implementation of a lateral movement and settlement survey to monitor any movement or settlement of surrounding buildings and adjacent streets during construction and monitoring by a Special Inspector, if needed; conducting a pre-construction survey and monitoring during pile driving; and implementation of corrective actions, as necessary. With implementation of these requirements under the proposed project and under any nearby projects, cumulative impacts related to ground settlement would be less than significant.

Topics:	*Potentially Significant Effects Not Identified in Prior EIR*	*Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR*	*Sponsor Declines to Adopt Feasible Mitigation Measures or Alternatives*	*No New or More Severe Significant Effects*
15. HYDROLOGY AND WATER QUALITY—Would the project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☒	☐	☐
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☒
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion of siltation on- or off-site?	☐	☐	☐	☒
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site?	☐	☐	☐	☒
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☒	☐	☐
f) Otherwise substantially degrade water quality?	☐	☐	☐	☒
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other authoritative flood hazard delineation map?	☐	☐	☐	☒
h) Place within a 100-year flood hazard area structures that would impede or redirect flood flows?	☐	☐	☐	☒
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☒	☐	☐
j) Expose people or structures to a significant risk of loss, injury or death involving inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒

The Mission Bay FSEIR did not specifically address potential impacts of the Mission Bay plan related to placing housing within a 100-year flood hazard area. However, the project would not include any housing or residential uses. Therefore, criterion E.15(g) does not apply to the proposed project. In addition, the project site is not located in the vicinity of a levee or dam, so criterion E.15(i) with respect to failure of a levee or dam is not applicable to this project. Similarly, the project site is not located on or near slopes that could be subject to mudflow, so criterion E.15(j) with respect to mudflow is not applicable to this project. Thus, these topics are not discussed further in this Initial Study or in the SEIR.

Summary of Hydrology and Water Quality Impacts in Mission Bay FSEIR

The Mission Bay FSEIR addressed potential effect on hydrology and water quality in the Hydrology and Water Quality, Community Services and Utilities, Initial Study Water, and Seismicity sections. Relevant information from these sections is summarized below.

The Mission Bay FSEIR Hydrology and Water Quality setting section characterized existing drainage patterns and municipal sewer treatment facilities serving the Mission Bay plan area at that time. The Mission Bay FSEIR reported that the Mission Bay plan area was located in the City's Bayside drainage basin, in which combined stormwater and sanitary sewage was collected, then conveyed to and treated at the Southeast Water Pollution Control Plant (SEWPCP) near Islais Creek. At that time, the Mission Bay plan area was located in four sub-basins, with the project site draining to two of the sub-basins. The north and east portions of the Blocks 29-32 site were located in the Bay sub-basin which drained directly to the Bay, and the balance of Blocks 29-32 site was located within the Mariposa sub-basin portion of the Bayside drainage basin. Stormwater collected in the Mariposa sub-basin was directed to the Mariposa pump station, and from there, to the SEWPCP. Stormwater occurring within the Bay sub-basin at that time drained directly to the Bay, and not the combined sewer system.

As reported in the Mission Bay FSEIR, the annual average dry weather flows at the SEWPCP at that time were estimated at 67 mgd. During wet weather, the SEWPCP could treat up to 150 mgd to a secondary level, and an additional 100 mgd to a primary level.[58] In addition, up to an additional 150 mgd of wet weather flows received primary treatment at the North Point Water Pollution Control Plant, increasing total wet weather treatment capacity for the Bayside drainage basin to 400 mgd. As also reported in the Mission Bay FSEIR, if rainfall exceeded the total capacity of the SEWPCP, the North Point facility, and storage/transport facilities, then excess flows are directed to sewer discharge structures located along the City's bayside. These flows receive flow-through treatment (similar to primary treatment) and are discharged to the Bay under the City's National Pollutant Discharge Elimination System (NPDES) permit issued by the Regional Water Quality Control Board (RWQCB).

Mission Bay Plan Area Drainage Plan

The Mission Bay FSEIR Hydrology and Water Quality impacts section described the proposed Mission Bay plan's drainage plan, which proposed a new separate storm sewer system for a portion of the Mission Bay plan area. Under the Mission Bay plan, stormwater within the Bay sub-basin (which

[58] Secondary treatment is the treatment of wastewater or sewage involving removal of organic matter using biological and chemical processes. This is a higher level of treatment than primary treatment, which is removal of floating and settleable solids using physical operations such as screening and sedimentation.

included the eastern portion of Blocks 29-32 under 1998 conditions) would drain into new infrastructure and no longer directly to the Bay. The Mission Bay plan proposed a reconfigured Central/Bay sub-basin (that would include the northern portion of the Blocks 29-32 site) that would be served by separate sewer and storm drain systems. The sanitary-only sewers from the Central/Bay sub-basin would connect to the existing combined sewer system for treatment at the SEWCP. The separate storm drainage system proposed within the Central/Bay sub-basin would divert an initial portion of the stormwater flow (approximately 80 percent of the average annual flow) to the City's combined system for treatment. Stormwater volumes greater than the initial flows and up to a 5-year storm would be discharged directly to four new stormwater outfalls (two to China Basin Channel and two to the Bay). Volumes greater than a 5-year event would pond or flow overland to the Bay. The Mission Bay plan also proposed a reconfigured Mariposa sub-basin (that would include the southern portion Blocks 29-32), and would be served by the City's existing combined sewer system.

Project Operational Effects on Water Quality

The Mission Bay FSEIR indicated that the Mission Bay plan would contribute pollutants to the Bay through 1) the discharge to municipal wastewater effluent from the SEWPCP, 2) the discharge of treated combined sewer overflows (CSOs) (these events are now referred to as combined sewer discharges or CSDs), and 3) the discharge of untreated stormwater, as described below.

Mission Bay Plan Effects of Volume and Quality of Municipal Wastewater Effluent

The Mission Bay FSEIR estimated that the Mission Bay plan would generate municipal wastewater and increase the total effluent from the SEWPCP by about 3 percent, and result in an approximate 3 percent increase in the pollutant loading to the Bay from municipal wastewater effluent. The Mission Bay FSEIR reported that the quality of municipal wastewater from the Mission Bay plan area would not differ substantially from the quality of other City wastewater flowing to the SEWPCP, and would not materially change the concentrations of pollutants in the effluent. The Mission Bay FSEIR determined that the effluent increases would be well within the City's treatment plant capacity, and would not cause a violation of the City's National Pollutant Discharge Elimination System (NPDES) permit requirements regarding its discharge from the SEWPCP. The Mission Bay FSEIR also determined that the plan pollutant concentrations were within water quality screening values, including Water Quality Objectives adopted by the RWQCB. Given these factors, the Mission Bay FSEIR concluded that Mission Bay plan effects of municipal wastewater effluent on water quality would be less than significant.

Mission Bay Plan Effects of Volume and Quality of Combined Sewer Discharges

The Mission Bay FSEIR estimated that the Mission Bay plan would increase the average annual volume of CSDs (formerly referred to as combined sewer overflows, or CSOs) by approximately 0.2 percent, and increase the duration of each overflow event by a few minutes. The Mission Bay FSEIR reported that the Mission Bay plan would not change the concentrations of pollutants in the treated CSDs. In addition, this slight increase in CSD volumes and duration would not cause a violation of the City's NPDES permit requirements for the CSDs, and thus, would not adversely affect existing near-shore aquatic biota or water-contact recreation in the Bay. Given these factors, the Mission Bay FSEIR concluded that Mission Bay plan effects of CSDs on water quality would be less than significant.

Mission Bay Plan Effects of Volume and Quality of Direct Stormwater Discharge

The Mission Bay FSEIR reported that the Mission Bay plan would increase the volume of stormwater directly discharged to the Bay by approximately 2 percent and would also change the concentration of pollutants in the stormwater discharge due to the intensification of land uses proposed in the Mission Bay plan area. However, the FSEIR concluded that any potential increase in pollutants would be very small relative to those associated with municipal wastewater and treated CSDs. The Mission Bay FSEIR determined that this increase in volumes and change in pollutant concentrations would not adversely affect existing aquatic biota in the Bay. Given these factors, the Mission Bay FSEIR concluded that Mission Bay plan effects of direct stormwater discharge on water quality would be less than significant.

Mission Bay Plan Effects of Sediment Quality

The Mission Bay FSEIR reported that the RWQCB identified China Basin Channel and Islais Creek as candidate toxic hot spots for sediment quality. The Mission Bay FSEIR indicated the Mission Bay plan would slightly decrease volumes of CSDs to China Basin Channel, however would increase flows elsewhere, most notably to Islais Creek. The Mission Bay FSEIR indicated that increased volumes of CSDs to Islais Creek with the Mission Bay plan would cause a corresponding increase in sediment deposition at that location. The Mission Bay FSEIR determined that the plan would not, however, measurably change the physical or chemical composition of the sediment layer, nor affect any determination by the RWQCB to designate China Basin Channel or Islais Creek as toxic hot spots. Given these factors, the Mission Bay FSEIR concluded that Mission Bay plan effects on sediment quality in Islais Creek and China Basin Channel would be less than significant.

Mission Bay Plan Contribution to Cumulative Effects

The FSEIR reported that there were no significant cumulative impacts identified from the estimated increased volume and pollutant load of treated municipal wastewater effluent, treated CSDs, and direct stormwater discharges, because there would not be substantial degradation in water quality of the Bay or near-shore waters, no toxic effect on aquatic biota, and no substantial change sediment quality or beneficial uses.

However, the FSEIR determined that due to the lack of conclusive evidence refuting a causal relationship between treated CSDs, stormwater discharges, and sediment quality, the Mission Bay plan could contribute to a potentially significant cumulative impact on near-shore waters of the Bay from multiple sources of CSDs and direct stormwater discharges to China Basin Channel. The FSEIR concluded that the estimated plan contribution (0.2 percent) to the potential cumulative increase (11 percent) in Bayside CSD volumes, and the contribution of plan-related stormwater discharges to possible cumulative impacts would be reduced to less than significant with the implementation of Mitigation Measures K.3 and K.4 regarding CSD volumes and alternative treatment technologies.

Mission Bay Phased Development Effects on Water Quality from Stormwater

The Mission Bay FSEIR discussed U.S. EPA Phase II stormwater regulations that had been proposed but not finalized at the time of preparation of the FSEIR. These proposed regulations would require the City to develop and implement a stormwater management program to reduce the discharge of pollutants to the maximum extent practicable and protect water quality. The Mission Bay FSEIR indicated that the lack of adopted regulatory requirements for a stormwater management program that addressed Mission Bay stormwater quality, and a failure to implement other BMPs to minimize stormwater pollution, could potentially conflict with the intent of the proposed stormwater permit requirements and result in a significant impact.

Mitigation Measure M.5 in the Mission Bay FSEIR Community Services and Utilities section (see Utilities and Services section in this Initial Study, above) required conveying all stormwater runoff from newly developed areas in the Bay Basin to the combined sewer system prior to completion of the initial-flow diversion system. Mitigation Measure K.5 in the Mission Bay FSEIR Hydrology and Water Quality section identified implementation of an individual stormwater management program that utilizes BMPs for Mission Bay until the Phase II regulations become final and Mission Bay is included in the City's stormwater management program. The FSEIR also identified Mitigation Measure K.2 in the Mission Bay FSEIR Hydrology and Water Quality section that required mandatory participation in the City's existing Water Pollution Prevention Program.

Mission Bay Plan Construction Effects on Water Quality

The Mission Bay FSEIR Hydrology and Water Quality section reported that construction activities would cause ground disturbance that would result in the potential for erosion, and potential for construction sedimentation and other pollutants in China Basin Channel and the Bay. The Mission Bay FSEIR indicated that construction activities proposed under the plan would be required to comply with the NPDES General Construction Activity Storm Water Permit, as administered by the RWQCB, which requires preparation and implementation of a Storm Water Pollution and Prevention Plan (SWPPP). The Mission Bay FSEIR also identified a number of best management practices (BMPs) that should be incorporated into the SWPPP as part of the plan, and included implementation of these BMPs as Mitigation Measures K.1a through K.1i. Regarding discharges of groundwater produced during construction-related dewatering, the FSEIR concluded that water quality effects related to these discharges would not be significant because the discharge would need to comply with the requirements of the City's Industrial Waste Ordinance, adopted in 1992. Based on these factors, the Mission Bay FSEIR concluded that construction-related impacts to water quality would be less than significant.

Mission Bay Plan Effects on Flooding

The Mission Bay FSEIR Initial Study Water section summarized relevant information from the 1990 Mission Bay FEIR regarding the issue of potential flooding. The 1990 Mission Bay FEIR indicated the existing elevation of the Mission Bay plan area ranged from approximately +6.0 to -2.0 feet San Francisco City Datum (SFD).[59] Groundwater in the Mission Bay plan area was reported at 3.5 to 9 feet below ground surface, and contiguous with the mean sea level in the adjacent Bay. As referenced in the Mission Bay FSEIR Initial Study, the 1990 Mission Bay FEIR determined that proposed structures or roadways in Mission Bay placed at elevations at or below -2.0 feet SFD, after settling on the site, could be subject to tidal flooding during a 100-year flood event, and that if sea level were to rise, groundwater levels in Mission Bay could rise similarly.

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59 San Francisco City Datum (SFD) establishes the City's zero point for surveying purposes at approximately 8.6 feet above the mean sea level established by 1929 U.S. Geological Survey datum, and approximately 11.3 feet above the current 1988 North American Vertical Datum.

The Mission Bay FSEIR Initial Study included Mitigation Measures K.6a through K.6f, adapted from the 1990 Mission Bay FEIR that required structures in the Mission Bay area to be designed and located in a way to protect low-lying shoreline areas from the dangers of tidal flooding, including consideration of a rise in relative sea level. The mitigation specified that to address effects of sea level rise, specific flood protection and engineering and building analyses must be conducted by a licensed engineer where structures are proposed below an elevation of -1.0 foot SFD. Potential measures identified by the mitigation included setback from the water’s edge, installation of seawalls, dikes and/or berms during construction of infrastructure; reducing the amount of excavation for utilities or basements; and use of fill to raise the grade of public open spaces. With implementation of these mitigation measures, the Mission Bay FSEIR determined that plan effects related to flooding and sea level rise would be less than significant.

Mission Bay Plan Effects on Groundwater Depletion and Recharge

The Mission Bay FSEIR Initial Study Water section determined that the Mission Bay plan would have a less than significant impact on depletion of groundwater resources and groundwater recharge, primarily because the plan does not propose to extract groundwater. The FSEIR Initial Study indicated that the Mission Bay plan would supply non-potable water uses by either recycled water, groundwater, or potentially a blend of imported groundwater and recycled water. However, the effects of groundwater extraction for this purpose were analyzed in a separate environmental review document for the recycled water project, which determined that the recycled water project would not adversely affect groundwater resources or groundwater recharge.

The Mission Bay FSEIR Initial Study also determined that groundwater dewatering during construction would be subject to approval either by the City for discharge to the sewer system or at an off-site disposal facility. Therefore, impacts on groundwater depletion and recharge were determined to be less than significant.

Mission Bay Plan Effects Related to Tsunami and Seiche

The Mission Bay FSEIR Seismicity impact section estimated that based on evaluations conducted by the U.S. Army Corps of Engineers, the plan area would be subject to as much as 4.7 feet of wave run-up during the 100-year tsunami event, and 7.8 feet of wave run-up during the 500-year tsunami event. Based on this, the maximum flooding level would be -1 feet SFD for the 100-year event and 2 feet SFD for the 500-year event. The FSEIR stated that the U.S. Army Corps of Engineers model estimated the height of "worst case" flooding during extreme high tide crest conditions, which occur about 30 times each year, and last for less than 2 hours each time and the likelihood of a 100-year tsunami occurring within that window is less than one hundredth of one percent. Thus, even during these rare events, only the lowest portions of the plan area would be inundated as a result of a tsunami. Given the fact that the likelihood of such events is less than one hundredth of one percent, the FSEIR determined that impacts would be less than significant.

Impact Evaluation

Water Quality

Impact HY-1: The project would not violate water quality standards or otherwise substantially degrade water quality with respect to construction activities, including construction dewatering. (Less than Significant)

The project would not result in water quality impacts as a result of construction-related stormwater discharges, including construction-related dewatering because these discharges would be required to be managed in accordance with existing San Francisco regulations, described below.

Water Quality Effects of Construction Activities

During construction, stormwater from the project site would drain to a separate storm drainage system that includes existing storm drain lines located along South Street, Third Street, and 16th Street (which have been built subsequent to the FSEIR consistent with the Mission Bay South Infrastructure Plan). As described above for the Mission Bay FSEIR, stormwater discharges during construction would require NPDES coverage under the General Construction Activity Storm Water Permit, as administered by the RWQCB. At the time the FSEIR was prepared, this general permit required preparation and implementation of a Storm Water Pollution and Prevention Plan (SWPPP), but did not include specific BMPs to be implemented to avoid water quality effects associated with construction-related stormwater discharges. To address this, the Mission Bay FSEIR also identified a number of best management practices (BMPs) that should be incorporated into the SWPPP as part of the plan, and included as Mitigation Measures K.1a through K.1i.

However, the State Water Resources Control Board subsequently adopted the General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, Order No. 2009-0009-DWQ (Construction General Stormwater Permit) in 2009 and this permit supersedes the permit in effect at the time of FSEIR publication. Construction activities subject to this permit include ground disturbance such as clearing, grading, and excavating, as well as soil stockpiling. Under the Construction General Stormwater Permit, construction projects are characterized by the level of risk to water quality. This is determined using a combination of the sediment risk of the project and the receiving water quality risk. Projects can be characterized as Level 1, Level 2, or Level 3, and the minimum Best Management Practices (BMPs) and monitoring that must be implemented during construction are based on the risk level. The BMPs are designed to prevent pollutants from coming in contact with stormwater and to keep all products of erosion and stormwater pollutants from moving offsite into receiving waters. They are specified in a SWPPP that must be prepared by a Qualified SWPPP Developer (QSD) and submitted to the San Francisco RWQCB before construction begins.

For construction activities characterized as Level 1, the Construction General Stormwater Permit specifies minimum BMPs to be implemented that address good housekeeping practices (including those for managing hazardous materials used during construction, non-stormwater management, erosion and sediment control, and run-on and runoff control. A qualified professional must inspect the required BMPs weekly when there is no rain and daily during a qualifying rainstorm. For construction activities characterized as Level 2 and 3, the minimum requirements identified for Level 1 apply, as well as some more stringent requirements. For instance, erosion controls must be implemented in conjunction with sediment controls in active construction areas, and linear sediment controls must be used along slopes. In addition, a QSD must prepare a rain event action plan for Level 2 and 3 construction activities. This plan would identify the designated site stormwater manager, the provider of erosion and sediment controls, and the stormwater sampling agent, as well as the trades active at the site during all construction phases. The plan would include suggested actions for each construction phase.

Compliance with the current General Construction NPDES Permit would ensure that construction-related stormwater discharges would not violate water quality standards or otherwise substantially degrade water quality. Therefore, this impact would be less than significant with implementation of regulatory requirements and FSEIR Mitigation Measures K.1a through K.1i. would be superseded by the specified regulatory requirements. No new mitigation measures are required, and the project would not result in any new significant impacts or substantially more severe impacts on water quality from construction activities than were disclosed in the Mission Bay FSEIR.

Water Quality Effects of Groundwater Dewatering

As noted in the Geology and Soils section of this Initial Study, the groundwater level at the project site is about 6½ to 7 feet below ground surface. Given that the estimated depth of excavation on the site would be up to 30 feet below San Francisco datum deep, construction-related groundwater dewatering would likely be required. However, the sponsor indicates that the project would be designed such that permanent dewatering would not be required.

As discussed above, the Mission Bay FSEIR Initial Study concluded that water quality impacts associated with discharge of groundwater during construction-related dewatering would be less than significant with implementation of the City's Industrial Waste Ordinance, adopted in 1992. This ordinance is found in Article 4.1 of the *Public Works Code*, as supplemented by Order No. 158170, which regulates the quantity and quality of discharges to the combined sewer system. In accordance with Article 4.1 and Order No. 158170, the discharge permit would contain appropriate discharge standards and may require installation of meters to measure the volume of the discharge. Although the groundwater could contain contaminants related to past site activities, as discussed in, the Hazards and Hazardous Materials section of this Initial Study, as well as sediment and suspended solids, the groundwater would be treated as necessary to meet permit requirements prior to discharge.

With discharge to the combined sewer system in accordance with regulatory requirements, water quality impacts related to a violation of water quality standards or degradation of water quality due to discharge of groundwater produced during construction-related dewatering would be less than significant.

The FSEIR did not address water quality impacts associated with discharge of groundwater produced during long-term dewatering once the development projects were constructed. However, the sponsor indicates that no long-term dewatering of the project site is proposed during operation of the project. Therefore, the project would not result in any new significant impacts or substantially more severe impacts on water quality from dewatering activities than previously identified in the FSEIR.

Groundwater

Impact HY-2: The project would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level. (Less than Significant)

As discussed above, the Initial Study for the Mission Bay FSEIR stated that non-potable water supply for development projects within the plan area would use recycled water that would potentially be a blend of imported groundwater and recycled water. As stated in the Initial Study for the Mission Bay FSEIR, the effects of groundwater extraction for this purpose were analyzed in a separate environmental review document for the recycled water project which determined that the recycled water project would not adversely affect groundwater resources or groundwater recharge. However, the San Francisco Public Utilities Commission (SFPUC) has not yet constructed the planned recycled water system for the eastside of the City, and currently, does not intend to blend groundwater with recycled water. Although the project would be required to install dual plumbing for use of recycled water in accordance with the Recycled Water Ordinance found in Article 22 of the San Francisco Public Works Code, the project would not use recycled water until it becomes available.

Further, implementation of the project would not result in depletion of groundwater resources because, other than potential pumping of groundwater during construction dewatering, the project would not involve the use or extraction of groundwater. Rather, potable water for the project would be provided by the SFPUC regional water system. If and when a supply of recycled water becomes available through the Eastside Recycled Water Project,[60] the project would also use recycled water for non-potable uses. Although groundwater dewatering could be required during construction of the project, this dewatering would not deplete groundwater resources because the Downtown San Francisco Groundwater Basin is not used as a drinking water supply and there are no plans for development of this basin for groundwater production.

Project implementation would not interfere with groundwater recharge because although the project would replace the great majority of the currently unpaved portions of the site with impervious surfaces, the new impervious surfaces comprise a negligible portion of the total area of the Downtown Groundwater basin. Impacts related to depletion of groundwater resources and interference with groundwater recharge would be less than significant because the project would not include groundwater pumping other than for dewatering, the Downtown San Francisco Groundwater Basin is not used as a potable water supply, there are no plans for development of the basin for groundwater production, and there would be only a minor increase in impervious surfaces. Therefore, the project's impacts on groundwater supplies and recharge would be less than significant, and the project would not result in any new significant impacts or substantially more severe impacts from those previously identified in the FSEIR.

60 The SFPUC plans to provide 2 million gallons per day of high quality recycled water to the customers in the east side of the City through the Eastside Recycled Water Project for non-potable uses such as irrigation and toilet flushing. This project is still in the planning stages, and the implementation date is uncertain.

Drainage Patterns

Impact HY-3: The project would not alter the existing drainage pattern of the area in a manner that would result in substantial erosion, siltation, or flooding on- or off-site, and the project would not substantially increase the rate or amount of surface runoff that would result in flooding on- or off-site. (Less than Significant)

The project site does not include any existing streams or water courses that could be altered or diverted. Therefore, the project would have no impact related to alteration of drainage patterns by altering the course of a stream in a manner that would cause erosion or flooding on or off-site.

At the time of preparation of the Mission Bay FSEIR, drainage at the project site was directed either to the combined sewer system in the Central sub-basin or Mariposa sub-basin or directly to the Bay. Since that time, a separate storm drainage system has been constructed along South Street, Third Street, and 16th Street, as part of implementation of the Mission Bay South Infrastructure Plan, so that portions of the site previously draining directly to the Bay now drain to a separate storm drain system. The remainder of the site continues to drain to the combined sewer system.

Under the proposed project, the stormwater would be routed to a separate storm sewer system. Construction of the on-site project components would be required to comply with applicable stormwater design guidelines, which would ensure that no substantial erosion or siltation on-or off-site would occur.

Currently, the project site is comprised of open ground and paved areas. Once constructed, the project would change the quantity of stormwater runoff from the site. However, in accordance with the Stormwater Design Guidelines, stormwater controls would be designed to treat 90 percent of the annual stormwater runoff to the separate storm sewer system. Compliance with these design guidelines would ensure that no on- or off-site flooding would occur.

Therefore, neither alteration of existing drainage patterns at the project site nor changes in stormwater runoff volumes would result in substantial erosion, siltation, or flooding on- or off-site, and this impact would be less than significant. The project would not result in any new significant impacts or substantially more severe impacts related to alteration of drainage patterns from those previously identified in the FSEIR, and no new mitigation measures would be required.

Flooding

Impact HY-4: The project would not expose people, housing, or structures, to substantial risk of loss due to existing flooding risks and would not redirect or impede flood flows. (Less than Significant)

As discussed above, the Mission Bay FSEIR concluded that structures and roadways placed at elevations at or below -2.0 feet SFD could be subject to tidal flooding during a 100-year flood event and specified mitigation measures to address flooding issues. Elevations at the project site range from approximately -1 foot SFD to +3 feet SFD,[61] therefore the project site would not be subject to tidal flooding during a

61 Langan Treadwell Rollo, Preliminary Geotechnical Evaluation, Block 29-32 Mission Bay, San Francisco, California. March 28, 2014.

100-year flood event. In addition, since publication of the FSEIR, the CCSF published interim flood maps in 2008 that show 100-year flooding zones within the City and County of San Francisco and the project site is not located within an identified 100-year flood zone.[62]

Also subsequent to publication of the FSEIR in 1998, the SFPUC has specifically identified potential flooding hazards related to the depth of sewer lines relative to properties they serve. The SFPUC identified a potential flood zone south of Market Street but the proposed project is not within this zone.[63] However, the proposed project site is within an area located on fill, and the SFPUC notes that subsidence in areas located on fill or Bay Mud could subside to a point where the sewers do not drain freely during a storm (and sometimes during dry weather), and the resulting sewer backups could result in localized flooding. Accordingly, the project sponsor would be referred to the SFPUC at the beginning of the building permit process to determine whether the project would result in ground level flooding during storms. If so, the applicant would be required to comply with SFPUC requirements for projects in flood-prone zones as part of the permit approval process. These measures could include providing a pump station for the sewage flow, raising the elevation of entryways, providing special sidewalk construction, and constructing deep gutters, among others.

Therefore, impacts associated with exposure of people or structures to substantial risk of loss due to existing flooding risks and impedance of flood flows would be less than significant. Because the project would result in less than significant impacts related to flooding based on current flood hazard mapping by the CCSF and would be subject to SFPUC requirements for projects in flood zones that could result from sewer backups as part of the permit approval process (if needed), the project would result in less severe flooding impacts than those analyzed in the FSEIR. Therefore, compliance with SFPUC requirements for project in flood zones would obviate the need for Mitigation Measures K.6a through K.6f to mitigate existing flooding hazards, and these measures previously identified in the Mission Bay FSEIR would not be necessary to reduce this impact to a less than significant level. As stated below, potential future flood risks due to projected sea level rise and the applicability of these mitigation measures related to flooding as a result of sea level rise will be addressed in the SEIR.

Inundation by Seiche or Tsunami

Impact HY-5: The project would not expose people or structures to a significant risk of loss, injury or death involving inundation by seiche or tsunami. (Less than Significant)

As discussed above, the FSEIR estimated that the maximum flooding level in the Mission Bay plan area would be -1 feet SFD for the 100-year tsunami event and 2 feet SFD for the 500-year tsunami event. In addition, based on the state's official tsunami inundation maps published subsequent to publication of the FSEIR, the eastern portion of the project site is within a tsunami inundation zone.[64]Based on modeling

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62 City and County of San Francisco, San Francisco Interim Floodplain Map, Northeast, Final Draft. July, 2008.

63 San Francisco Planning Department, Planning Director Bulletin No. 4, Review of Project Identified in Areas Prone to Flooding.

64 California Emergency Management Agency, California Geological Survey, University of Southern California. Tsunami Inundation Map for Emergency Planning, San Francisco North Quadrangle/San Francisco South Quadrangle (SF Bay). June 15, 2009.

provided in the Tsunami Response Annex of the CCSF Emergency Response Plan, the potential tsunami and seiche run-up at the project site would be approximately 6 feet.[65]

Although extremely rare, a tsunami or seiche could damage the proposed structures. Visitors and staff of the event center and other uses could also be endangered. However, as described below, the project is set back from the Bay which would provide a buffer between the Bay shoreline and the proposed project, and the project would also raise most occupied portions of the event center and mixed use development above the inundation depth. Further, San Francisco has a well-established Tsunami Warning System that would be activated and would protect people from harm, as also discussed below.

Structures. The proposed event center and other proposed structures would be constructed to current building standards. Although some damage to the structures could occur, the improvements constructed under the proposed project would be resilient to tsunamis or seiches. Therefore, impacts related to damage to structures from inundation by seiche and tsunami are considered less than significant and would not be a new significant impact or substantially more severe than impacts identified in the Mission Bay FSEIR.

People. The proposed project would increase the number of people at Blocks 29-32, and would therefore expose more people to tsunami or seiche hazards than under existing conditions. However, the project would include design features that would raise most occupied portions of the event center and mixed use development above the inundation depth. Proposed design features would include:

- Raising certain pedestrian access and outdoor areas, including the main plaza, the main pedestrian path providing access around the event center, and the Bayfront Overlook, Bayfront Terrace, and food hall roof
- Providing certain above-grade entry/exits to proposed buildings, including the main and secondary entries to the event center, to the office and retail buildings, and the upper floors of the proposed food hall

In the event that an earthquake occurred that would be capable of producing a seiche or tsunami that could affect San Francisco, the National Warning System would also provide warning to the City. The San Francisco outdoor warning system (sirens and loudspeakers, tested each Tuesday at 12:00 noon) would then be initiated which would sound an alarm alerting the public to tune into local TV, cable TV, or radio stations, which would carry instructions for appropriate actions to be taken as part of the Emergency Alert System. Police would also canvas the neighborhoods sounding sirens and bullhorns, as well as knocking on doors as needed, to provide emergency instructions. Evacuation centers would be set up if required. The advance warning system would allow for evacuation of people prior to a seiche or tsunami and would provide a high level of protection to public safety.

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[65] City and County of San Francisco, Emergency Response Plan, an Element of the CCSF Emergency Management Program, Tsunami Response Annex, March 2011, http://www.sfdem.org/ftp/uploadedfiles/DEM/PlansReports/TsunamiAnnex-2008.pdf, accessed on September 10, 2014.

Therefore, impacts related to exposure of people to risk from inundation by seiche and tsunami are considered less than significant. This would not be a new or more significant impact than identified in the Mission Bay FSEIR.

Cumulative Impacts

Impact C-HY-1: The project, in combination with past, present, and reasonably foreseeable future projects in the site vicinity, would not result in a considerable contribution to cumulative impacts on hydrology and water quality with respect to construction activities, dewatering, groundwater supplies, drainage pattern, flooding, seiche or tsunami. (Less than Significant)

The geographic scope of potential cumulative impacts on water quality encompasses central San Francisco Bay and the Downtown Groundwater Basin. The geographic scope of effects on drainage and flooding consists of Bayside Drainage Basin. Impacts related to inundation by tsunami could occur along the entire San Francisco Waterfront; therefore the geographical scope for this impact includes the entire waterfront. This analysis is based on past, present, and reasonably foreseeable future projects in this area, including those listed above in Section D, Approach to Analysis.

As discussed in Impacts HY-1 and HY-2, implementation of appropriate regulatory requirements would ensure that the proposed project would result in less than significant impacts related to erosion and discharges of groundwater during dewatering. Other projects that could potentially contribute to a cumulative impact would be subject to the same or similar regulatory requirements including the Construction General NPDES permit and Article 4.1 of the Public Works Code as supplemented by DPW Order No. 158170 (including implementation of an erosion control plan). Implementation of these requirements under each individual project would ensure that all discharges comply with regulatory standards and would not result in a violation of water quality standards. Therefore, cumulative impacts related to these topics would be less than significant.

As discussed in Impacts HY-3 and HY-4, project elements affecting drainage and flooding issues at the project site would be subject to compliance with established guidelines for the separate storm drainage system and/or the combined sewer system, which would reduce these impacts to less than significant. Other past, present, and reasonably foreseeable future projects within the Bayside Drainage Basin would also be subject to these regulations. Therefore, based on the City's established regulations and guidelines for the separate and combined sewer system, which are designed to serve the City as a whole, cumulative impacts would also be less than significant.

As discussed in Impact HY-5, a tsunami or seiche would not significantly damage the proposed structures and visitors and staff of the event center and other uses would not be exposed to substantial risks related to tsunami or seiche because the occupied portions of the event center and mixed use development would be constructed above the 500-year tsunami inundation elevation. San Francisco also has a well-established Tsunami Warning System that would be activated and would protect people from harm and the new structures would be constructed in accordance with the current building code which would make them resilient to damage by tsunamis. Because other projects would be built to current building codes, and the Tsunami Warning System would also protect other people in the project vicinity from harm due to tsunamis, cumulative impacts related to inundation by tsunami or seiche would be less than significant.

Issues to be Analyzed in the SEIR

The impact evaluation above explains why the proposed project would not result in new significant impacts or substantially increase the severity of impacts on hydrology and water quality with respect to criteria E.15 (b), (c), (d), (f), (g), (h), or (j), and no further analysis is required on these subjects. However, with respect to criteria E.15(a), (e) and (i), additional evaluation of the proposed project is necessary for both direct and cumulative impacts related to certain aspects of these criteria. The SEIR will include a detailed analysis of:

- The potential for changes in stormwater runoff from the site and wastewater discharged to the combined sewer to affect the frequency or duration of combined sewer discharges. This analysis will also discuss the applicability of FSEIR Mitigation Measures K.2, K.5, and M.5, which all pertain to stormwater management measures.
- The potential for changes in runoff patterns due to the proposed project and to cumulative development to affect the capacity of the combined sewer system. This analysis will also discuss the applicability of FSEIR Mitigation Measures K.3 and K.4, which pertain to cumulative impacts on the combined sewer system.
- The potential for the project to expose people or structures to a significant risk of loss or injury due to future flooding from sea level rise and the applicability of Mission Bay FSEIR Mitigation Measure K.6, which pertains to flooding.

Topics:	*Potentially Significant Effects Not Identified in Prior EIR*	*Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR*	*Sponsor Declines to Adopt Feasible Mitigation Measures or Alternatives*	*No New or More Severe Significant Effects*
16. HAZARDS AND HAZARDOUS MATERIALS—Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☐	☒
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☐	☒
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒

Topics:	Potentially Significant Effects Not Identified in Prior EIR	Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR	Sponsor Declines to Adopt Feasible Mitigation Measures or Alternatives	No New or More Severe Significant Effects
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
h) Expose people or structures to a significant risk of loss, injury or death involving fires?	☐	☐	☐	☒

The project site is not located within one-quarter mile of an existing or proposed school. Therefore, criterion E.16(c) is not applicable to the proposed project. Similarly, the project site is not located within an airport land use plan area or in the vicinity of a private airstrip. Therefore, criteria E.16(e) and E.16(f) are also not applicable. Thus, these topics are not discussed further in this Initial Study or in the SEIR.

Summary of Hazards and Hazardous Materials Impacts in Mission Bay FSEIR

The Mission Bay FSEIR addressed issues of hazards and hazardous materials in multiple sections: Health and Safety which addressed the proposed use, storage and disposal of hazardous materials during operation of the Mission Bay plan and emergency response; Contaminated Soil and Groundwater, which addressed issues related to potential soil and groundwater contamination in the Mission Bay plan area; Seismicity, which addressed issues related to emergency access and response; and Community Services and Utilities, which addressed public safety risks. Relevant information on hazards and hazardous materials from these sections is summarized below.

Mission Bay Plan Hazardous Materials Use, Waste Generation and Risk of Upset

Mission Bay Plan Hazardous Materials Use

The Mission Bay FSEIR Health and Safety impacts section indicated that businesses within the Commercial Industrial, Commercial Industrial/Retail and UCSF portions of the Mission Bay plan area would use substantial quantities of hazardous materials. The Mission Bay FSEIR reported that legal and regulatory requirements applicable to hazardous materials operations would require businesses to meet a range of health and safety laws and regulations, and that the implementation of these legally required health and safety measures would adequately address typical health and safety issues related to use and disposal of hazardous materials.

However, the FSEIR acknowledged laws and regulations do not address certain health and safety concerns related to the use of biohazardous materials that could be used by some of the businesses such as UCSF and surrounding businesses that would engage in research and development activities complimentary to UCSF activities. To address the lack of enforceable guidelines as it relates to aerosol transmission of biohazardous materials, the FSEIR identified Mitigation Measures I.1, I.2, and I.3 requiring implementation of appropriate guidelines, filtration of exhausts for Biosafety Level 3 laboratories or equivalent measures to avoid substantial health risks to individuals in the vicinity of the exhaust, and restrictions on the types biohazardous materials that could be used by businesses in the plan area. The FSEIR concluded that with implementation of this mitigation, potential health related to handling of biohazardous materials would be less than significant.

Mission Bay Plan Risk of Upset / Accidents

The Mission Bay FSEIR Health and Safety impacts section described potential safety concerns related to possible hazardous materials accidents and concluded that most accident risks would be adequately addressed by implementing required health and safety plans, providing emergency response training, and providing emergency response services. The Mission Bay FSEIR also stated that releases of highly toxic materials subject to the federal and state Accidental Release Programs could present more of a risk. However, existing regulations require the implementation of appropriate operational measures in accordance with required Risk Management Plans to reduce the possibility and consequences of potential accidents that could pose potential risks to neighboring residents, schools, or other off-site receptors (this is a plan required under state and federal regulations to specify operating and emergency response procedures to prevent a release of highly toxic materials, and is different from the risk management plan for exposure to hazardous materials required by Mission Bay FSEIR Mitigation Measure J.1, as discussed below). The Mission Bay FSEIR concluded that implementation of Risk Management Plans required under the Accidental Release Programs for the use of these toxic materials and compliance with school siting criteria outlined in the California Health and Safety Code, Education Code, and California Code of Regulations would ensure the impacts of accidents involving highly toxic materials would be less than significant.

Mission Bay Contaminated Soil and Groundwater

Setting

The Mission Bay FSEIR Contaminated Soil and Groundwater setting section described historic and current land uses in the Mission Bay plan area. The FSEIR reported that the Mission Bay plan area was filled beginning in 1859 and continuing for approximately 50 years, with the fill consisting primarily of earthquake rubble, municipal garbage, and rock and soil from other locations in the City. The FSEIR reported that uses previously and/or presently on Blocks 29-32 at that time included a range of commercial and industrial uses including, but not limited to, crude oil storage, offices, railroad tracks, trucking-related activities, maintenance and repair facilities, junk yard, stock corral, sand and gravel mixing, and open space. The Mission Bay FSEIR also reported that existing uses at the time of preparation of the FSEIR included a gravel plant, bus company facility, equipment rental, storage yard, railroad tracks, auto body shop, warehouse and parking.

The Mission Bay FSEIR Contaminated Soil and Groundwater setting section also summarized the results of soil and groundwater studies conducted in Mission Bay, including a comprehensive investigation conducted by ENVIRON in 1997 of the entire Mission Bay plan area. The 1997 investigation detected chemicals of various types and concentrations in the soil and groundwater throughout the Mission Bay plan area. The 1997 investigation identified petroleum hydrocarbons in soil, groundwater, and floating on groundwater (called "petroleum free product") in the vicinity of Illinois and 16th Streets (including within Blocks 31 and 32), and attributed the free product to former petroleum bulk storage, pipelines and transfer facilities in the vicinity. The FSEIR determined that concentrations of contaminants in soil or groundwater in the Mission Bay plan area, with the exception of the identified petroleum free product area, did not present a human health or ecological risk under existing conditions. The FSEIR reported that potential effects on near-shore and aquatic organisms associated with the free product were being investigated and if necessary would be remediated by the oil companies responsible for the contamination.

Mission Bay Plan Development (Construction) Effects

The Mission Bay FSEIR Contaminated Soil and Groundwater impact section reported that the proposed development of the Mission Bay plan area could result in potential exposure of workers and the public (including residents, employees and visitors) in the Mission Bay plan area to chemicals in soil and groundwater that could be released during construction. The Mission Bay FSEIR indicated that vacant sites within the Mission Bay plan area could be a source of exposed soils during part or most of the approximately 20-year development period. In addition, the Mission Bay FSEIR indicated construction activities within the Mission Bay plan area that would involve the disturbance of contaminated soil or groundwater would affect increasingly greater number of persons during the later phases of development.

The Mission Bay FSEIR discussed various types of construction activities, including excavation, grading, trenching, soil movement/transport, pile installation, building demolition and removal of underground storage tanks that would potentially expose workers and the public to contaminated soils, dust, soil gases and other hazards. The Mission Bay FSEIR also noted the potential for construction dust-related effects on the aquatic and terrestrial environment. In addition, the FSEIR indicated that construction activities that would have the potential to affect groundwater, including pile driving activities (to potentially contaminate deeper groundwater zones), trenching activities (to result in potential horizontal migration of contaminants in groundwater and soil vapor), and construction dewatering (to potentially influence localized groundwater gradients and spread contaminated groundwater, particularly in and near the area discussed above that was identified with the petroleum free product on the groundwater).

The Mission Bay FSEIR Contaminated Soil and Groundwater section included Mitigation Measures J.1a through J.1k requiring preparation of a Risk Management Plan or Plans (RMP) incorporating specific measures that would provide for the management of risks associated with exposure to contaminated soil and groundwater and would be protective of human health and the aquatic environment. The Mission Bay FSEIR specified that the human health standard to be applied to the Mission Bay plan, as approved by the San Francisco Bay Regional Water Quality Control Board (RWQCB), would be a cumulative cancer risk of 10 in 1 million and a Hazard Index of 1 for non-cancer risks. Mitigation identified in the Mission Bay FSEIR specified minimum parameters to be included in the RMP for the addressing contaminated soils and groundwater prior to and during construction of individual development projects. The mitigation also provided measures for enforcement of the RMP. The Mission Bay FSEIR concluded that implementation of the RMP under the regulatory oversight, jurisdiction, and responsibility of the RWQCB would ensure any effects associated with contaminated soils and groundwater would be less than significant.

Mission Bay Plan Contaminated Soil and Groundwater — Long-Term Occupancy (Post Development) Effects

The 1997 ENVIRON investigation summarized in the Mission Bay FSEIR Contaminated Soil and Groundwater impact section included a quantitative human health and ecological risk assessment to evaluate potential effects on human and aquatic populations upon plan completion. The risk evaluation showed that the potential risks posed by residual contaminants would remain after plan completion would be below applicable human health and aquatic ecological risk criteria. The Mission Bay FSEIR indicated that currently exposed soils would be covered by proposed buildings, pavement, or with open space areas using approved fill materials, that would create a protective barrier, or cap, between residual contaminants in soil and human or ecological populations and required establishment and maintenance of this cap as mitigation. Additional mitigation addressed the re-use of soil and prohibited the use of shallow groundwater for domestic, industrial, or irrigation purposes unless found acceptable using established risk assessment methodology.

The FSEIR also noted that deed restrictions required for each property within the Mission Bay plan area would place limits on future uses within Mission Bay consistent with the provisions of the RMP, and accordingly, property owners would be required to comply with applicable provisions of the RMP. These proposed RMP measures were included as Mitigation Measures J.1l through J.1o in the Mission Bay FSEIR.

The FSEIR also provided Mitigation Measure J.2 requiring the RMP to include a process for investigating sites proposed for school or child-care center uses within the Mission Bay plan area to ensure these facilities would be properly sited. The Mission Bay FSEIR concluded that the implementation of the RMP would ensure any potential post-development effects on human and aquatic populations would remain less than significant.

Mission Bay Emergency Response

The Mission Bay FSEIR Seismicity impacts section discussed impacts related to exposure of the concentrated population within the Mission Bay plan area to seismic hazards. Although the Mission Bay FSEIR noted that new fire station proposed at that time in Mission Bay South would improve emergency response to the area, the FSEIR also indicated potential difficulties in providing emergency access to the Mission Bay South plan area in the event of a major earthquake. This was determined to be a potentially significant impact. The FSEIR concluded that impacts associated with emergency access in the event of a major earthquake would be less than significant with implementation of Mitigation Measures H.1, H.2, H.3b, and H.5 requiring the project sponsor to store heavy construction equipment capable of negotiating roads damaged by an earthquake, coordinate emergency response plans with the City, and prepare a project-specific emergency response plan, and construct a new fire station.

The Mission Bay FSEIR Health and Safety impacts section also described the potential for a catastrophic event (e.g., an earthquake) to result in accidents involving hazardous materials and causing fires or explosions, requiring emergency response. The Mission Bay FSEIR Health and Safety impacts section determined that with mitigation identified in the FSEIR Seismicity section requiring preparation and implementation of comprehensive emergency preparedness and emergency response plan for the entire Mission Bay plan area, potential impacts to the public from hazardous materials accidents during a catastrophic event would be less than significant.

Mission Bay Plan Interim/Temporary Stormwater Collection Facility Safety Risks

The Mission Bay FSEIR Community Services and Utilities impacts section reported that interim detention basins would be created within the Mission Bay plan area to allow for temporary surface storage of rainwater associated with interim uses within Mission Bay (e.g., paved parking areas). The Mission Bay FSEIR indicated that construction of fencing around any interim detention basins, included as part of the Mission Bay plan and specified in Mitigation Measure M.4 would prevent potential safety impacts associated with humans entering the detention basins.

Impact Evaluation

Risk of Upset

Impact HZ-1: The project could create a significant hazard through routine transport, use, or disposal of hazardous materials or result in a substantial risk of upset involving the release of hazardous materials. (Less than Significant with Mitigation)

Transport, Use, and Disposal of Hazardous Materials

During operation, the proposed event center and other development would use common types of hazardous materials, such as cleaners, disinfectants, and chemical agents required to maintain the sanitation of the public use areas as well as the commercial bathrooms and food preparation areas. These commercial products are labeled to inform users of potential risks and to instruct them in appropriate handling procedures. In addition, the project anticipates installing on-site generators to provide a source of electricity in the event of an outage. These generators would require diesel for operation. Operations may also result in the production of minor amounts of hazardous waste associated with maintenance and cleaning that would require offsite disposition such as disposal or recycling.

As discussed above, the Mission Bay FSEIR Health and Safety impacts section concluded that legally required health and safety measures would adequately address most common health and safety issues related to the use, disposal, and accidental release of common hazardous materials. In San Francisco, the specific regulatory requirements are specified in Articles 21 and 22 of the San Francisco Health Code which provide for the safe handling of hazardous materials and waste in the City. These articles are implemented by the San Francisco Department of Public Health (DPH), which also implements the requirements of state and federal hazardous materials regulations. In accordance with Article 21, any facility that handles hazardous materials in excess of specified quantities would be required to obtain a Certificate of Registration from the DPH and to implement a Hazardous Materials Business Plan (HMBP) that includes inventories, a program for reducing the use of hazardous materials and generation of hazardous wastes, site layouts, a program and implementation plan for training all new employees and annual training for all employees, and emergency response procedures and plans. The proposed event center and individual site uses may also elect to participate in the San Francisco Green Business Program which would promote a reduction in the use of hazardous materials. Article 22 authorizes the DPH to implement the state hazardous waste regulations, including authority to conduct inspections and document compliance. Similarly, the transport of hazardous materials and wastes would be subject to the legal requirements discussed above and in the Mission Bay FSEIR.

As discussed in the Mission Bay FSEIR, use of highly toxic materials, referred to as regulated substances, would be subject to the federal and state Accidental Release Programs. None of the materials anticipated to be used at the arena and other developments would be classified as regulated substances under these programs. However, in the event that regulated substances could be needed for use at the event center (such as refrigerants or other chemicals to support the ice rink), a Risk Management Plan, specifying operational strategies to prevent a release and emergency procedures to be address a release should one occur, would be required in accordance with the California Accidental Release Program as implemented through Article 21A of the San Francisco Health Code as discussed in the FSEIR (this is different than the risk management plan for exposure to hazardous materials in soil and groundwater discussed below in

Impact HZ-2). In addition, none of the materials used would be classified as radioactive, and regulations pertaining to the management of these materials would not apply.

At this time, it is not known specifically what uses might occupy the proposed office development, and the possibility of uses that would handle biohazardous materials cannot be precluded. Thus, as identified in the Mission Bay FSEIR, in the event that there could be future activities that handle biohazardous materials, implementation of FSEIR Mitigation Measures I.1, I.2, and I3 would reduce potential health and safety impacts to less than significant.

As also discussed above, the Mission Bay FSEIR concluded that the generation of household hazardous wastes from residential uses implemented under the Mission Bay Plan would be less than significant with implementation of appropriate City programs. However, this impact would not apply to the proposed project because it does not include any residential uses.

Implementation of the requirements of Articles 21, 21a and 22 also include implementation of emergency response procedures which would specify methods to prevent a release of hazardous materials, and control a release if one were to occur; this would ensure that impacts related to risk of upset involving a release of hazardous materials would be less than significant.

Given that the project would be required to implement all measures in compliance with all applicable hazardous materials and hazardous waste regulations, operation of the project would not result in any new significant impacts, or increase the severity of previously identified impacts related to the routine use, transport, and disposal of hazardous materials during operation. No new or different mitigation measures are required. With implementation of measures specified in the Mission Bay FSEIR, impacts associated with the routine transport, use, or disposal of hazardous materials or associated with risk of upset involving the release of hazardous materials would be less than significant.

Mitigation Measure M-HZ-1a. Guidelines for Handling Biohazardous Materials

Mission Bay FSEIR Mitigation Measure I.1. Require businesses that handle biohazardous materials and do not receive federal funding to certify that they follow the guidelines published by the National Research Council and the United States Department of Health and Human Services Public Health Service, National Institutes of Health, and Centers for Disease Control, as set forth in Biosafety in Microbiological and Biomedical Laboratories, Guidelines for Research Involving Recombinant DNA Molecules (NIH Guidelines), and Guide for the Care and Use of Laboratory Animals, or their successors, as applicable.

Mission Bay FSEIR Mitigation Measure I.2. Require businesses handling biohazardous materials to certify that they use high efficiency particulate air (HEPA) filters or substantially equivalent devices on all exhaust from Biosafety Level 3 laboratories unless they demonstrate that exhaust from their Biosafety Level 3 laboratories would not pose substantial health or safety hazards to the public or the environment. Require such businesses to certify that they inspect or monitor the filters regularly to ensure proper functioning.

Mission Bay FSEIR Mitigation Measure I.3. Require businesses handling biohazardous materials to certify that they do not handle or use biohazardous materials requiring Biosafety Level 4 containment (i.e., dangerous or exotic materials that pose high risks of life-threatening diseases or aerosol-transmitted infections, or unknown risks of transmission) in the Project Area.

Safety Hazards Associated with Stormwater Detention Basins

As discussed above, the Mission Bay FSEIR Community Services and Utilities impacts section reported that interim detention basins constructed within the Mission Bay plan area to allow for temporary surface storage of rainwater associated with interim uses would present a safety hazard. The FSEIR included mitigation requiring construction of fencing around any interim detention basins. However, there would be no interim stormwater detention ponds constructed on the site under the proposed project. Therefore this impact would not be applicable to the proposed project, and the project would not result in any new or more severe impacts relative to those analyzed in the Mission Bay FSEIR. Mitigation Measure M.4 does not apply to the project, and no new or different mitigation measures are required.

Risk of Upset Involving Exposure to Naturally Occurring Asbestos

Naturally occurring asbestos was identified as a Toxic Air Contaminant (TAC) in 1986 by the California Air Resources Board (CARB) and is present in many parts of California. It is commonly associated with serpentine[66] and ultramafic[67] rock types such as Franciscan Complex mélange. Chrysotile (a form of asbestos from the serpentine mineral group) and amphibole asbestos (including crocidolite) are naturally occurring asbestos minerals that may present a human health hazard, if they become airborne.

The Mission Bay FEIR and FSEIR did not specifically address impacts associated with exposure to naturally occurring asbestos during construction of development projects under the Mission Bay Plan. However, the preliminary geotechnical evaluation completed for the project notes that the artificial fill at the site contains cobble and boulder sized pieces of serpentinite.[68] Therefore, if naturally occurring asbestos is present in the serpentinite within the artificial fill to be excavated, the workers and the public could be exposed to naturally occurring asbestos during excavation activities.

In 2001, the CARB adopted the Asbestos Airborne Toxic Control Measure (Asbestos ATCM) for Construction, Grading, Quarrying, and Surface Mining Operations in areas of serpentine and other ultramafic rocks (17 CCR Section 93105), which became effective in July 2002. The ATCM protects public health and the environment by requiring the use of best available dust mitigation measures to prevent off-site migration of asbestos-containing dust from road construction and maintenance activities, construction and grading operations, and quarrying and surface mining operations in areas of ultramafic rock, serpentine, or asbestos. The Bay Area Air Quality Management District (BAAQMD) implements the regulation.

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66 Serpentinite is a rock consisting of one or more serpentine minerals formed when ultramafic rocks have been metamorphosed (ultramafic rocks are formed in high-temperature environments well below the surface of the earth), and is commonly associated with ultramafic rock along faults such as the San Andreas fault. Serpentinite commonly contains chrysotile, an asbestiform variety of the serpentine minerals. Amphibole asbestos is also found in some forms of Franciscan Complex bedrock such as blueschist.

67 Ultramafic rocks are one type of igneous rock (formed at high temperatures well below the surface of the earth) that is rich in iron and magnesium.

68 Langan Treadwell Rollo, 2014. *Preliminary Geotechnical Investigation, Block 29-32 Mission Bay, San Francisco, California*. March 28.

For construction activities that would disturb more than 1 acre of land such as the proposed project, construction contractors are required to prepare an asbestos dust mitigation plan specifying measures that will be taken to ensure that no visible dust crosses the property boundary during construction. The asbestos dust mitigation plan must be submitted to and approved by the BAAQMD prior to the beginning of construction, and the site operator must ensure the implementation of all specified dust mitigation measures throughout the construction project. In addition, the BAAQMD may require air monitoring for off-site migration of asbestos dust during construction activities and may change the plan on the basis of the air monitoring results. Title 17 CCR Section 93105(h)(9) defines asbestos containing material as any material that has an asbestos content of 0.25 percent or greater.

While there is a well-established regulatory framework for managing naturally occurring asbestos during construction, this impact would be potentially significant because no sampling has been conducted to establish the asbestos content in the fill materials that would be excavated during construction. This impact would be reduced to a less-than-significant level with implementation of Mitigation Measure M-HZ-1b, identified in this Initial Study, requiring the project sponsor to implement a geologic investigation to assess the naturally occurring asbestos content of the fill materials. This mitigation also requires the project sponsor to implement the requirements of the asbestos ATCM, including implementation of a Dust Mitigation Plan for naturally-occurring asbestos, if the investigation determines that the asbestos content of the fill is 0.25 percent or greater. Implementation of this measure would ensure that if naturally occurring asbestos is present, no visible dust crosses the project boundaries, and could also require air monitoring to demonstrate compliance with this criterion if deemed necessary by the BAAQMD. Rock containing naturally occurring asbestos that would be disposed of off-site would not be considered a hazardous waste under California regulations.[69]

Mitigation Measure M-HZ-1b: Geologic Investigation and Dust Mitigation Plan for Naturally Occurring Asbestos

The project sponsor shall conduct a geologic investigation in accordance with the guidelines of the California Geologic Survey[70] to determine the naturally occurring asbestos content of fill materials to be excavated at the project site. If the investigation determines that the naturally occurring asbestos content of the fill materials is 0.25 percent or greater, the project sponsor or its construction contractor shall submit the appropriate notification forms and prepare an asbestos dust mitigation plan in accordance with the Asbestos ATCM. The plan shall specify measures that will be taken to ensure that no visible dust crosses the property boundary during construction. The plan must specify the following measures:

- Prevent and control visible track-out from the property
- Ensure adequate wetting or covering of active storage piles
- Control disturbed surface areas and storage piles that would remain inactive for 7 days

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69 Department of Toxic Substances Control, 2000. *Letter to Jon A. Morgan, Director, Environmental Management Department, County of El Dorado. Naturally Occurring Asbestos.* January 20.

70 California Geologic Survey, 2002. *Guidelines for Geologic Investigations of Naturally Occurring Asbestos in California. Special Publication 124.*

- Control traffic on on-site unpaved roads, parking lots, and staging areas, including a maximum vehicle speed of 15 miles per hour
- Control earthmoving activities
- Control offsite transport of dust emissions that contain naturally-occurring asbestos-containing materials
- Stabilize disturbed areas following construction

The asbestos dust mitigation plan shall be submitted to and approved by the Bay Area Air Quality Management District (BAAQMD) prior to the beginning of construction, and the site operator must ensure the implementation of all specified dust mitigation measures throughout the construction project. In addition, if required by the BAAQMD, the project sponsor or a qualified third party consultant shall conduct air monitoring for offsite migration of asbestos dust during construction activities and shall modify the dust mitigation plan on the basis of the air monitoring results if necessary.

Implementation of Mitigation Measure M-HZ-1b, above, would reduce impacts associated with potential exposure to naturally occurring asbestos during construction to less than significant.

Contaminated Soil and Groundwater

Impact HZ-2: The project would be located on a site identified on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5. Excavation could also require the handling of potentially contaminated soil and groundwater, potentially exposing workers and the public to hazardous materials, or resulting in a release into the environment during construction. (Less than Significant with Mitigation)

As discussed above, the Mission Bay FSEIR Contaminated Soil and Groundwater setting section states that Blocks 29-32 were historically used for a variety of industrial and commercial uses. A Phase I Environmental Site Assessment[71] conducted in support of the proposed project also notes specific former uses on the site (between 1902 and 2010) included bulk fuel storage and distribution; railroad operations; a machine shop; boiler house; steel mill; well casing manufacturer; warehousing, shipping and receiving operations for a variety of products; fruit cannery, junk yards, vehicle parking and maintenance facilities and a ready-mix concrete facility.

As summarized in the Mission Bay FSEIR, a 1997 investigation conducted to evaluate soil and groundwater quality throughout the Mission Bay plan area identified petroleum hydrocarbons in soil, groundwater, and floating on groundwater (petroleum free product) in the vicinity of Illinois and 16th Streets (including within Blocks 31 and 32), and attributed the free product to former petroleum bulk storage as well as pipelines and transfer facilities in the vicinity. This area is collectively referred to as the Pier 64 area. As summarized in the FSEIR, the concentrations of contaminants in soil or groundwater in the Mission Bay

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[71] Langan Treadwell Rollo, 2014. Updated Phase I Environmental Site Assessment, Site X, Mission Bay Blocks 29-32, San Francisco, California. April 11.

plan area, with the exception of the identified petroleum free product area, did not present a human health or ecological risk under existing conditions.

Actions Completed Since Publication of the Mission Bay FSEIR

Risk Management Plan. Subsequent to publication of the Mission Bay FSEIR, a RMP was prepared and approved by the RWQCB in 1999 to address risk management measures to be implemented prior to development, during development (during construction), after development of specific parcels within the Mission Bay plan area.[72] All risk management measures in the RMP are deemed to be protective of human health and the environment under the conditions specific to each phase of development.

Measures to be implemented prior to development are intended to manage risks associated with exposed soil before a site is developed and are protective of populations at and adjacent to the undeveloped parcel. Measures to be implemented during development are intended to manage risks during construction and are protective of construction site workers and the surrounding public. They include dust control measures, soil management protocols, stormwater pollution plan requirements, worker health and safety planning requirements, contingency requirements in the event that previously unidentified underground structures or contamination are identified, protocols for dewatering activities, and a framework for complying with the requirements of Article 20 of the San Francisco Health Code, commonly referred to a the Maher Ordinance (note that this ordinance was subsequently revised in 2013, and is now codified in Article 22A of the San Francisco Health Code). Several of the measures apply specifically to the free product area where the project site is located; these measures are intended to control the release and migration of free product during project construction.

Risk management measures to be implemented after development are intended to manage risks to site occupants and ensure that they would have no contact with site soils and groundwater as well as risks to maintenance and utility workers that may contact soil left in place during their normal work activities. They include covering of exposed areas; limiting future residential development within the Mission Bay plan area to preclude single family homes with private front or back yards; restricting the future use of groundwater for domestic, industrial, or irrigation purposes; providing protocols for future subsurface activities; and implementing a long-term groundwater monitoring program.

In addition, the RMP specifies the process to ensure regulatory oversight of development activities within the Mission Bay plan area. Owners must specifically notify the RWQCB in advance of initiating construction and must also submit a dust monitoring notification to the RWQCB and DPH. In addition, the owner must document compliance with specified measures to the RWQCB and must also notify the RWQCB of any unanticipated structures or contamination encountered during construction, as well as any unanticipated environmental conditions not covered by the RMP. The owner must also submit quarterly reports to the RWQCB during construction and a completion letter once construction is complete.

As stated in the RMP, completion of this RMP satisfies the requirements of Mission Bay FSEIR Mitigation Measure J.1 and provides guidelines for implementing Mitigation Measure J.2, described above. The requirements of the RMP are enforced through an environmental covenant recorded against each parcel in

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72 Environ Corporation, 1999. *Risk Management Plan, Mission Bay Area, San Francisco, California.* May 11.

the Mission Bay plan area. The environmental covenant requires compliance with the RMP and runs with the property, binding future site owners to also comply with the requirements of the RMP.

Site Investigations and Remediation, and Regulatory Actions. As summarized in the Phase I Environmental Site Assessment completed for the project, the RWQCB adopted Order No. R2-2005-0028 in 2005 which established cleanup requirements for the Pier 64 area. The order divided the Pier 64 area into six operable units; portions of the Blocks 29-32 are located within the "North Terminal Operable Unit." The site has been subject to several site investigations, underground tank removals, and remedial actions to address contaminants in the soil and groundwater prior to and pursuant to this order. As reported in the Phase I Environmental Site Assessment, the underground storage tank removals and remedial actions completed include:

> Removal of a 13,500 gallon diesel underground storage tank from Block 31 in 1987 and a 1,000 gallon gasoline underground storage tank from Block 32 in 1997. These underground storage tanks were located with the area of the free petroleum product plume and free product in this area was removed during the remediation conducted in 2005 (discussed below);
>
> Removal of a 4,000 gallon diesel underground storage tank, a 10,000 gallon underground tank, and a 5,000 gallon gasoline underground storage tank occurred in 1995. These tanks were located in portions of Blocks 29 and 31 that are outside of the North Terminal Operable Unit. Localized soil and groundwater affected by petroleum hydrocarbons were addressed at the time of tank removal. These tanks were removed under the oversight and authority of the DPH Local Oversight Program and RWQCB, and case closure was granted in February 1995.

The Phase I soil remediation conducted in 2001 included the removal of approximately 14,020 tons of visibly stained soil to a depth of approximately 2 feet below the groundwater table (a total depth of approximately 9 feet below ground surface) as well as petroleum pipelines encountered during excavation. During this remediation, free petroleum product accumulated on the groundwater surface was removed from the excavated area, and the excavation was backfilled.

The Phase II remediation conducted in 2005 which included demolition of the existing site structures and removal of approximately 90,000 tons of soil containing petroleum hydrocarbons from the North Terminal Operable Unit and adjacent areas. This excavation also extended to approximately two feet below the groundwater table, or nine feet below ground surface. During this remediation, free petroleum product accumulated on the groundwater surface was removed from the excavated area, and the excavation was backfilled. The revised RMP (described below) indicates that the site was not returned to original grade at this time, but that it would be the property owner's responsibility.

On December 22, 2006, the RWQCB issued a no further action letter stating that no further soil remediation was required. With completion of the above activities, and based on the results of a groundwater monitoring program required by the RWQCB, twenty groundwater monitoring wells installed in the Pier 64 area as part of the groundwater monitoring program were properly abandoned in June, 2013.

A Revised Risk Management Plan (RRMP) was prepared in 2006 in accordance with Order R2-2005-028 to reflect remedial actions conducted within the Pier 64 area in 2001 and 2005.[73] The RRMP determined that based on completion of the above described remedial actions, the risk management measures required prior to development no longer applied to the North Terminal Operable Unit where the proposed project is located. All of the RMP risk management measures applicable during development and after development would still apply, with the exception of those measures specific to development in the free product area (because the previous remediations in the North Terminal Operable Unit successfully removed from product within this area).

As stated in the RRMP, Catellus (the then owner of the North Terminal Operable Unit) and the City and County of San Francisco each recorded a Covenant and Environmental Restriction (deed restriction) on the property that, among other things, required property owners to comply with the terms of the Mission Bay RMP. Because this Covenant and Environmental Restriction will run with the property as discussed in the RMP, future site owners (including the project sponsor) will be subject to the requirements of the RMP. In 2014, the RWQCB issued order R2-2014-022 rescinding Order R2-2005-2008 because the above-described remediations and groundwater monitoring satisfied the requirements of that order. Order R2-2014-022 states that any residual contamination in the Pier 64 area poses acceptable risks to human health and the environment and can be effectively managed using the existing Mission Bay RMP.

While the completion of remedial actions described above would be considered substantial changes that have occurred at the project site, implementation of these actions has effectively removed free petroleum products in the Pier 64 area and reduced risks to human health and the environment in this area compared to conditions described in the FSEIR. With implementation of the Mission Bay RMP, prepared in accordance with Mission Bay FSEIR Mitigation Measure J.1, human health and environmental health risks would remain within acceptable levels, and the proposed project would not result in new or more severe impacts relative to the Mission Bay FSEIR.

Preparation of the Mission Bay RMP satisfies the requirements of Mission Bay FSEIR Mitigation Measure J.1; therefore this mitigation does not apply to the proposed project. In addition, compliance with the RMP as required by the deed restriction would ensure that human health and environmental risks during and after development of the proposed project would be within acceptable levels and no new or different mitigation would be required.

As stated above, the RWQCB has determined that the Mission Bay RMP, completed in accordance with Mission Bay FSEIR Mitigation Measure J.1, adequately addresses human health and environmental risks during and after development of the proposed project. Therefore, Mitigation Measure J.1, already implemented, adequately addresses impacts associated with contaminated soil and groundwater. Compliance with the RMP, as required by the deed restriction, would ensure that human health and environmental risks during and after development of the proposed project would be within acceptable levels and no new or different mitigation would be required. Furthermore, in the event that child care facilities were to occur under the proposed project, implementation of FSEIR Mitigation Measure J.2 would reduce this impact to less than significant.

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73 BBL Environmental Services, Inc., 2006. *Revised Risk Management Plan, Former Petroleum Terminals and Related Pipelines Located at Pier 64 and Vicinity, City and County of San Francisco, California*. August.

Mitigation Measure M-HZ-2: RMP Provisions for Child Care Facilities

Mission Bay FSEIR Mitigation Measure J.2. Carry out a site-specific risk evaluation for each site in a non-residential area proposed to be used for a public school or child care facility; submit to RWQCB for review and approval. If cancer risks exceed 1 x 10^{-5} and/or noncancer risk exceeds a Hazard Index of 1, carry out remediation designed to reduce risks to meet these standards or select another site that is shown to meet these standards.

Emergency Response

Impact HZ-3: The project would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan or expose people or structures to a significant risk of loss, injury or death involving fires. (Less than Significant)

The proposed project would increase the number of employees and visitors in the Mission Bay South area. There would be an additional 2,728 new full-time equivalent (FTE) employees associated with the team operations and event center management, retail and office uses, and additional 1,000 day-of-game staff during a game/event at the event center. Depending on the game/event up to 18,500 patrons could be attendance at the event center, and there would be additional visitors associated with the retail uses. The project employees and visitors could contribute to congestion if an emergency evacuation of the Mission Bay plan area were required. As discussed above, the Mission Bay FSEIR Seismicity impact section concluded that with implementation of mitigation requiring the project sponsor to store heavy construction equipment capable of negotiating roads damaged by an earthquake, coordinate emergency response plans with the City, prepare a project-specific emergency response plan, and construct a new fire station, impacts associated with emergency access in the event of a major earthquake would be less than significant.

Section 12.202(e)(1) of the San Francisco Fire Code currently requires that all owners of high-rise buildings (taller than 75 feet), such as the event center and office buildings, "shall establish or cause to be established procedures to be followed in case of fire or other emergencies. All such procedures shall be reviewed and approved by the chief of division." Additionally, project construction would have to conform to the provisions of the Building Code and Fire Code, which require additional life-safety protections for high-rise buildings and the final building plans for the new facilities would be reviewed by the San Francisco Fire Department (as well as DBI) to ensure conformance with the applicable provisions, including development of an emergency procedure manual and an exit drill plan. This regulatory requirement fulfills the intent of Mitigation Measure H.3b.

Although not "adopted" by legislative action, the City has a published Emergency Response Plan dated 2009 and prepared by the Department of Emergency Management as part of the City's Emergency Management Program.[74] This plan includes plans for hazard mitigation and disaster preparedness and recovery, and identifies hazards to which San Francisco is particularly susceptible such as earthquake, hurricane, tsunami, flood, winter storm, and act of terrorism, including use of chemical, biological, radiological, nuclear, and explosive weapons. The Emergency Response Plan complies with several relevant

[74] San Francisco Department of Emergency Management, City and County of San Francisco Emergency Response Plan, December 2010. Available at: http://www.sfdem.org/Modules/ShowDocument.aspx?documentid=1154. Reviewed September 9, 2011.

state and federal directives for emergency planning, including the California Standardized Emergency Management System and the Incident Command System. The Plan includes sections on operations, including management and procedures; staffing, operations, and logistics regarding the City's emergency operations center; and mutual aid involving other agencies. The Emergency Response Plan assigns responsibilities for disaster planning, operations (including fire and rescue, law enforcement, human services, infrastructure, transportation, communications, and community support), and logistics, as well as finance and administration, to City agencies and departments. The Emergency Response Plan also identifies volunteer agencies, such as the American Red Cross, that are integral to disaster response efforts.

The Emergency Response Plan contains 16 "annexes" (similar to appendices), consistent with a federally established framework, that cover topics including firefighting, public works and engineering, mass casualty care, and earthquakes, among numerous others. The Earthquake Annex, in particular, sets forth planning assumptions for a series of earthquakes of varying magnitudes on different faults, and sets forth procedures for assessment of damage and injuries, and operational response and strategies in the event of a major earthquake.

Implementation of the project would increase the number of on-site employees and also the number of visitors that would be subject to a potential disaster, including a major earthquake or any of the other hazards identified in the Emergency Response Plan. However, in the event of such a disaster, implementation of the San Francisco Emergency Response Plan, prepared in 2008 (subsequent to publication of the Mission Bay FSEIR) would ensure that adequate city resources are available for response. Implementation of the site-specific emergency response plan required under the Fire Code, and life safety requirements of the Building and Fire Codes as described above would ensure that the proposed project would not obstruct implementation of the City's Emergency Response Plan, nor would it necessarily interfere with emergency evacuation planning. Preparation of the Emergency Response Plan, and implementation of these regulatory requirements fulfill the intent of Mission Bay FSEIR Mitigation Measures H.1 and H.2, therefore these measures do not apply to the proposed project.

In addition, the project site is located adjacent to Third Street, a primary evacuation route identified in the Emergency Response Plan. In addition, Terry A. François Boulevard is a designated Tsunami Evacuation Route. Project construction could interfere with implementation of the Emergency Response Plan if construction activities restricted access for emergency response vehicles or evacuating vehicles. However, any construction activities that could restrict access would be of a temporary nature. The Construction Management Plan required as part of the San Francisco Municipal Transportation Agency's Transportation Advisory Staff Committee would address localized construction effects (such as increased traffic and the need for coordination with emergency response providers) prior to construction. The plan would include measures to minimize construction-related disruptions and would be reviewed by the multi-agency Transportation Advisory Staff Committee. Due to the short duration of disruption and required coordination and review of the project's construction management plan, construction would not likely interfere with the Emergency Response Plan. Issues related to long-term emergency access will be discussed in the SEIR under the Transportation section.

Although not discussed in the Mission Bay FSEIR, the project would be constructed in a developed area of San Francisco, which lacks an "urban-wildland interface" and where fire, medical, and police services are available and provided. The street grid provides ample access for emergency responders and egress for event attendees and workers, and the proposed project would neither directly nor indirectly alter that situation. Therefore, the proposed project would not directly or indirectly result in the additional exposure of persons to fire risk.

Construction of the new Public Safety Building at Third Street and Mission Rock was completed in the summer of 2014, and satisfies the requirements of Mission Bay FSEIR Mitigation Measure H.5. Therefore, this mitigation measure is no longer applicable to the proposed project.

As discussed above, implementation of the city's Emergency Response Plan, the site-specific emergency response plan required under the Fire Code, and life safety requirements of the Building and Fire Codes would ensure that the proposed project would not obstruct implementation of the City's Emergency Response Plan, nor would it necessarily interfere with emergency evacuation. These regulatory requirements fulfill the requirements of mitigation specified in the Mission Bay FSEIR for this impact, and no additional mitigation is required.

Cumulative Impacts

Impact C-HZ-1: The project, in combination with past, present, and reasonably foreseeable future projects in the site vicinity, would not result in a considerable contribution to cumulative impacts related to hazardous materials. (Less than Significant)

Hazardous materials impacts related to implementation of the proposed project could result from use of hazardous materials (Impact HZ-1), excavation within materials containing naturally occurring asbestos (Impact HZ-1), and conducting construction activities within potentially contaminated soil and groundwater and subsequent use of the site (Impact HZ-2). These impacts would be primarily restricted to the project site and immediate vicinity; therefore, the geographic scope for cumulative impacts related to hazards includes the project site and immediate vicinity.

As discussed above, the project would not result in any significant impacts with respect to hazards or hazardous materials that could not be mitigated to a less-than-significant level. All cumulative development in San Francisco would be subject to the same regulatory framework as would the project for the transport use, and storage of hazardous materials (Impact HZ-1) and compliance with these existing regulations would serve to minimize any cumulative impacts.

The project could result in exposure to naturally occurring asbestos during construction (Impact HZ-1), and cumulative projects in the area could also encounter these materials potentially resulting in a significant cumulative impact. However, implementation of Mitigation Measure M-HZ-1a requiring a geologic investigation, and compliance with the Asbestos ATCM would ensure that the project's contribution to this cumulative impact is less than significant with mitigation.

With implementation of the RMP for the entire Mission Bay Plan area, cumulative impacts related to soil and groundwater contamination would be less than significant as discussed in Impact HZ-2. Similarly, other projects within the Plan area would be required to investigate and, as necessary, abate soil and groundwater contamination on a project-by-project basis in accordance with Article 22A of the San Francisco Health Code. Therefore, cumulative impacts related to soil and groundwater contamination would be less than significant.

The Mission Bay FSEIR concluded that the effort to address cumulative hazardous waste generation and disposal impacts related to large quantity hazardous waste generators would require additional commitment of federal, State, and other local agencies. Therefore, efforts to offset the plan contribution to cumulative hazardous waste generation and disposal effects may not be successful, resulting in a residual impact that may be significant and unavoidable. However, as discussed in impact HZ-1, the project would only generate small quantities of hazardous wastes associated with maintenance and cleaning. Therefore, the project would not have a cumulatively considerable contribution to this cumulative impact, such that there would be no new or substantially more severe impact than what was identified in the Mission Bay FSEIR.

Issues related to long term emergency access will be discussed in the SEIR under the Transportation section.

Topics:	*Potentially Significant Effects Not Identified in Prior EIR*	*Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR*	*Sponsor Declines to Adopt Feasible Mitigation Measures or Alternatives*	*No New or More Severe Significant Effects*
17. MINERAL AND ENERGY RESOURCES—Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒
c) Encourage activities which result in the use of large amounts of fuel, water, or energy, or use these in a wasteful manner?	☐	☐	☐	☒

The Mission Bay FSEIR did not specifically address potential impacts of the Mission Bay plan on mineral resources. However, the project site at Blocks 29-32 does not contain any known mineral resources delineated in the San Francisco General Plan or any other land use plans and does not include mineral resources that are of value to the region and the residents of the state.[75] Therefore, criteria E.17(a) and E.17(b) do not apply to the proposed project, and these topics are not discussed further in this Initial Study or in the SEIR.

Summary of Energy Resource Impacts in Mission Bay FSEIR

The Mission Bay FSEIR Initial Study Energy/Natural Resources section estimated that existing operational energy consumption within Mission Bay in 1998 was approximately 160 billion Btu[76] annually for electricity and natural gas sources, and approximately 420 billion Btu annually for transportation sources.

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75 California Department of Conservation, Division of Mines and Geology, 1996. Update of Mineral Land Classification: Aggregate Materials in the South San Francisco Bay Production-Consumption Zone, Open File Report 96-03.

76 Electric energy is usually measured in kilowatt hours (kWh), and natural gas in million cubic feet (MMcf). Both may be converted to British thermal units (Btu); 1 Btu is the quantity of heat necessary to raise the temperature of 1 pound of water 1 degree Fahrenheit.

The Mission Bay FSEIR Initial Study estimated that at buildout, operational energy consumption from the Mission Bay plan would be about 2,109 billion Btu annually for electricity and natural gas sources, and 3,212 billion Btu annually for transportation sources. However, impacts associated with this increase in energy use were considered less than significant because compliance with Title 24 Energy Conservation Standards would ensure that electricity and natural gas would not be used in a wasteful manner. The Mission Bay FSEIR Initial Study Energy/Natural Resources section estimated that construction of projects under the Mission Bay plan would consume approximately 20,645 billion Btu. As such, the Mission Bay FSEIR identified no significant impacts to energy resources from the Mission Bay plan, and accordingly, did not require any mitigation measures related to energy resources.

The Mission Bay FSEIR Community Services and Utilities impacts section estimated the Mission Bay plan would require approximately 2.9 million gallons per day (mgd) of water at build-out. The FSEIR specified water conservation measures, proposed as part of the plan and included as Mitigation Measures M.2a through M.2f that would ensure that the effects of plan implementation on water supply would remain less than significant.

Impact Evaluation

Energy and Water Use

Impact ME-1: The project would not result in the use of large amounts of fuel, water, or energy, or use these in a wasteful manner. (Less than Significant)

Construction Energy

As discussed above, the Mission Bay FSEIR Initial Study Energy/Natural Resources section estimated that the construction of development projects under the Mission Bay Plan would use approximately 20,645 billion Btu of energy. Construction of the event center and other proposed developments would also require the use of fuel, energy, and water. The FSEIR did not estimate energy consumption specific to the development of proposed on Blocks 29-32 or the amount of water that would be used during construction. However, the amount of these resources used for construction of the proposed project would be typical of a normal construction project in San Francisco, and energy consumption would be expected to be commensurate with the percentage of development at this site relative to total development under the Plan. Therefore, as indicated in the FSEIR, the use of these resources during construction would not be wasteful, and impacts related to the use of energy resources during construction would be less than significant. No new mitigation would be required.

Operational Energy and Water Resources

Fuels. As stated above, the Mission Bay FSEIR estimated that at full build out of the Mission Bay plan, fuel usage for transportation would be 3,212 billion Btu, approximately 8 times greater than the use of fuels at the time of FSEIR publication. The amount of fuel use attributable to development on Blocks 29-32 was not specifically calculated in the FSEIR.

The project could contribute to the estimated increase in the use of transportation fuels by introducing new event attendees, employees, and site visitors to the project site. However, as described in the Project

Description, the event center and other proposed developments will be served by multiple public transportation opportunities; Terry A. François Boulevard would be realigned and reconfigured to include a two-way bicycle route; the project would ensure access to bicycle parking and incorporate alternative transportation facilities. With these features, the event attendees, employees, and site visitors would be encouraged to use public transportation or use alternative transportation methods. Should one travel in a personal vehicle, the use of low emission and fuel efficient vehicles would be encouraged by providing designated parking spots in the parking garage in accordance with Section 5.103.1.10 of the San Francisco Green Building Code. Therefore, the project would not result in the wasteful use of transportation fuels and this impact would be less than significant. No new mitigation is necessary.

Energy. The Mission Bay FSEIR did not estimate energy consumption specific to the development proposed on Blocks 29-32, but concluded that compliance with Title 24 Energy Conservation Standards would ensure that the area-wide 13 fold increase in energy use at full build out in the Mission Bay plan area would not result in a wasteful use of energy.

The proposed event center and other proposed developments would require the use of energy for purposes such as lighting, heating, cooling, ventilation, food storage and preparation, and equipment operation. Subsequent to publication of the Mission Bay FSEIR, San Francisco adopted its own green building code, implementing the California Green Building Code and California Building Energy Efficiency Standards, with amendments. Accordingly, the design of the buildings would need to meet or exceed the energy efficiency requirements of the 2013 San Francisco Green Building Code which, at a minimum, would require compliance with the 2013 California Building Energy Efficiency Standards. In accordance with the San Francisco Green Building Code, the project would be designed to Leadership in Energy and Environmental Design (LEED) Gold standards, including provision of either some on-site renewable energy or purchase of green energy credits. Alternatively, the project could exceed the energy efficiency requirements specified in the 2013 California Building Energy Efficiency Standards by 10 percent. In addition, in accordance with the San Francisco Green Building Code, the project sponsor would be required to commission the building's energy systems and components to verify that they meet the energy code requirements.

As described in the Project Description, the project would use a campus approach for LEED certification. This approach treats the entire site as a shared campus, allowing several LEED credits to be pre-approved under a campus site application and then referenced by each individual or group of buildings located on the site. The arena would pursue LEED for New Construction certification as an individual building, while the mixed-use development would pursue LEED for Core and Shell certification as a group project. Some examples of energy conservation measures that could be addressed in the building designs include sustainable building envelope strategies; shading; plug load reduction such as occupancy and daylight sensors; VAV demand control ventilation systems; water-cooled chillers, variable speed pumps, and airside/waterside economizers.

No new mitigation measures or alternatives are required because, as for the Mission Bay FSEIR, compliance with Title 24 regulations and now the San Francisco Green Building Code would ensure that the proposed project would not use energy in a wasteful manner.

Water. As discussed above, the Mission Bay FSEIR Community Services and Utilities impacts section estimated the Mission Bay plan would require approximately 2.9 million gallons per day (mgd) of water at build-out and specified water conservation measures, proposed as part of the plan and included as mitigation, that would ensure that the effects of plan implementation on water supply would remain less than significant. Implementation of these measures would also ensure that water used under Mission Bay plan would not be used in a wasteful manner.

The proposed project would require the indoor use of water for toilet flushing and other sanitary needs, food preparation, and other indoor activities. However, the project would be required to comply with the water conservation measures specified in the 2013 California Green Building Code. Further, in accordance with the 2013 San Francisco Green Building Code, the project sponsor would be required to incorporate plumbing fixtures and fixture fittings to reduce the amount of potable water used by 30 percent. If and when a supply of recycled water becomes available through the Eastside Recycled Water Project[77] the project would also use recycled water for non-potable uses.

For outdoor water use (landscape irrigation), the project sponsor would be required to use climate-appropriate plants and submit the required landscape documentation to the SFPUC in accordance with the San Francisco Water Efficient Irrigation Ordinance and the San Francisco Green Landscaping Ordinance. Installation of weather- or soil moisture-based irrigation controllers that would automatically adjust irrigation in response to changes in plants' needs as weather conditions change would also be required.

Compliance with the above standards would ensure that water is not used wastefully during operation of the event center and other proposed developments, and would in effect implement FSEIR Mitigation Measures M.2a through M.2f. Therefore, impacts related to wasteful use of water would be less than significant and FSEIR Mitigation Measures M.2a through M.2f are no longer required for the proposed project. No new mitigation measures are required.

Cumulative Impacts

Impact C-ME-1: The project, in combination with other past, present, and reasonably foreseeable future projects, would not result in significant adverse cumulative impacts on energy resources. (Less than Significant)

The proposed project would use fuel, energy, and water. Although other projects in the region would also use these resources, cumulative impacts would be less than significant because all of the regional projects, including the proposed project, would be required to comply with the California Green Building Standards Code and Building Energy Efficiency Standards at a minimum. Furthermore, many of the regional projects would also be subject to local green building requirements such as those of the City and County of San Francisco, which must be as stringent as the state requirements and are often more stringent. These building codes encourage sustainable construction and operational practices related to planning and design,

[77] The SFPUC plans to provide 2 million gallons per day of high quality recycled water to the customers in the east side of the City through the Eastside Recycled Water Project for non-potable uses such as irrigation and toilet flushing. This project is still in the planning stages, and the implementation date is uncertain.

energy efficiency, water efficiency, and conservation. Therefore, cumulative impacts related to wasteful use of fuel, energy, and water resources would be less than significant.

Topics:	*Potentially Significant Effects Not Identified in Prior EIR*	*Potentially Substantial Increase in Severity of Significant Impact Identified in Prior EIR*	*Sponsor Declines to Adopt Feasible Mitigation Measures or Alternatives*	*No New or More Severe Significant Effects*
18. AGRICULTURE AND FOREST RESOURCES: In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. **—Would the project**				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)) or timberland (as defined by Public Resources Code Section 4526)?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or forest land to non-forest use?	☐	☐	☐	☒

The Mission Bay FSEIR did not specifically address potential impacts of the Mission Bay plan on agriculture and forest resources. However, the project site at Blocks 29-32 does not contain any prime farmland, unique farmland, farmland of statewide importance, forest, or timberlands; does not support agricultural or timber uses; is not zoned for agricultural or timber uses; and is not under a Williamson Act contract. Therefore, none of the agriculture and forest resources significance criteria are applicable to the proposed project, and these topics are not discussed further in this Initial Study or in the SEIR.

F. MITIGATION MEASURES

This section lists the mitigation measures identified in this Initial Study. Implementation of these measures would mitigate significant project environmental impacts, and/or considerable project contribution to cumulative environmental impacts such that all corresponding impacts would be reduced to less than significant. The listed mitigation measures include those measures originally identified in the Mission Bay FSEIR that are applicable to the proposed project, as well as certain new mitigation measures identified in this Initial Study to reduce potential impacts to less than significant. Mitigation measures are numbered to correspond to the Initial Study impact number, with a cross reference to the impact numbering system from the Mission Bay FSEIR where appropriate.

It should also be noted that certain mitigation measures identified in the Mission Bay FSEIR are no longer applicable to the proposed project, as described in Section E above; those measures are not listed in this section. For those topics and impact areas to be analyzed in the SEIR, additional mitigation measures will be identified in the SEIR as needed.

Mitigation Measure M-CP-2a: Archaeological Testing, Monitoring and/or Data Recovery Program

Based on a reasonable presumption that archaeological resources may be present within the project site, the following measures shall be undertaken to avoid any potentially significant adverse effect from the proposed project on buried or submerged historical resources. The project sponsor shall retain the services of an archaeological consultant approved by OCII or its designated representative such as those from the rotational Department Qualified Archaeological Consultants List (QACL) maintained by the Planning Department archaeologist. The project sponsor shall contact the Department archaeologist to obtain the names and contact information for the next three archaeological consultants on the QACL. The archaeological consultant shall undertake an archaeological testing program as specified herein. In addition, the consultant shall be available to conduct an archaeological monitoring and/or data recovery program if required pursuant to this measure. The archaeological consultant's work shall be conducted in accordance with this measure at the direction of OCII or its designated representative. All plans and reports prepared by the consultant as specified herein shall be submitted first and directly to OCII or its designated representative for review and comment, and shall be considered draft reports subject to revision until final approval by OCII or its designated representative. Archaeological monitoring and/or data recovery programs required by this measure could suspend construction of the project for up to a maximum of four weeks. At the direction of the OCII or its designated representative, the suspension of construction can be extended beyond four weeks only if such a suspension is the only feasible means to reduce to a less than significant level potential effects on a significant archaeological resource as defined in CEQA Guidelines Sect. 15064.5 (a)(c).

Consultation with Descendant Communities: On discovery of an archaeological site[78] associated with descendant Native Americans, the Overseas Chinese, or other descendant group an appropriate

[78] By the term "archaeological site" is intended here to minimally include any archaeological deposit, feature, burial, or evidence of burial.

representative[79] of the descendant group and OCII or its designated representative shall be contacted. The representative of the descendant group shall be given the opportunity to monitor archaeological field investigations of the site and to consult with OCII or its designated representative regarding appropriate archaeological treatment of the site, of recovered data from the site, and, if applicable, any interpretative treatment of the associated archeological site. A copy of the Final Archaeological Resources Report shall be provided to the representative of the descendant group.

Archaeological Testing Program. The archaeological consultant shall prepare and submit to OCII or its designated representative for review and approval an archaeological testing plan (ATP). The archaeological testing program shall be conducted in accordance with the approved ATP. The ATP shall identify the property types of the expected archaeological resource(s) that potentially could be adversely affected by the proposed project, the testing method to be used, and the locations recommended for testing. The purpose of the archaeological testing program will be to determine to the extent possible the presence or absence of archaeological resources and to identify and to evaluate whether any archaeological resource encountered on the site constitutes an historical resource under CEQA.

At the completion of the archaeological testing program, the archaeological consultant shall submit a written report of the findings to OCII or its designated representative. If based on the archaeological testing program the archaeological consultant finds that significant archaeological resources may be present, OCII or its designated representative in consultation with the archaeological consultant shall determine if additional measures are warranted. Additional measures that may be undertaken include additional archaeological testing, archaeological monitoring, and/or an archaeological data recovery program. No archaeological data recovery shall be undertaken without the prior approval of OCII or its designated representative. If OCII or its designated representative determines that a significant archaeological resource is present and that the resource could be adversely affected by the proposed project, at the discretion of the project sponsor either:

A. The proposed project shall be re-designed so as to avoid any adverse effect on the significant archaeological resource; or

B. A data recovery program shall be implemented, unless OCII or its designated representative determines that the archaeological resource is of greater interpretive than research significance and that interpretive use of the resource is feasible.

Archaeological Monitoring Program. If OCII or its designated representative in consultation with the archaeological consultant determines that an archaeological monitoring program shall be implemented the archaeological monitoring program shall minimally include the following provisions:

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79 An "appropriate representative" of the descendant group is here defined to mean, in the case of Native Americans, any individual listed in the current Native American Contact List for the City and County of San Francisco maintained by the California Native American Heritage Commission and in the case of the Overseas Chinese, the Chinese Historical Society of America. An appropriate representative of other descendant groups should be determined in consultation with the Department archaeologist.

- The archaeological consultant, project sponsor, and OCII or its designated representative shall meet and consult on the scope of the AMP reasonably prior to any project-related soils disturbing activities commencing. OCII or its designated representative in consultation with the archaeological consultant shall determine what project activities shall be archaeologically monitored. In most cases, any soils- disturbing activities, such as demolition, foundation removal, excavation, grading, utilities installation, foundation work, driving of piles (foundation, shoring, etc.), site remediation, etc., shall require archaeological monitoring because of the risk these activities pose to potential archaeological resources and to their depositional context;

- The archeological consultant shall advise all project contractors to be on the alert for evidence of the presence of the expected resource(s), of how to identify the evidence of the expected resource(s), and of the appropriate protocol in the event of apparent discovery of an archaeological resource;

- The archaeological monitor(s) shall be present on the project site according to a schedule agreed upon by the archaeological consultant and OCII or its designated representative until OCII or its designated representative has, in consultation with project archaeological consultant, determined that project construction activities could have no effects on significant archaeological deposits;

- The archaeological monitor shall record and be authorized to collect soil samples and artifactual/ecofactual material as warranted for analysis;

- If an intact archaeological deposit is encountered, all soils-disturbing activities in the vicinity of the deposit shall cease. The archaeological monitor shall be empowered to temporarily redirect demolition/excavation/pile driving/ construction activities and equipment until the deposit is evaluated. If in the case of pile driving activity (foundation, shoring, etc.), the archaeological monitor has cause to believe that the pile driving activity may affect an archaeological resource, the pile driving activity shall be terminated until an appropriate evaluation of the resource has been made in consultation with OCII or its designated representative. The archaeological consultant shall immediately notify the OCII or its designated representative of the encountered archaeological deposit. The archaeological consultant shall make a reasonable effort to assess the identity, integrity, and significance of the encountered archaeological deposit, and present the findings of this assessment to OCII or its designated representative.

Whether or not significant archaeological resources are encountered, the archaeological consultant shall submit a written report of the findings of the monitoring program to the OCII or its designated representative.

Archaeological Data Recovery Program. The archaeological data recovery program shall be conducted in accord with an archaeological data recovery plan (ADRP). The archaeological consultant, project sponsor, and OCII or its designated representative shall meet and consult on the scope of the ADRP prior to preparation of a draft ADRP. The archaeological consultant shall submit a draft ADRP to OCII or its designated representative. The ADRP shall identify how the proposed data recovery program will preserve the significant information the archaeological resource is expected to contain. That is, the ADRP will identify what scientific/historical research questions are applicable to the expected resource, what data classes the resource is expected to possess, and how the expected data classes would address the applicable research questions. Data recovery, in general, should be limited to the portions of the historical property that could be adversely affected by the proposed project. Destructive data recovery methods shall not be applied to portions of the archaeological resources if nondestructive methods are practical.

The scope of the ADRP shall include the following elements:

- *Field Methods and Procedures*. Descriptions of proposed field strategies, procedures, and operations.
- *Cataloguing and Laboratory Analysis*. Description of selected cataloguing system and artifact analysis procedures.
- *Discard and Deaccession Policy*. Description of and rationale for field and post-field discard and deaccession policies.
- *Interpretive Program*. Consideration of an on-site/off-site public interpretive program during the course of the archaeological data recovery program.
- *Security Measures*. Recommended security measures to protect the archaeological resource from vandalism, looting, and non-intentionally damaging activities.
- *Final Report*. Description of proposed report format and distribution of results.
- *Curation*. Description of the procedures and recommendations for the curation of any recovered data having potential research value, identification of appropriate curation facilities, and a summary of the accession policies of the curation facilities.

Human Remains and Associated or Unassociated Funerary Objects. The treatment of human remains and of associated or unassociated funerary objects discovered during any soils disturbing activity shall comply with applicable State and Federal laws. This shall include immediate notification of the Coroner of the City and County of San Francisco and in the event of the Coroner's determination that the human remains are Native American remains, notification of the California State Native American Heritage Commission (NAHC) who shall appoint a Most Likely Descendant (MLD) (Pub. Res. Code Sec. 5097.98). The archaeological consultant, project sponsor, OCII or its designated representative, and MLD shall make all reasonable efforts to develop an agreement for the treatment of, with appropriate dignity, human remains and associated or unassociated funerary objects (CEQA Guidelines. Sec. 15064.5(d)). The agreement should take into consideration the appropriate excavation, removal, recordation, analysis, custodianship, curation, and final disposition of the human remains and associated or unassociated funerary objects.

Final Archaeological Resources Report. The archeological consultant shall submit a Draft Final Archaeological Resources Report (FARR) to OCII or its designated representative that evaluates the historical significance of any discovered archaeological resource and describes the archaeological and historical research methods employed in the archaeological testing/monitoring/data recovery program(s) undertaken. Information that may put at risk any archaeological resource shall be provided in a separate removable insert within the final report.

Once approved by OCII or its designated representative, copies of the FARR shall be distributed as follows: California Archaeological Site Survey Northwest Information Center (NWIC) shall receive one (1) copy and OCII or its designated representative shall receive a copy of the transmittal of the FARR to the NWIC. As requested by OCII, the Environmental Planning division of the Planning Department shall receive one bound, one unbound and one unlocked, searchable PDF copy on CD of the FARR along with copies of any formal site recordation forms (CA DPR 523 series) and/or documentation for nomination to the National Register of Historic Places/California Register of Historical Resources. In instances of high public interest in or the high interpretive value of the resource, OCII or its designated representative may require a different final report content, format, and distribution than that presented above.

Mitigation Measure M-CP-2b: Accidental Discovery of Archaeological Resources (Implementing FSEIR Mitigation D.6)

The following mitigation measure is required to avoid any potential adverse effect from the proposed project on accidentally discovered buried or submerged historical resources as defined in *CEQA Guidelines* Section 15064.5(a)(c). The project sponsor shall distribute the Planning Department archaeological resource "ALERT" sheet to the project prime contractor; to any project subcontractor (including demolition, excavation, grading, foundation, pile driving, etc. firms); or utilities firm involved in soils disturbing activities within the project site. Prior to any soils disturbing activities being undertaken each contractor is responsible for ensuring that the "ALERT" sheet is circulated to all field personnel, including machine operators, field crew, pile drivers, supervisory personnel, etc. The project sponsor shall provide OCII officer or its designated representative with a signed affidavit from the responsible parties (prime contractor, subcontractor(s), and utilities firm) confirming that all field personnel have received copies of the Alert Sheet.

Should any indication of an archaeological resource be encountered during any soils disturbing activity of the project, the project Head Foreman and/or project sponsor shall immediately notify OCII officer or its designated representative and shall immediately suspend any soils disturbing activities in the vicinity of the discovery until OCII officer or its designated representative has determined what additional measures should be undertaken.

If OCII officer or its designated representative determines that an archaeological resource may be present within the project site, the project sponsor shall retain the services of an archaeological consultant from the pool of qualified archaeological consultants maintained by the Planning Department archaeologist. The archaeological consultant shall advise OCII officer or its designated representative as to whether the discovery is an archaeological resource, retains sufficient integrity, and is of potential scientific/historical/cultural significance. If an archaeological resource is present, the archaeological consultant shall identify and evaluate the archaeological resource. The archaeological consultant shall make a recommendation as to what action, if any, is warranted. Based on this information, OCII officer or its designated representative may require, if warranted, specific additional measures to be implemented by the project sponsor.

Measures might include: preservation in situ of the archaeological resource; an archaeological monitoring program; or an archaeological testing program. If an archaeological monitoring program or archaeological testing program is required, it shall be consistent with the Environmental Planning (EP) division guidelines for such programs. OCII officer or its designated representative may also require that the project sponsor immediately implement a site security program if the archaeological resource is at risk from vandalism, looting, or other damaging actions.

The project archaeological consultant shall submit a Final Archaeological Resources Report (FARR) to OCII officer or its designated representative that evaluates the historical significance of any discovered archaeological resource and describing the archaeological and historical research methods employed in the archaeological monitoring/data recovery program(s) undertaken. Information that may put at risk any archaeological resource shall be provided in a separate removable insert within the final report.

Copies of the Draft FARR shall be sent to OCII officer or its designated representative for review and approval. Once approved by OCII officer or its designated representative, copies of the FARR shall be distributed as follows: California Archaeological Site Survey Northwest Information Center (NWIC) shall receive one (1) copy and OCII officer or its designated representative shall receive a copy of the transmittal of the FARR to the NWIC. OCII and the Environmental Planning division of the Planning Department shall each receive one bound copy, one unbound copy and one unlocked, searchable PDF copy on CD three copies of the FARR along with copies of any formal site recordation forms (CA DPR 523 series) and/or documentation for nomination to the National Register of Historic Places/California Register of Historical Resources. In instances of high public interest or interpretive value, OCII officer or its designated representative may require a different final report content, format, and distribution than that presented above.

Mitigation Measure M-BI-4a: Preconstruction Surveys for Nesting Birds

To the extent practicable, vegetation removal and grading of the site in advance of new site construction shall be performed between September 1 and January 31 in order to avoid breeding and nesting season for birds. If these activities cannot be performed during this period, a preconstruction survey of onsite vegetation for nesting birds shall be conducted by a qualified biologist.

In coordination with the OCII or its designated representative, pre-construction surveys of onsite vegetation shall be performed during bird breeding season (February 1 – August 31) no more than 14 days prior to vegetation removal, grading, or initiation of construction in order to locate any active passerine nests within 250 feet of the project site and any active raptor nests within 500 feet of the project site. Surveys shall be performed in accessible areas within 500 feet of the project site and include suitable habitat within line of sight as access is available. If active nests are found on either the project site or within the 500-foot survey buffer surrounding the project site, no-work buffer zones shall be established around the nests. Buffer distances will consider physical and visual barriers between the active nest and project activities, existing noise sources and disturbance, as well as sensitivity of the bird species to disturbance. Modification of standard buffer distances, 250 feet for active passerine nests and 500 feet for active raptor nests, will be determined by a qualified biologist in consultation with the California Department of Fish and Wildlife (CDFW). No vegetation removal or ground-disturbing activities including grading or new construction shall occur within a buffer zone until young have fledged or the nest is otherwise abandoned as determined by the qualified biologist.

If construction work during the nesting season stops for 14 days or more and then resumes, then nesting bird surveys shall be repeated, to ensure that no new birds have begun nesting in the area.

Mitigation Measure M-BI-4b: Bird Safe Building Practices

The project sponsor shall design and implement the project consistent with the San Francisco *Standards for Bird-Safe Buildings* and Planning Code Section 139, as approved by OCII. OCII shall consult with the Planning Department and the Zoning Administrator concerning project consistency with Planning Code Section 139.

Mitigation Measure M-HZ-1a. Guidelines for Handling Biohazardous Materials

Mission Bay FSEIR Mitigation Measure I.1. Require businesses that handle biohazardous materials and do not receive federal funding to certify that they follow the guidelines published by the National Research Council and the United States Department of Health and Human Services Public Health Service, National Institutes of Health, and Centers for Disease Control, as set forth in Biosafety in Microbiological and Biomedical Laboratories, Guidelines for Research Involving Recombinant DNA Molecules (NIH Guidelines), and Guide for the Care and Use of Laboratory Animals, or their successors, as applicable.

Mission Bay FSEIR Mitigation Measure I.2. Require businesses handling biohazardous materials to certify that they use high efficiency particulate air (HEPA) filters or substantially equivalent devices on all exhaust from Biosafety Level 3 laboratories unless they demonstrate that exhaust from their Biosafety Level 3 laboratories would not pose substantial health or safety hazards to the public or the environment. Require such businesses to certify that they inspect or monitor the filters regularly to ensure proper functioning.

Mission Bay FSEIR Mitigation Measure I.3. Require businesses handling biohazardous materials to certify that they do not handle or use biohazardous materials requiring Biosafety Level 4 containment (i.e., dangerous or exotic materials that pose high risks of life-threatening diseases or aerosol-transmitted infections, or unknown risks of transmission) in the Project Area.

Mitigation Measure M-HZ-1b: Geologic Investigation and Dust Mitigation Plan for Naturally Occurring Asbestos

The project sponsor shall conduct a geologic investigation in accordance with the guidelines of the California Geologic Survey[80] to determine the naturally occurring asbestos content of fill materials to be excavated at the project site. If the investigation determines that the naturally occurring asbestos content of the fill materials is 0.25 percent or greater, the project sponsor or its construction contractor shall submit the appropriate notification forms and prepare an asbestos dust mitigation plan in accordance with the Asbestos ATCM. The plan shall specify measures that will be taken to ensure that no visible dust crosses the property boundary during construction. The plan must specify the following measures:

- Prevent and control visible track-out from the property
- Ensure adequate wetting or covering of active storage piles
- Control disturbed surface areas and storage piles that would remain inactive for 7 days
- Control traffic on on-site unpaved roads, parking lots, and staging areas, including a maximum vehicle speed of 15 miles per hour
- Control earthmoving activities
- Control offsite transport of dust emissions that contain naturally-occurring asbestos-containing materials

[80] California Geologic Survey, 2002. *Guidelines for Geologic Investigations of Naturally Occurring Asbestos in California. Special Publication 124.*

- Stabilize disturbed areas following construction

Mitigation Measure M-HZ-2: RMP Provisions for Child Care Facilities

Mission Bay FSEIR Mitigation Measure J.2. Carry out a site-specific risk evaluation for each site in a non-residential area proposed to be used for a public school or child care facility; submit to RWQCB for review and approval. If cancer risks exceed 1 x 10-5 and/or noncancer risk exceeds a Hazard Index of 1, carry out remediation designed to reduce risks to meet these standards or select another site that is shown to meet these standards.

C. DETERMINATION

On the basis of this Initial Study:

- [ ] I find that the proposed project COULD NOT have a new or substantially more severe significant effect on the environment than identified in the Mission Bay FSEIR, and a NEGATIVE DECLARATION will be prepared.

- [ ] I find that although the proposed project could have a new or substantially more severe significant effect on the environment than identified in the Mission Bay FSEIR, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

- [ ] I find that the proposed project MAY have a new or substantially more severe significant effect on the environment than identified in the Mission Bay FSEIR, and an ENVIRONMENTAL IMPACT REPORT is required.

- [x] I find that the proposed project MAY have a "potentially new or substantially more severe significant impact" or "potentially new or substantially more severe significant unless mitigated" impact on the environment than identified in the Mission Bay FSEIR, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. A SUBSEQUENT ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

- [ ] I find that although the proposed project could have a new or substantially more severe significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, no further environmental documentation is required.

11-17-14
Date

Tiffany Bohee
Executive Director
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APPENDIX A
Special Status Species Tables

TABLE 1
SPECIAL-STATUS PLANT SPECIES REPORTED OR WITH POTENTIAL TO OCCUR NEAR THE EVENT CENTER AND MIXED-USE DEVELOPMENTAREA AT MISSION BAY BLOCKS 29-32

Common Name Scientific Name	Federal Status	State Status	Calif. Rare Plant Rank	Habitat Description / Blooming Period	Potential to Occur in the Action Area
Species Listed or Proposed for Listing					
Presidio Manzanita *Arctostaphylos montana* ssp. *ravenii*	FE	CE	1B.1	Open, rocky, serpentine slopes in chaparral, coastal scrub, and coastal prairie. February – March	**Absent.** No suitable habitat present.
Marsh sandwort *Arenaria paludicola*	FE	CE	1B.1	Freshwater or brackish marshes and swamps. May – August	**Low.** No suitable habitat present.
Presidio clarkia *Clarkia franciscana*	FE	CE	1B.1	Serpentine outcrops in coastal scrub, and valley and foothill grassland. May – July	**Low.** No suitable habitat present.
Beach layia *Layia carnosa*	FE	CE	1B.1	Sand dunes. March – July	**Low.** No suitable habitat present.
San Francisco lessingia *Lessingia germanorum*	FE	CE	1B.1	Coastal scrub, sandy soils free of competing species. July – November	**Low.** No suitable habitat present.
White rayed pentachaeta *Pentachaeta bellidiflora*	FE	CE	1B.1	Open, dry, rocky slopes and grassy areas, usually on serpentine. March – May	**Low.** No suitable habitat present.
Marin western flax *Hesperolinon congestum*	FT	CT	1B.1	Chaparral and grassland, usually on serpentine barrens. April – July	**Low.** No suitable habitat present.
California seablite *Suaeda californica*	FE	--	1B.1	Coastal Salt Marsh, wetland-riaprian July - October	**Low.** Documented occurrences south of the proposed project at Pier 94 and India Basin. Suitable habitat not present within the project site.
Franciscan manzanita *Arctostaphylos franciscana*	FE	--	1B.1	Open, rocky, serpentine outcrops in chaparral. February – April	**Absent.** No suitable habitat present. This species was believed to be extinct in the wild (although still extant through cultivation), but was rediscovered in Presidio National Park in late 2009.
Robust spineflower *Chorizanthe robusta* var. *robusta*	FE	--	1B.1	Sandy or gravelly coastal dunes, coastal scrub, cismontane woodland and maritime chaparral. April – September	**Low.** No suitable habitat present.
Showy ranchería clover *Trifolium amoenum*	FE	--	1B.1	Valley grassland, wetland riparian April - June	**Low.** No suitable habitat present. No local records documented in San Francisco.

TABLE 1 (Continued)
SPECIAL-STATUS PLANT SPECIES REPORTED OR WITH POTENTIAL TO OCCUR NEAR THE EVENT CENTER AND MIXED-USE DEVELOPMENTAREA AT MISSION BAY BLOCKS 29-32

Common Name Scientific Name	Federal Status	State Status	Calif. Rare Plant Rank	Habitat Description / Blooming Period	Potential to Occur in the Action Area
Species Listed or Proposed for Listing (cont.)					
San Bruno Mountain manzanita *Arctostaphylos imbricada*	--	CE	1B.1	Chaparral and coastal scrub, usually on sandstone outcrops. February – May	**Absent.** No suitable habitat present.
Pacific manzanita *Arctostaphylos pacifica*	--	CE	1B.2	Coastal scrub and chaparral. February – April	**Absent.** No suitable habitat present.
San Francisco popcorn-flower *Plagiobothrys diffusus*	--	CE	1B.1	Coastal prairie, and valley and foothill grasslands. March – June	**Low.** No suitable habitat present.
Federal Species of Concern or State Species of Special Concern					
Adobe sanicle *Sanicula maritima*	--	Rare	1B.1	Moist clay or ultramafic soil in chaparral, coastal prairie, meadows, seeps, and valley and foothill grassland. February – May	**Low.** No suitable habitat present.
Hairless popcorn-flower *Plagiobothrys glaber*	--	--	1A	Coastal salt marshes and alkaline meadows. March – May	**Low.** No suitable habitat present.
coast lilly *Lilium maritimum*	--	--	1B.1	Coastal Prairie, mixed evergreen forest, northern coastal scrub, closed-cone pine forest, north coastal coniferous forest, wetland-riparian May – August	**Low.** No suitable habitat present.
Northern curly-leaved mondarella *Mondarella sinuata* ssp. *Nigrescens*	--	--	1B.2	Coastal strand, chaparral May - July	**Low.** No suitable habitat present.
Blue coast gilia *Gilia capitata* spp. *chamissonis*	--	--	1B.1	Coastal dunes and scrub. April – July	**Low.** No suitable habitat present. Extant population is present within the Presidio of San Francisco.
Kellogg's horkelia *Horkelia cuneata* ssp. *sericea*	--	--	1B.1	Coastal scrub, dunes, and openings of closed-cone coniferous forests. February – July	**Low.** No suitable habitat present.
Rose leptosiphon *Leptosiphon rosaceus*	--	--	1B.1	Coastal bluff scrub. April – July	**Low.** No suitable habitat present.
Fragrant fritillary *Fritillaria liliacea*	--	--	1B.2	On clay, often serpentine derived soils in coastal scrub, grassland, and coastal prairie. February – April	**Low.** No suitable habitat present. Extant population located at Twin Peaks.

TABLE 1 (Continued)
SPECIAL-STATUS PLANT SPECIES REPORTED OR WITH POTENTIAL TO OCCUR NEAR THE EVENT CENTER AND MIXED-USE DEVELOPMENTAREA AT MISSION BAY BLOCKS 29-32

Common Name Scientific Name	Federal Status	State Status	Calif. Rare Plant Rank	Habitat Description / Blooming Period	Potential to Occur in the Action Area
Federal Species of Concern or State Species of Special Concern (cont.)					
Bent-flowered fiddleneck *Amsinckia lunaris*	--	--	1B.2	Coastal bluff scrub, cismontane woodland, and valley and foothill grassland. March – June	**Low.** No suitable habitat present.
Montara manzanita *Arctostaphylos montaraensis*	--	--	1B.2	Slopes and ridges in chaparral and coastal scrub. January – March	**Absent.** No suitable habitat present.
Alkali milk-vetch *Astragualus tener* var. *tener*	--	--	1B.2	Alkali flats, flooded grassland, playas and vernal pools. March – June	**Low.** No suitable habitat present; species presumed extirpated in San Francisco.
Pappose tarplant *Centromadia parryi* ssp. *parryi*	--	--	1B.2	Chaparral, coastal prairie, meadows, seeps, coastal salt marshes and swamps, and vernally mesic, often alkaline, valley and foothill grasslands. May – November	**Low.** No suitable habitat present.
Franciscan thistle *Cirsium andrewsii*	--	--	1B.2	Coastal bluff scrub, coastal prairie, coastal mesic scrub, and broadleaf upland forest; sometimes on serpentine. March – July	**Low.** No suitable habitat present.
San Francisco Bay spineflower *Chorizanthe cuspidata* var. *cuspidata*	--	--	1B.2	Coastal scrub, dunes and grassland. April – July	**Low.** No suitable habitat present.
Point Reyes bird's-beak *Chloropyron maritimum* ssp. *palustre*	--	--	1B.2	Coastal salt marshes and swamps. June – October	**Low.** No suitable habitat present.
Compact cobwebby thistle *Cirsium occidentale* var. *compactum*	--	--	1B.2	Coastal scrub, grassland, and dunes. April – June	**Low.** No suitable habitat present.
Round-headed Chinese-houses *Collinsia corymbosa*	--	--	1B.2	Coastal dunes and coastal prairie. April – June	**Low.** No suitable habitat present; species has not been seen in San Francisco for more than 100 years.
San Francisco collinsia *Collinsia multicolor*	--	--	1B.2	On humus-covered soil derived from mudstone in closed-cone coniferous forest, coastal scrub. March – May	**Low.** No suitable habitat present.
Dark-eyed gilia *Gilia millefoliata*	--	--	1B.2	Coastal dunes. April – July	**Low.** No suitable habitat present; species potentially extirpated in San Francisco.

TABLE 1 (Continued)
SPECIAL-STATUS PLANT SPECIES REPORTED OR WITH POTENTIAL TO OCCUR NEAR THE EVENT CENTER AND MIXED-USE DEVELOPMENTAREA AT MISSION BAY BLOCKS 29-32

Common Name Scientific Name	Federal Status	State Status	Calif. Rare Plant Rank	Habitat Description / Blooming Period	Potential to Occur in the Action Area
Federal Species of Concern or State Species of Special Concern (cont.)					
Diablo helianthella *Helianthella castanea*	--	--	1B.2	On rocky soils in broadleaf upland forest, cismontane woodland, coastal scrub, riparian woodland, and valley and foothill grassland. March – June	**Absent.** No suitable habitat present.
White seaside tarplant *Hemizonia congesta* ssp. *congesta*	--	--	1B.2	Grassy valleys and hills, often on fallow fields in coastal scrub. April – November	**Low.** No suitable habitat present.
Short-leaved evax *Hesperevax sparsiflora* var. *brevifolia*	--	--	1B.2	Sandy bluffs and flats in coastal scrub and coastal dunes. March – June	**Low.** No suitable habitat present.
Arcuate bush mallow *Malacothamnus arcuatus*	--	--	1B.2	Gravelly alluvium in chaparral and cismontane woodland. April – September	**Absent.** No suitable habitat present.
Marsh microseris *Microseris paludosa*	--	--	1B.2	Closed-cone coniferous forest, cismontane woodland, coastal scrub, and valley and foothill grassland. August – June	**Low.** No suitable habitat present.
Choris's popcorn-flower *Plagiobothrys chorisianus* var. *chorisianus*	--	--	1B.2	Mesic sites in chaparral, coastal scrub, and coastal prairie. March – June	**Low.** No suitable habitat present.
San Francisco campion *Silene verecunda* ssp. *verecunda*	--	--	1B.2	Mudstone, shale, or serpentine substrates in coastal scrub, coastal prairie, chaparral and valley and foothill grassland. March – June	**Low.** No suitable habitat present.
Santa Cruz microseris *Stebbinsoseris decipiens*	--	--	1B.2	On sandstone, shale or serpentine derived seaward facing slopes in broadleaf upland forest, closed-cone coniferous forest, chaparral, coastal prairie, and coastal scrub. April – May	**Low.** No suitable habitat present.
Coastal triquetrella *Triquetrella californica*	--	--	1B.2	On shaded soil, rocks sand or gravel in dry or moist conditions or in coastal bluff and coastal scrub.	**Low.** No suitable habitat present.
San Francisco owl's clover *Triphysaria floribunda*	--	--	1B.2	Grasslands. April – June	**Low.** No suitable habitat present.
Bristly sedge *Carex comosa*	--	--	2B.1	Lake margins, marshes, swamps, coastal prairie, and valley and foothill grasslands. May – September	**Absent.** No suitable habitat present.

TABLE 1 (Continued)
SPECIAL-STATUS PLANT SPECIES REPORTED OR WITH POTENTIAL TO OCCUR NEAR THE EVENT CENTER AND MIXED-USE DEVELOPMENTAREA AT MISSION BAY BLOCKS 29-32

Common Name Scientific Name	Federal Status	State Status	Calif. Rare Plant Rank	Habitat Description / Blooming Period	Potential to Occur in the Action Area
Federal Species of Concern or State Species of Special Concern (cont.)					
Oregon polemonium *Polemonium carneum*	--	--	2B.2	Coastal prairie, coastal scrub, lower montane coniferous forest. April – September	**Low.** No suitable habitat present.
San Francisco gumplant *Grindelia hirsutula* var. *maritima*	--	--	3.2	On sandy or serpentine slopes of sea bluffs in coastal scrub, or valley and foothill grasslands. June – September	**Absent.** No suitable habitat present.

NOTES:
The "Potential for Effect" category is defined as follows:
High = Species is expected to occur and habitat meets species requirements.
Moderate = Habitat is only marginally suitable or is suitable but not within species geographic range.
Low = Habitat does not meet species requirements as currently understood in the scientific community.

STATUS CODES:

Federal:
FE = Listed as "endangered" under the federal Endangered Species Act
FT = Listed as "threatened" under the federal Endangered Species Act
FSC = NOAA Fisheries designated "species of concern"
FPD = Proposed delisted
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State:
CE = Listed as "endangered" under the California Endangered Species Act
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WL = California Department of Fish and Wildlife designated "watch list"
3503.5 = Eggs, Nests, and Nestlings Protected under section 3503.5 of the California Department of Fish and Game Code
* = California special animal

California Rare Plant Rank:
List 1A = Plants presumed extirpated in California and either rare or extinct elsewhere
List 1B = Plants rare, threatened, or endangered in California and elsewhere
List 2A = Plants presumed extirpated in California, but more common elsewhere
List 2B = Plants rare, threatened, or endangered in California, but more common elsewhere
List 3 = Plants about which we need more information--a review list
List 4 = Plants of limited distribution--a watch list

SOURCE: USFWS (2014), CDFW (2014), CNPS (2014).

TABLE 2
SPECIAL-STATUS ANIMAL SPECIES REPORTED OR WITH POTENTIAL TO OCCUR NEAR THE EVENT CENTER AND MIXED-USE DEVELOPMENTAREA AT MISSION BAY BLOCKS 29-32

Common Name *Scientific Name*	**Federal Status**	**State Status**	**Habitat Description**	**Potential to Occur in the Action Area**
Invertebrates				
San Bruno elfin butterfly *Callophrys mossii bayensis*	FE	--	Coastal scrub on rocky outcrops with broadleaf stonecrop (*Sedum spathulifolium*)	**Low.** No suitable habitat present. Three known populations at San Bruno Mountain, Montara, and Pacifica.
Bay checkerspot butterfly *Euphydryas editha bayensis*	FT	--	Serpentine grasslands.	**Low.** No suitable habitat present.
Mission blue butterfly *Plebejus icarioides missionensis*	FE	--	Grassland with *Lupinus albifrons, L. Formosa*, and *L. varicolor.*	**Low.** Closest suitable habitat present at Twin Peaks. Species unlikely to occur at the project site.
Callippe silverspot butterfly *Speyeria callippe callippe*	FE	--	Found in native grasslands with *Viola pedunculata* as larval food plant.	**Low.** No suitable habitat present.
Monarch butterfly *Danaus plexippus*	--	*	Eucalyptus groves (wintering sites).	**Low.** No suitable habitat present though may occur on a transient basis. Several records of this species wintering in eucalyptus groves within San Francisco including Golden Gate Park, the Presidion, Fort Mason, and Telegraph Hill.
Tomales isopod *Caecuditea tomalensis*	--	--	Still-to slow-moving water in vegetated ponds, preferably spring-fed.	**Low.** No suitable habitat present.
Reptiles and Amphibians				
Western pond turtle *Emys marmorata*	--	CSC	Ponds, marshes, rivers, streams, and irrigation ditches with aquatic vegetation. Requires basking sites and suitable upland habitat for egg-laying. Nest sites most often characterized as having gentle slopes (<15%) with little vegetation or sandy banks.	**Low.** No suitable habitat present.
San Francisco garter snake *Thamnophis sirtalis tetrataenia*	FE	SE	Densely vegetated ponds near open hillsides with abundant small mammal burrows.	**Absent.** Species is considered likely extirpated from San Francisco.
California red-legged frog *Rana draytonii*	FT	CSC	Freshwater ponds and slow streams with emergent vegetation for egg attachment.	**Low.** No suitable habitat present.
Birds				
California clapper rail *Rallus longirostris obsoletus*	FE	CE	Salt marsh wetlands along the San Francisco Bay.	**Low.** No suitable habitat present.
Bank swallow *Riparia riparia* (nesting)	--	CT	Vertical banks and cliffs with sandy soil, near water. Nests in holes dug in cliffs and river banks.	**Low.** No suitable habitat present.
Yellow warbler Dendroica petechia brewsteri	--	CSC	Nests in dense riparian cover and montane chaparral. Breeding distribution includes the coast ranges and western slopes of the Sierra Nevada. Rare to uncommon in lowland areas.	**Low. No suitable riparian habitat present.**

TABLE 2 (Continued)
SPECIAL-STATUS ANIMAL SPECIES REPORTED OR WITH POTENTIAL TO OCCUR NEAR THE EVENT CENTER AND MIXED-USE DEVELOPMENTAREA AT MISSION BAY BLOCKS 29-32

Common Name *Scientific Name*	Federal Status	State Status	Habitat Description	Potential to Occur in the Action Area
Birds (cont.)				
California black rail *Laterallus jamaicensis coturniculus*	--	CT	Salt and brackish marshes; also in freshwater marshes at low elevations.	**Low.** No suitable habitat present.
Salt marsh common yellowthroat *Geothlypis trichas sinuous*	--	CSC	Forages in various marsh, riparian and upland habitats. Nests on or near the ground in concealed locations.	**Low.** No suitable riparian habitat present.
Alameda song sparrow *Melospiza melodia pusillula*	--	CSC	Salt marshes of eastern and south San Francisco Bay.	**Low.** No suitable habitat present.
San Pablo song sparrow *Melospiza melodia samuelis*	--	CSC	Salt marshes of eastern and north San Francisco Bay.	**Low.** No suitable habitat present.
Peregrine falcon *Falco peregrinus*	FD	FP	Woodlands, coastal habitats, riparian areas, coastal and inland waters, human made structures that may be used as nest or temporary perch sites.	**Low.** May forage over the project area though proposed project site does not provide nesting habitat.
Double-crested cormorant *Phalacrocorax auritus*	--	WL, 3503.5	Coastal areas and inland lakes in fresh, saline, and estuarine waters.	**Low.** No suitable nesting habitat present at the proposed project site though colonies are known to nest on the Bay Bridge. Species may occur in adjacent Bay waters or over the project site on a transient basis.
Cooper's hawk *Accipiter cooperii*	--	3503.5	Nests in riparian areas and oak woodlands, forages at woodland edges.	**Low.** No suitable habitat present.
Sharp-shinned hawk *Accipiter striatus*	--	3503.5	Nests in riparian areas and oak woodlands, forages in open areas	**Low.** No suitable habitat present.
Great horned owl *Bubo virginianus*	--	3503.5	Riparian, coniferous, chaparral and desert habitats.	**Low.** No suitable habitat present.
Red-tailed hawk *Buteo jamaicensis*	--	3503.5	Found in nearly all habitats and elevations.	**Low.** No suitable habitat present. May occur over the project on a transient basis.
Red-shouldered hawk *Buteo lineatus*	--	3503.5	Riparian woodlands with swamps and emergent wetlands.	**Low.** No suitable habitat present.
American kestrel *Falco sparverius*	--	3503.5	Frequents generally open grasslands, pastures, and fields; primarily a cavity nester.	**Low.** No suitable habitat present. May occur over the project on a transient basis.
Osprey *Pandion haliaetus*	--	3503.5	Habitat varies greatly and usually includes adequate supply of accessible fish, shallow waters, open and elevated nest sites (10-60 feet in height), and artificial structures such as towers. Builds large platform stick nests near or in open waters such as lakes, estuaries, bays, reservoirs, and within the surf zone.	**Low.** No suitable habitat is present. May forage in adjacent waters. Project site does not provide suitable nesting habitat.
Great blue heron *Ardea herodias*	--	3503.5	Shallow estuaries and fresh and saline emergent wetlands.	**Low.** May forage in standing water of the onsite basin.
American goldfinch *Carduelis tristis*	--	3503.5	Cismontane foothills; riparian and cropland habitats.	**Present.** Suitable habitat is present.

TABLE 2 (Continued)
SPECIAL-STATUS ANIMAL SPECIES REPORTED OR WITH POTENTIAL TO OCCUR NEAR THE EVENT CENTER AND MIXED-USE DEVELOPMENTAREA AT MISSION BAY BLOCKS 29-32

Common Name *Scientific Name*	**Federal Status**	**State Status**	**Habitat Description**	**Potential to Occur in the Action Area**
Birds (cont.)				
Barn swallow *Hirundo rustica*	--	3503.5	Open areas from coastal grassland and shrubland to mixed coniferous forests.	**Moderate.** Suitable habitat is present.
Mammals				
Western red bat *Lasiurus blossevillii*	--	CSC	Roosts primarily in trees, 2-40 feet above ground, from sea level up through mixed conifer forests. Prefers habitat edges and mosaics with trees that are protected from above and open below with open areas for foraging.	**Low.** No suitable habitat is present.
Pallid bat *Antrozous pallidus*	--	CSC	Prefers caves, crevices, hollow trees, or buildings in areas adjacent to open space for foraging. Associated with lower elevations in California.	**Low.** No suitable habitat is present.
Townsend's big-eared bat *Corynorhinus townsendii*	--	CSC SC	Throughout California in a wide variety of habitats. Most common in mesic sites. Roosts in the open, hanging from walls and ceilings of rocky areas with caves or tunnels. Roosting sites limited. Extremely sensitive to human disturbance.	**Low.** No suitable habitat is present.
American badger *Taxidea taxus*	--	CSC	Open grasslands with loose, friable soils.	**Low.** No suitable habitat present.
Point Reyes jumping mouse *Zapus trinotatus orarius*	--	CSC	Upland areas of bunch grass in marshes in Point Reyes.	**Low.** Project site is south of the known range for this species.

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* = California special animal

SOURCE: USFWS (2014), CDFW (2014), CNPS (2014).

APPENDIX TMP

Final Transportation Management Plan

Final Transportation Management Plan for the

Warriors San Francisco Event Center

Prepared by:

FEHR & PEERS

332 Pine Street 4th Floor
San Francisco, CA 94104
(415) 348-0300

May 2015

Prepared for:

Golden State Warriors Arena LLC

FINAL

Transportation Management Plan (TMP) for the

Golden State Warriors Event Center and Mixed-Use Development

Prepared for:

Golden State Warriors Arena LLC

Prepared by:

FEHR & PEERS

May 2015

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EXECUTIVE SUMMARY

The Transportation Management Plan (TMP) is a management and operating plan designed to provide multi-modal access to a range of events at the new Golden State Warriors (GSW, or Warriors) Event Center in San Francisco's Mission Bay neighborhood, and to the retail and office uses on the same development site. The purpose of the plan is to ensure safe and efficient access by promoting and facilitating the use of nearby public transit services and pedestrian and bicycle infrastructure for travel to and from the Event Center and the adjacent mixed use development, thereby reducing vehicular impacts to the Mission Bay/Dogpatch area and the adjacent neighborhoods. The plan's primary goals include a reduction to single occupancy vehicle trips to/from the site, with a maximum auto mode split of 53 percent for event attendees during weekday peak event conditions (6:00PM – 8:00 PM), and a maximum auto mode split of 59 percent for all trips during weekend peak event conditions (6:00 PM – 8:00 PM). All employees and visitors will be encouraged to utilize other means for travel to and from the site. Auto mode share goals are based on site-specific travel demand estimates being prepared as part of the project's subsequent environmental impact report (SEIR) analysis.[1]

The TMP is a working document that will be expanded and refined over time by the Warriors, the City of San Francisco, and other agencies responsible for carrying out the plan. An active monitoring process will occur during the four years after the project's completion to make any necessary adjustments. It is also anticipated that subsequent refinements will be made to respond to changing circumstances, new transportation access and parking opportunities, and planned transportation improvements that are implemented in the project vicinity over time.

The TMP provides a summary of the Event Center and mixed-use development project description; event and no-event scenarios that are addressed in this document; existing transportation facilities and planned major transportation projects; travel characteristics of Event Center attendees, office workers, and retail patrons; transportation control recommendations; travel demand and communication strategies; and performance standards.

The scenarios addressed in this plan are as follows.

- Typical Day (No-Event Day)
- Convention – weekday event with approximately 9,000 attendees
- Arena Concert – evening event with approximately 14,000 attendees
- NBA Game – an evening Warriors game with 18,064 attendees
- Dual Event – NBA game or arena concert coinciding with AT&T Park event

The travel characteristic assumptions for varying scenarios at the proposed development are based on the analysis prepared concurrently for the project's draft SEIR.

[1] *Travel, Parking, and Loading Demand Estimates for the Proposed Event Center & Mixed Use Development at Mission Bay Blocks 29-32 Final Memorandum*, Adavant Consulting and LCW Consulting, November 19, 2014.

Transportation control strategies that are identified in the Plan include provision of an on-site, site-specific Transportation Management Center (TMC) located in the security center in the Event Center; designation of a Parking Control Officer (PCO) director who will staff the Event Center TMC and manage game-day controls; designation of up to three in-field PCO supervisors who will roam and oversee PCO operations; the potential locations of PCOs who will direct vehicular and pedestrian traffic under various event scenarios; provision of GSW or Event Center staff to assist with wayfinding and crowd management; a coordinated partial street closure of the northbound lanes on 3rd Street (between 16th Street and Mission Bay Boulevard South) and partial closure of westbound lanes on South Street for a short period after the conclusion of peak NBA and arena concert events; and designation of curbside locations for Muni buses, Mission Bay Transportation Management Association (TMA) shuttles, other shuttle buses, charter buses, taxis, Transportation Network Companies (TNCs) (e.g., Uber, Lyft), limousines, private vehicle loading and unloading, and media trucks. The transportation control strategies also address transit boarding at the nearby Muni stations and pedestrian control at the Event Center main garage driveway access point on 16th Street.

Communication strategies that are identified in the Plan include promotion, outreach and wayfinding strategies designed to inform event attendees of the various transportation options that are available and provide directions on how to access them. This includes a description of transportation information that will be provided by the Warriors and event promoters with event ticket purchases. The wayfinding strategies include a series of signs that will be placed to facilitate circulation and access in and around the buildings on-site.

CHAPTER 1. INTRODUCTION

This introduction describes the purpose, goals, and objectives of the Transportation Management Plan (TMP) for the Golden States Warriors Event Center and Mixed-use Development Project ("Event Center Development"). It gives a project overview within the San Francisco context, including ongoing and upcoming projects that will change the transportation system in the area and may prompt adjustments to the TMP in the coming years. It then lists organizations and agencies with a stake in the project with their respective roles and responsibilities, and discusses the overall TMP implementation strategy, including coordination between stakeholders. Finally, it outlines the information contained in the remainder of the TMP.

1.1 TMP PURPOSE, GOAL, AND OBJECTIVES

The purpose of the TMP is to outline strategies to optimize access to and from the Event Center Development within the constraints inherent to a large public event. The TMP considers the travel characteristics of Event Center attendees, office workers, retail patrons, and all other visitors to the site. Its main goal is to ensure safe and efficient access for all modes with a particular focus on promoting pedestrian, bicycle, and transit access to the Event Center and adjacent mix of uses, thereby reducing vehicular impacts to the Mission Bay/Dogpatch area and nearby neighborhoods.

The objectives of the TMP are:

- To facilitate and promote safe use of non-automobile transportation by people attending and supporting Event Center events or office and retail uses on-site, and to maintain the stated maximum auto mode share of 53 percent under peak weekday event conditions (6:00 PM – 8:00 PM) and 59 percent under peak weekend event conditions (6:00 PM – 8:00 PM);
- To highlight and optimize the use of transit by both event attendees and event or daily employees;
- To facilitate and maximize bicycle use by Event Center Development event attendees and event or daily employees;
- To facilitate a high-quality walking experience to the Event Center Development from adjacent residences, employment locations, transit stations, and parking garages by identifying key walking routes and major street crossing locations, so that wayfinding can be provided and PCOs can be located at critical points to manage the interaction of pedestrians and vehicles during major events;
- To publicize the non-traditional transportation resources existing in the site vicinity, including the Mission Bay Transportation Management Association (TMA) shuttle service and pedicab ride providers;
- To maximize safety for all transportation users at key locations around the Event Center Development site and broader neighborhood during event ingress and egress;
- To ensure the safe interaction of pedestrians and cyclists traveling along South and 16th Street and vehicles accessing the Event Center Development garage entries located on South Street at Bridgeview Way and on 16th Street at Illinois Street; and
- To facilitate the safe and efficient flow of vehicle traffic into and out of the site and throughout the Mission Bay neighborhood during event and no event conditions.

The TMP is a living document and will be amended from time to time by the Golden State Warriors, in coordination with SFMTA and with input from the nearby community, as travel patterns change as a result of development and changes to the roadway infrastructure and operations. The Golden State Warriors are committed to implementation of flexible strategies to advance the goals and objectives outlined here.

1.1.1 Design Objectives

The key transportation-oriented objectives of the Event Center Development design are:

<u>Guest Safety</u>

- Design clear and distinct pick-up and drop-off locations for each travel mode such that zones are primarily single-purpose and potential conflict areas are minimized (i.e., transit zones to the west, bikes and cyclists to the southeast, private vehicles to the east).
- Discourage mid-block pedestrian crossings at 3rd Street, 16th Street, or Terry François Boulevard
- Create crossings that work for an all-day, all-year development; avoid creating crosswalks that only operate under PCO supervision
- Reduce conflicts between pedestrians and autos at driveways and garage entrances

<u>Guest Convenience</u>

- Locate guest arrival areas near building entrances and other conveniences to create visual connections to the travel mode and to augment wayfinding, including:
    - The southeast arena entrance (along Terry François Boulevard and 16th Street)
    - Office entrances on 16th Street and South Street, especially for regular TMA shuttles
    - Northwest and southwest site corners, staging areas, and pathways, especially for arrivals via bike and Muni bus or light rail
- Prioritize open pathways designed for optimal pedestrian circulation and public access
    - Maintain open access to the atrium to preserve the 16th Street/Main plaza connection
    - Highlight, through both static and dynamic wayfinding, the northwest corner and southwest corner, and the gracious and pleasant paths to and from the Main Plaza to these corners
    - Leverage the position of the Gatehouse and the decorative fencing proposed on Third Street a means to direct patrons to the northwest and southwest corners of the project and to discourage mid-block crossings of 3rd Street
- Locate drop-off and pick-up locations for a given mode in close proximity to each other for pre- and post-event scenarios to create consistency, enhance intuitiveness, and create efficient paths of travel for patrons

Synergy & Resource Intelligence

- Build a network of dynamic, up-to-the-minute transit information signage and wayfinding, both inside and outside of project buildings, to aid in the efficiency of patron arrivals and departures
- Locate the bike valet close to the Terry François Boulevard cycle track and nearby Bay Area Bike Share station(s)
- Position the bike valet in sight of the Arena's southeast Lobby building entrance
- Locate the daily TMA shuttle stop close to office lobbies

Good Neighbor Policies

- Create generous pedestrian queuing areas on-site to minimize neighborhood spillover
- Maintain local access to 4th Street and Bridgeview Way by promoting alternate pre- and post-game routes that emphasize use of 3rd Street, 7th Street, and Terry Francois Boulevard
- Access to building entries, garage entries, and sidewalk areas for daily users of the 409 and 499 Illinois buildings, the 450 South Street garage, and of the future buildings on Blocks 33-34 will not be unreasonably impeded
- Maintain access to the UCSF Mission Bay Campus and UCSF Hospitals for patients, employees, and the university community
- Maintain the site's identity as a porous, accessible, and welcoming neighborhood center

Media Requirements

- Locate media to provide for reliable satellite connections as per NBA League guidelines while providing under-ground cabling below sidewalks for the safety of pedestrians

1.2 KEY STAKEHOLDERS

Key stakeholders in the TMP and their respective roles and responsibilities are listed in Table 1-1.

TABLE 1-1: KEY STAKEHOLDERS, ROLES, AND RESPONSIBILITIES

Key Stakeholders	Roles and Responsibilities
Golden State Warriors (GSW)	The GSW is the project sponsor and is responsible for implementation of the TMP.
San Francisco Municipal Transportation Agency (SFMTA)	The SFMTA oversees the City's public right-of-way (ROW) and manages all surface transportation infrastructure and systems in the City, including roads, curb space, sidewalks, bicycle lanes, parking, transit, and traffic control measures[1]. The SFMTA also regulates taxis and enforces parking regulations. SFMTA operates San Francisco's bus and light rail service under the Muni brand, which will provide access to the Event Center and mixed-use development. Recommendations related to physical changes to the ROW must be supported by the SFMTA and approved by OCII. The SFMTA also coordinates closely with the SFCTA on the ongoing Waterfront Transportation Assessment, which includes the Mission Bay neighborhood in its study area.
Office of Community Investment and Infrastructure (OCII)	OCII has jurisdiction over implementing any major redevelopment projects in the Mission Bay North and South Redevelopment Project Areas. OCII will act as the land use regulatory authority and the lead agency on the EIR. OCII will ensure that the project follows the Mission Bay Infrastructure Plan, which is the guiding document for remaining infrastructure improvements in the Mission Bay Area.
Caltrans	Caltrans is California's Department of Transportation and has jurisdiction over the freeways that provide regional vehicle access to the proposed Event Center Development site.
Port of San Francisco (Port)	The Port of San Francisco (Port) has jurisdiction over San Francisco's waterfront, including Terry François Boulevard and small portions of 16^{th} and South Streets at their eastern edges.[1] This includes the provision of any new ferry terminal facilities and a cycle track facility, and jurisdiction over street parking operations in the areas noted above.
San Francisco County Transportation Authority (SFCTA)	The SFCTA serves as the Congestion Management Agency (CMA) for San Francisco County and is responsible for the ongoing Waterfront Transportation Analysis, which includes the Mission Bay neighborhood in its study area.
San Francisco Planning Department	The Planning Department is responsible for reviewing and commenting on project design, and assessing environmental impacts on the City and its residents in collaboration with the overall assessment being led by OCII
San Francisco Department of Public Works (DPW)	DPW is responsible for street maintenance and implementation of streetscape projects as part of the Mission Bay Plan, including curb ramp installations and upgrades.
San Francisco Police Department (SFPD)	SFPD is responsible for emergency response, oversight/override of traffic control plans, incident management, and coordination with SFFD and the California Highway Patrol as needed.
San Francisco Fire Department (SFFD)	SFFD provides fire suppression and emergency medical services to the residents, visitors, and workers within San Francisco.

TABLE 1-1: KEY STAKEHOLDERS, ROLES, AND RESPONSIBILITIES	
Key Stakeholders	**Roles and Responsibilities**
Caltrain	Caltrain is a California commuter rail line connecting San Francisco to the Peninsula and Santa Clara Valley to the south. Its San Francisco terminal station is at 4th and King Streets, approximately 2/3 mile north of the project site. The 22nd Street Caltrain station is also located within walking distance of the Event Center Development.
Bay Area Rapid Transit (BART)	BART is a rapid transit system that serves the San Francisco Bay Area. It operates five routes with 44 stations in four counties. Downtown San Francisco is roughly the geographic center of the BART system, and its Embarcadero, Montgomery Street, Powell Street, and 16th Street Mission stations are within approximately 1.7 to 2.1 miles of the Event Center Development. Powell Street station will be connected to the site vicinity by the Central Subway upon that project's completion in 2019.
Water Emergency Transportation Authority (WETA)[2]	WETA was established by Senate Bill (SB) 976 to improve the ability of ferries to respond in an emergency and to consolidate several regional ferry services. WETA operates service to Alameda/Oakland, Harbor Bay, San Francisco, South San Francisco, and Vallejo as San Francisco Bay Ferry. WETA is exploring the potential for a ferry terminal at the foot of 16th Street near the Event Center Development.
Golden Gate Ferry (GGF)[3]	GGF operates frequent ferry service between San Francisco and Larkspur in central Marin County, and between San Francisco and Sausalito in southern Marin County. Extra service is also offered from Larkspur to AT&T Park for Giants home games and other sporting and music events.
Mission Bay Transportation Management Association (TMA)	The TMA is a non-profit organization established to maximize access and mobility to, from, and within Mission Bay by means of free shuttle operations servicing residents and employees in the area. Shuttles transport patrons primarily to key transit locations, including the Caltrain station at 4th St. and King St. and the Powell St. BART station. The Warriors will become members of the association and provide annual contributions for the expansion of this service (including service to Blocks 29-32 and additional evening and weekend routes throughout the neighborhood).
University of California, San Francisco (UCSF)	The UCSF Mission Bay campus is located in close proximity to the Warriors' project. Campus operations include regular shuttle service between UCSF campuses across San Francisco; these shuttles are intended to serve only university personnel (faculty, staff, students, etc.). They are, however, a regular presence within the Mission Bay street network.
Community Groups	Several community groups offer consultation and feedback on the project design and operational planning to help ensure a smooth integration into the Mission Bay neighborhood. Some community groups include the Mission Bay Community Advisory Committee (CAC), San Francisco Bicycle Coalition, and others.

Notes:

1. Although the Port has jurisdiction over certain street segments in San Francisco, SFMTA still manages all aspects of surface transportation on those streets under agreement with the Port.
2. Source: http://www.watertransit.org
3. Source: http://www.goldengateferry.org

Source: Fehr & Peers, 2014.

1.3 PROJECT CONTEXT

The proposed Event Center Development site consists of Blocks 29, 30, 31 and 32 in the Mission Bay neighborhood of San Francisco and is served by local and regional transit (Muni, ferries, regional buses and Caltrain); a developing roadway, bike route, sidewalk network; and freeway access. Bicyclists will be encouraged to arrive at the site via 16th Street and the planned Blue Greenway along Terry François Boulevard. The project location is illustrated on Figure 1-1. The project site plan is illustrated on Figure 1-2.

The project site is located approximately 2/3 mile from AT&T Park, a 42,000 seat Major League Baseball Stadium and home to the San Francisco Giants. Although the Warriors season does not largely overlap with the Giants season, they share some transportation facilities and management strategies. Although rare, a dual event scenario is considered as part of this document.

Over the past several years, many projects in the area have affected the transportation system in the vicinity of the Event Center Development, including the opening of the T 3rd light rail line connecting San Francisco's Financial District to Sunnydale, which started operation in 2007. The projects listed in the following sections, which are either recently completed, under construction, pending, or under consideration, will continue to enhance the transportation system in the area and may warrant changes to the TMP as they are implemented. Several significant transportation investments at or near the site are projected to begin operation within the next 5-10 years. These near-term transportation projects are illustrated on Figure 1-3 and include SFMTA's Central Subway, the electrification of Caltrain, the Blue Greenway, enhanced transit service along 16th Street, and the 2nd Street Project, among others. These types of capacity and service enhancements provide essential context for planning safe, efficient transportation access to the Event Center and adjacent office and retail uses.

Several large-scale development projects are also proposed for the Mission Bay neighborhood that may affect travel patterns in the area. The project's SEIR (currently being prepared) will analyze traffic patterns and intersection performances under cumulative conditions that contain several prominent developments in the project vicinity. The TMP may likewise need to be revised, after development projects are realized and operational, to more effectively manage transportation systems under all event and no-event conditions. Some reasonably foreseeable development projects include the following:

- Pier 70 Mixed-Use Project
- Seawall Lot 337 and Pier 48 Mixed-Use Project
- Kaiser Medical Office Building at 1600 Owens Street
- Central SoMa Plan
- UCSF Long Range Development Plan

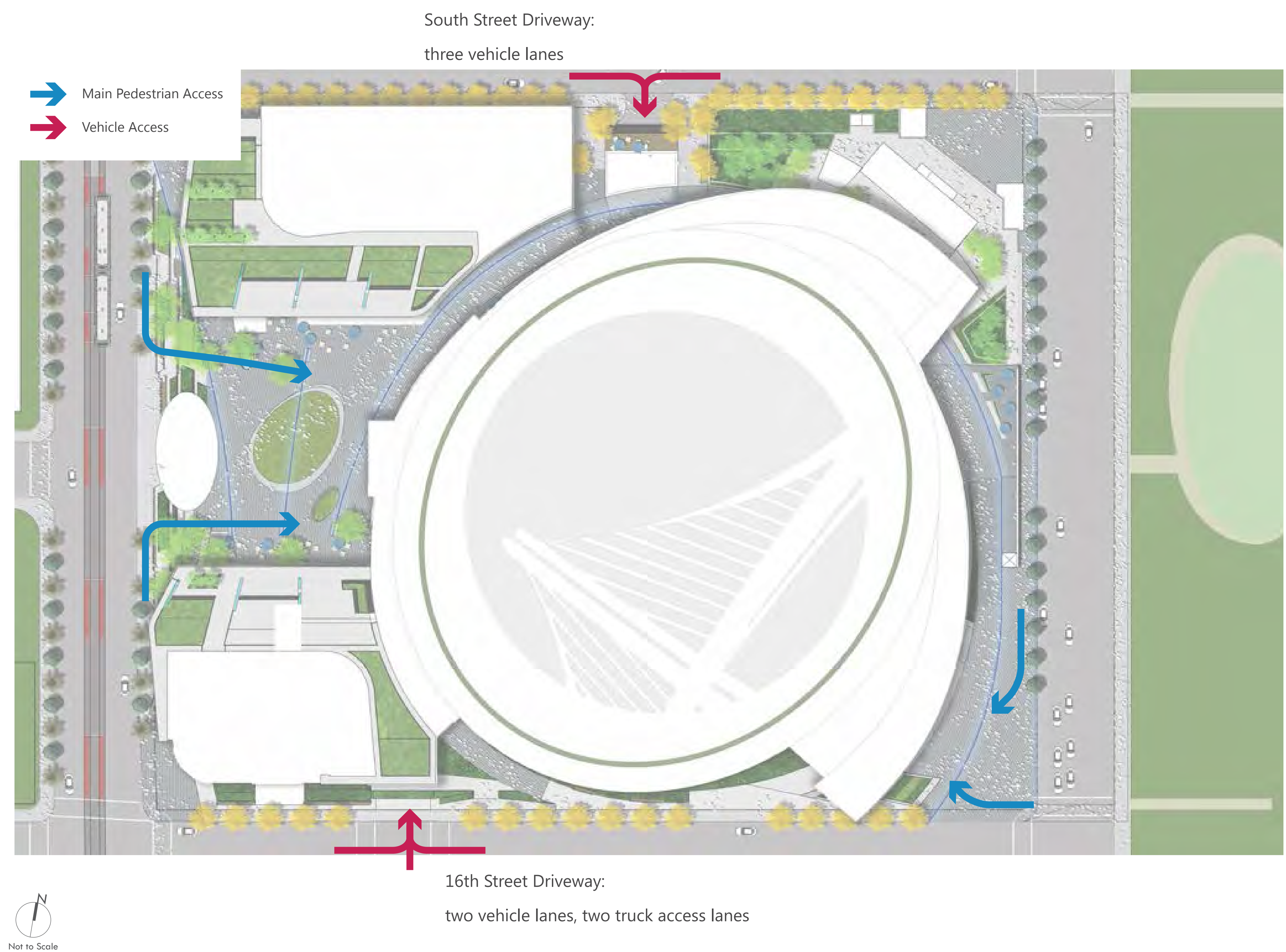
Not to Scale

FEHR PEERS

PROJECT LOCATION

FIGURE 1-1

SF13-0682_SF Warriors Arena TMP\Graphics



FEHR & PEERS

SF13-0682 SF Warriors Arena\Graphics

SITE PLAN

FIGURE 1-2

NEAR-TERM TRANSPORTATION PROJECTS

FIGURE 1-3

FEHR & PEERS

SF13-0682_SF Warriors Arena TMP\Graphics

1.3.1 Transit Projects

Through consultation with SFMTA a list of projects were selected based on their proximity to the Project site, ability to affect the transportation network, and likelihood of being completed. Several major near-term and long-term SFMTA Muni projects are proposed that, once implemented, will directly improve service frequency, capacity, travel time, cost-effectiveness and reliability in the vicinity of the project site.

SFMTA Muni Forward – This is the implementation phase of the SFMTA Transit Effectiveness Project (TEP). The project includes both general improvements throughout the system and measures for specific transit lines. Implementation is ongoing. The following changes are planned to take place in the project area:

- 10 Townsend – The Muni Forward proposes to rename the 10 Townsend the 10 Sansome. Service would be rerouted off of Townsend down 4th Street. From 4th Street the route would extend through Mission Bay to new proposed street segments on 7th Street between Mission Bay Boulevard and Irwin Street, on Irwin Street between 7th and 16th streets, on 16th Street between Irwin and Connecticut streets, and on Connecticut Street between 16th and 7th streets. Peak period headways would be reduced from 20 to 6 minutes. Midday headways would be reduced from 20 to 12 minutes.

- 22 Fillmore – The Muni Forward proposes rerouting the 22 Fillmore to continue along 16th Street, creating new connections to Mission Bay from the Mission neighborhood. The proposed route change would add transit to 16th Street between Kansas Street and 3rd Street and 3rd Street between 16th Street and Mission Bay Boulevard North. Muni Forward also proposes to change the AM peak period headway, reducing from 9 minute to 6 minute headways.

  Additionally, the SFMTA has proposed two transit enhancement treatment visions for 16th Street ("Muni Forward"), of which one or a combination of the two will be selected by the SFMTA Board prior to implementation. The treatments are referred to as the Moderate and Expanded Alternatives in the TEP EIR. The Moderate Alternative proposes a number of physical changes to the portion of the rerouted 22 Fillmore in the vicinity of the Mission Bay campus site including, but not limited to, new transit stops, relocated transit stops, and transit bulbs (approximately 45 feet in length), as well as new traffic signals at Connecticut and Missouri streets. The Expanded Alternative includes the features listed for the Moderate Alternative as well as the conversion of a lane of mixed-flow lane of traffic to a transit-only lane (side running or center running to be determined) along 16th Street in both directions in the vicinity of the campus site as well as the prohibition of left turns at Bryant, Potrero (westbound only), Utah, San Bruno, Kansas, Rhode Island, De Haro, Carolina, Wisconsin, Arkansas, Connecticut, and Missouri streets. Both alternatives would reduce peak period headways; AM would be reduced from 9 to 6 minutes, PM peak headways would be reduced from 8 to 5.5 minutes, and midday headways would be reduced from 10 to 7.5 minutes. The stated purpose of both alternatives is to make the 22 Fillmore more frequent, reliable, and effective along 16th Street.

  Prior to the extension of the 22 Fillmore into Mission Bay via either the Moderate or Expanded Alternative, which both require the addition of poles and extension of the Overhead Contact System (OCS), the SFMTA plans to implement a temporary motor coach service – the 55 Mission Bay - to coincide with the opening of the Phase One Medical Center at UCSF Mission Bay between Mission Bay and the 16th Street BART Station. The route would follow 16th Street from Mission Street to 3rd Street and 3rd Street from 16th Street to Mission Bay Boulevard North. The preliminarily proposed locations for new bus stops for this service in the vicinity of the Event Center site are on 16th Street at 4th Street (both directions) and on 3rd Street just south of Mission Bay Boulevard South (southbound direction). The operating hours and service frequencies of the proposal have not yet been made public at the time of publication of this document.

SFMTA Central Subway – SFMTA Muni will operate a light rail subway at high frequency between Chinatown, Union Square, Yerba Buena Gardens and the Caltrain depot at 4th and King Streets (about 2/3 mile from the project site) beginning in 2019. The T 3rd line will extend north from its current terminus at 4th and King Streets to serve this subway, and no longer operate along the Embarcadero. Construction of this project is well underway. This project would improve transit service between the project site and Downtown and create new connections between the project site and regional transit via connections to BART at Powell St. station.

SFMTA Bus Rapid Transit – SFMTA plans to build and operate a Muni "rapid bus" corridor with a terminal within 2/3 mile from the project site: the Van Ness corridor, with one of two lines terminating at 4th & King Streets. These service and infrastructure enhancements are expected to be in operation by 2020.

Caltrain Modernization Program – Caltrain plans to electrify the railway for increased efficiency and capacity. The Modernization Program will increase the frequency of service, including expanding the number of peak hour trains by one/hour. The project is scheduled for completion in 2021.

Transbay Transit Center – The new Transbay Transit Center, currently under construction and scheduled for completion in 2017, will be a major hub serving 11 transit providers. It will be located between Beale, 1st, Mission and Howard Streets, approximately 1.75 miles from the project site.

Ferry Building Landings and Terminals – the Port of San Francisco operates the ferry terminals at the Ferry Building two miles from the project site, in cooperation with the Water Emergency Transportation Authority (WETA) and Golden Gate Transit. Frequent, daily ferry service is provided between the Ferry Building and seven cities in Alameda, Solano, San Mateo and Marin Counties. The Ferry Building is also a major Muni bus and streetcar terminal hub, serving numerous cross-town and downtown lines. The Downtown San Francisco Ferry Terminal Expansion Project includes construction of up to three new ferry gates and implementation of several pedestrian amenities which would increase ferry capacity and improve the passenger experience, as well as provide additional emergency facilities in the event of a major catastrophe. The project is under environmental review and is expected to begin construction in early 2015. WETA is also currently exploring the possibility of constructing a terminal at the foot of 16th Street adjacent to the Event Center Development site, however, due to the preliminary nature of their study, ferry access to the site is not assumed for the sake of this TMP.

1.3.2 Pedestrian and Bicycle Projects

2nd Street Project – Multiple improvements are proposed for 2nd Street and could start construction as early as 2016. The goal of this project is to improve pedestrian safety along the corridor, create a more attractive public realm, provide a separated bicycle lane, minimize Muni delays, and increase foot traffic. These improvements would provide an enhanced pedestrian corridor for those walking from Downtown to and from the Event Center, offices, or retail proposed within the Event Center Development in Mission Bay.

Blue Greenway – This Port of San Francisco led project will create a network that connects public open space and water access in south-east San Francisco, from China Basin Channel to the San Francisco County Line, which will include a combination of bicycle and pedestrian trails and parks. Through Mission Bay along the Event Center Development frontage, the Blue Greenway will include a north-south bikeway on Terry François Boulevard that will connect to the Embarcadero bikeway to the north.

The 2009 Bike Plan and 2013 Bicycle Strategy includes several improvements to the bicycle network throughout the City. Of the improvements approved for implementation in the near-term and long-term, the following projects will affect bicycle circulation in the vicinity of the site:

- The transition of the Class III facilities on 16th Street to a Class II facility from 3rd Street to Terry François Boulevard (as an element of the Blue Greenway).
- The addition of bicycle lanes on Illinois Street from Cargo Way to 16th Street.
- The addition of bicycle lanes on Mississippi Street from 16th Street to Mariposa Street.
- The addition of a physically separated bikeway along The Embarcadero from 3rd Street to Fisherman's Wharf

1.3.3 Regional Traffic Projects

Proposal to remove the northern section of Interstate 280 – This proposal is currently being explored by the City and would remove the I-280 terminus on- and off-ramps from their current location adjacent to the Caltrain Station at 4th and King Streets. This removal may have various benefits, including uniting the neighborhoods currently split by the freeway, opening up land along I-280 and at the 4th and King Street rail yards for development, reducing the complexity of the downtown rail extension, and reducing vehicle-pedestrian conflicts at the crossing outside the Caltrain Station. If this project moves forward, it will likely affect access to the Event Center Development site by rerouting vehicle traffic to/from I-280, creating additional roadway connections between Mission Bay and areas west, and potentially altering pedestrian routes.

1.3.4 Near-Term Infrastructure Projects

New roadway projects are underway with an anticipated completion date of Spring 2015 at the following locations:

- Extension of Owens St from 16th Street to Mariposa Street / I-280
- Extension of 16th Street to Terry François Boulevard

New signals have recently been completed or are currently being constructed within 1 mile of the project site at the following intersections.

- 3rd Street / Channel Street
- 3rd Street / Mission Bay Boulevards
- 4th Street / Channel Street
- 4th Street / Gene Friend Way
- 16th Street / 4th Street
- 16th Street / Vermont Street
- 16th Street / 7th Street, and
- 7th Street / Mission Bay Drive / Berry Street

New signals are being constructed with an anticipated completion date in Spring 2015 at:

- Mariposa Street / 4th Street and

- Mariposa Street / I-280 SB On-ramp

Signal Modification projects are also underway within 1/3 mile of the project site. Signal reconfigurations are being constructed with an anticipated completion date in Spring 2015 at the following intersections:

- 3rd Street / 16th Street
- 3rd Street / Mariposa Street
- 16th Street / Owens Street
- Owens Street / Mariposa Street / I-280 NB Off-ramp
- Mariposa Street / I-280 SB On-ramp

Street restriping projects have been completed or are pending at the following intersections.

- 7th Street / 16th Street
- 7th Street / Mission Bay Drive / Berry Street
- Mariposa Street Bridge (over Caltrain tracks)
- Mariposa Street / 3rd Street
- Mariposa / 4th Street
- Mariposa Street from I-280 SB on-ramp to Pennsylvania Avenue

Street restriping projects are in the planning stages, and pending approval, at the following intersections.

- 16th Street / Potrero Avenue
- 7th Street / Brannan Street

Street widening or improvement projects are underway within ¼ mile of the site and have an anticipated completion date in Spring 2015 at the following locations.

- 3rd Street / 16th Street
- Mariposa Street from Owens Street to Illinois Street
- Connections to UCSF Mission Bay Campus (at 16th Street and Mariposa Street)
- NB I-280 off-ramp

1.4 IMPLEMENTATION STRATEGY

1.4.1 Coordination with Agencies and Transit Providers

Traffic controls proposed in the TMP will require coordination with several of the agencies described in section 1.2. **Table 1-2** summarizes the necessary coordination between the Warriors and public agencies and transit providers during Event Center events.

TABLE 1-2: PROPOSED CONTROL AND SERVICE COORDINATION SUMMARY		
Control or Service	**Entity**	**Coordination**
Post-game special train service to South Bay	Caltrain	Real-time communication between Transportation Management Control (TMC) and Caltrain during games so any planned special event train can be put into service at 4th /King station at the appropriate time.
Variable Message Signs (VMS)	Caltrans, SFMTA	Location, installation, and operation of variable message signs (VMS) alerting drivers of traffic conditions and temporary post-event lane closures on 3rd Street.
Use of existing SFgo intersection surveillance cameras, as well as four new proposed surveillance cameras along the Event Center's perimeter streets, for observation of traffic conditions on streets pre-, during, and post-event	SFMTA	Permission from SFMTA to see live streams from video cameras from the TMC room at the Event Center.
Traffic management by Parking Control Officers (PCOs) on the streets pre-, during, and post-event	SFMTA	Real-time communication between TMC, Field Supervisor, variable message sign operators, emergency services personnel, and PCOs on the street.
Post-game special northbound light rail service	SFMTA (Muni)	Real-time communication between TMC and SFMTA (Muni) during events so that additional light rail trains can be put into service at appropriate times.
Pre- and Post-event Shuttles	Mission Bay TMA, Private Shuttle Providers, SFMTA	Real-time communication between TMC and Shuttle Operators during events so shuttle buses can be put into service at appropriate time.
Valet bicycle parking during events	GSW	The provision of valet bicycle parking and additional temporary secure corral parking during events at the Event Center will be coordinated with SFMTA and the San Francisco Bicycle Coalition (SFBC), or other vendor.
Pre- and Post-event Pedicab service along Terry Francois Boulevard	Private Pedicab Providers	Pre-event planning and clearly marked staging areas for private pedicab drivers.
Enhanced post-event BART service on event days	BART	Communication about event schedules so that BART can augment service by providing additional train cars post-event.
On-street special event pricing	SFMTA , Port	Provide event schedule to SFMTA Parking group and the Port for implementation of special event pricing at on-street parking meters during events, pending Port approval.
Emergency response and emergency vehicle routing	SFPD, SFFD, SDMTA	Real-time emergency response and PCO support as needed to ensure emergency vehicle access to and around the project site.

Source: Fehr & Peers 2014.

1.5 DOCUMENT ORGANIZATION

Chapter 2 summarizes the Event Center Development project and outlines the event scenarios. Chapter 3 describes the existing transportation system in the project vicinity, including the street network, transit, bicycle and pedestrian infrastructure, and regional traffic access. Chapter 4 describes the travel demand management program that will be implemented to increase the level of access to the project by transit, bicycling and walking. Chapter 5 describes the anticipated characteristics of Event Center attendees and visitors to the mixed-use development, including the key assumptions on which the TMP recommendations are based. Chapter 6 describes the proposed controls and is organized by event scenario, ranging from a no-event day to smaller convention events to the most complex event (Event Center event concurrent with event in AT&T Park). Chapter 6 also includes a discussion of the project's Transit Service Plan. Chapter 7 describes freight loading for the Event Center Development. Emergency vehicle access for the site is described in Chapter 8. Finally, Chapter 9 discusses communication strategies designed to complement the controls listed in Chapter 6, and includes wayfinding and outreach. Chapter 10 describes how the TMP will be monitored and refined over time, while outlining performance standards for evaluating the plan's effectiveness.

CHAPTER 2. PROJECT DESCRIPTION AND EVENT SCENARIOS

2.1 PROJECT DESCRIPTION

2.1.1 General

The proposed site is comprised of land referred to as Blocks 29, 30, 31 and 32, located in the Mission Bay South area of San Francisco. The 11-acre project consists of a new approximately 18,000-seat multi-purpose event center and mixed-use development including multiple office buildings, retail, restaurants, structured parking, plaza areas, and other amenities. The event center would host the Golden State Warriors basketball team during the National Basketball Association (NBA) season, as well as provide a year-round venue for a variety of other uses, including concerts, family shows, other sporting events, cultural events, conferences and conventions.

The proposed program for the Mission Bay South project site at Blocks 29-32 includes the following:

- Event Center Basketball seating capacity: 18,064
- Event Center supporting uses include a practice facility and Bayfront Terrace
- 750,000 square foot Event Center
- 25,000 square feet of GSW office space
- 580,000 square feet of office buildings
- 125,000 square feet of visitor-serving retail and restaurant uses
- 950 parking stalls in on-site parking structure
- 13 underground truck docks
- 132 stalls in existing structured garage at 450 South Street
- Access points for trucks and automobiles on 16th Street at Illinois Street
- Access points for small delivery vehicles and automobiles on South Street at Bridgeview Way

The public realm zones and uses for the Event Center Development are shown on the site plan in Figure 1-2. There will be five pedestrian entries to the site, one midblock on South Street, one on the 3rd Street frontage, one midblock on 16th Street, one at the corner of 16th Street and Terry François Boulevard via the southeast Plaza, and one midblock on Terry François Boulevard. Large open plaza areas will be located on the west side of the multi-purpose event center and in the southeastern portion of the site. The plazas will provide access to the retail and office uses on site and would be connected by a ramp wrapping around the exterior along the north and eastern-sides of the multi-purpose event center. An atrium connecting 16th Street and the western plaza area serves as a secondary connection between open spaces on-site.

2.1.2 Proposed Street Cross-Sections

As part of the Event Center Development, the existing or planned cross-sections for several adjacent streets are proposed to be modified to better meet the needs of the Event Center and surrounding mix of uses. The conceptual striping plan for the project site is shown on Figure 2-1.

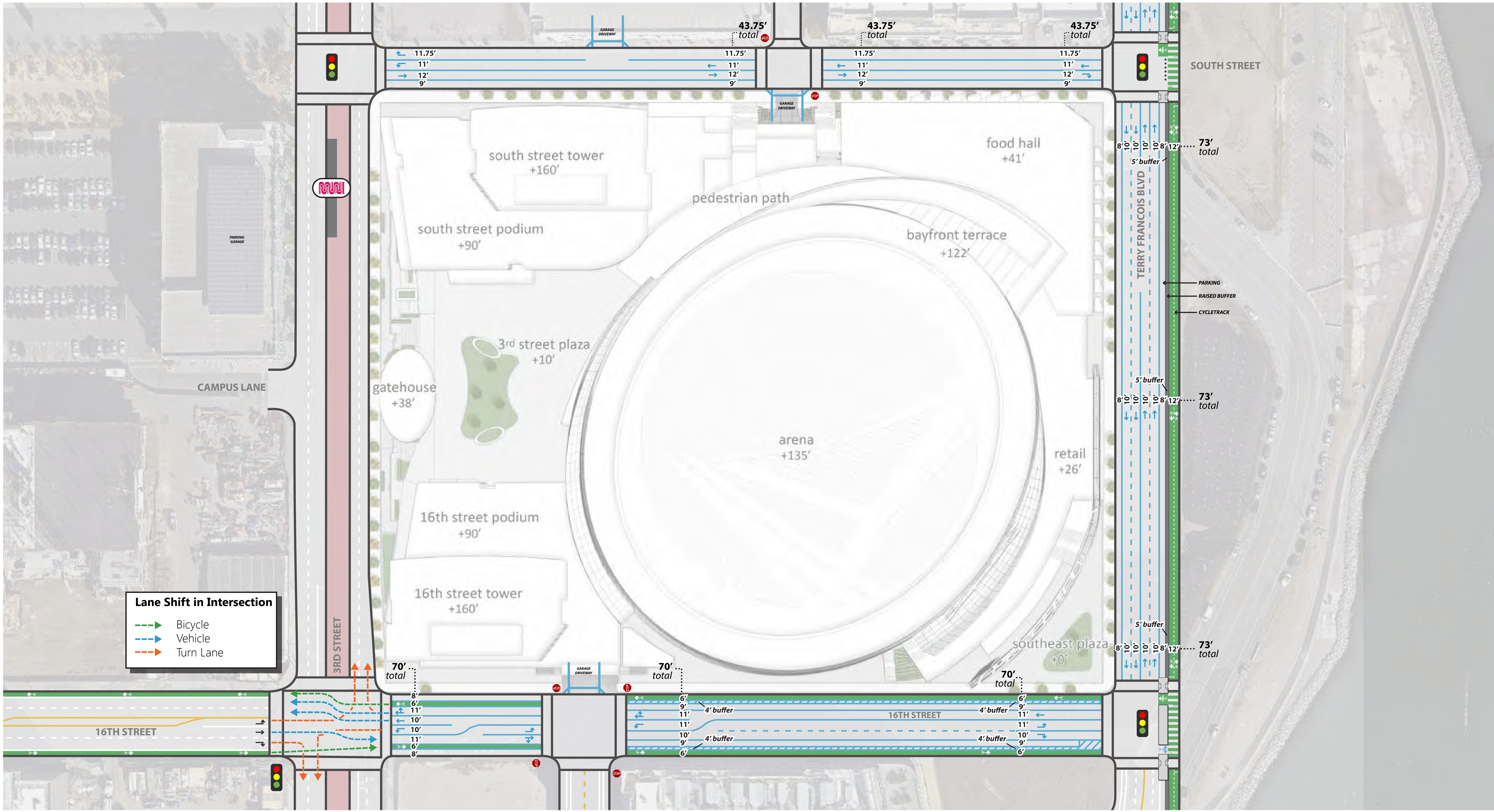
The project proposes to revise the planned cross-section for 16th Street from 3rd Street to Terry François Boulevard. The revised street cross-section would include 6 foot bike lanes with a 4 foot buffer on both sides, -9 foot parking lanes on both sides (for the segment from Illinois Street to Terry François Boulevard), one 11 foot through lane in each direction, and an 11 foot center lane that would serve as left turn pockets at 3rd Street, Illinois Street, and Terry François Boulevard. The on-street parking provided along 16th Street will be metered for general daytime use on non-event days, but restricted during limited hours for a variety of event-related needs including shuttle bus loading, media trucks, and charter bus loading when events are scheduled. One on-street space on the north side of 16th Street, between 3rd Street and Illinois Street, will be designated for on-street metered commercial loading for all hours until event-related curb regulations go into effect.

The project also proposes to restripe South Street within the boundaries of the project. The proposed cross-section would include a 9-foot parking lane on the south side of the street and a parking lane on the north side of the street measuring just less than 12 feet. Parking would be prohibited on the north side of the street between the 450 South Street parking garage entrance and 3rd Street, and the curbside lane would be used for an exclusive westbound right turn lane at the 3rd Street intersection. The proposed cross section would also include an 11 to 12-foot through lane in each direction. A bus stop for the Mission Bay TMA shuttle will be provided on the south side of South Street, from the 3rd Street intersection east a distance of 60 feet. A taxi loading area will be provided on the south side of South Street, from the Event Center garage access (opposite Bridgeview Way) east a distance of 100 feet. The remainder of the curbside frontage along South Street will be metered for general daytime use on non-event days. Eight on-street spaces on the south side of South Street will be designated for on-street metered commercial loading for all hours until event-related curb regulations go into effect. During events as needed, all on-street parking on the south side of South Street between 3rd Street and Terry François Boulevard will be prohibited so this space may be used for bus and taxi loading areas. Parking on the north side of South Street may be prohibited during peak events to allow use of the westbound parking lane for vehicle access and egress to the Event Center garage and the 450 South Street garage.

The planned Blue Greenway project will add a two-way bikeway along the east side of Terry François Boulevard with a 4-foot buffer. The reconstructed portion of Terry François Boulevard along the project frontage will also provide four travel lanes and on-street parking lanes on both sides. A Paratransit stop, 75 feet in length, which will accommodate up to three vans, will be provided on the west side of Terry François Boulevard near the southeast entrance to the Event Center and elevators to the Pedestrian Path. The remainder of the curbside frontage along Terry François Boulevard will be metered for general daytime use on non-event days. Eight on-street spaces on the west side of Terry François Boulevard will be designated for on-street metered commercial loading for all hours until event-related curb regulations go into effect. During events as needed, all on-street parking on the west side of Terry François Boulevard will be prohibited. During these conditions, the frontage will be designated for taxi use, Paratransit vehicle use, and TNC or private vehicle passenger drop-off/pick-up. At the intersection of Terry François Boulevard and 16th Street, two-stage bike boxes or equivalent measures will be provided to facilitate safe turns for cyclists traveling between 16th Street and the Blue Greenway bikeway on the east side of Terry François Boulevard.

In addition to the changes in cross sections, the following intersection controls would be implemented as part of the proposed project:

- The intersection of Terry A. Francois Boulevard/South Street is currently stop-controlled at the eastbound approach to the intersection, and would be signalized.
- The intersection of Bridgeview Way/South Street is currently uncontrolled, and would be made a side-street stop-controlled intersection with southbound vehicles on Bridgeview Way required to stop.
- The new intersection of Terry A. Francois Boulevard/16th Street would be signalized.
- The intersection of Illinois Street/16th Street is currently uncontrolled, and would be made an all-way stop-controlled intersection. Conditions at this intersection would be monitored, and if determined by the SFMTA that a traffic signal is warranted, the intersection would be signalized.
- The intersection of Terry A. Francois Boulevard/Illinois Street/Mariposa Street is currently stop-controlled, and would be signalized.



Not to Scale

FEHR & PEERS

SF13-0682 SF Warriors Arena\Graphics

CONCEPTUAL STRIPING - PROJECT SITE

FIGURE 2-1

2.1.3 Mission Bay TMA Shuttle Program Expansion

The Mission Bay Transportation Management Association (TMA) strives to reduce single-occupant vehicle trips by encouraging alternative modes of transportation for residents, employees and visitors to the Mission Bay development area. The Mission Bay TMA currently provides two free shuttle bus route services (east and west) between Mission Bay and the Powell Street BART Station and the 4th/King Caltrain Station.

The Warriors will join the Mission Bay TMA and the organization's required contributions to the association will enable expanded service, which may include additional evening or midday shuttles and/or weekend service. Additional routes to locations including the 16th Street BART Station and/or Transbay Terminal may also be feasible. This service will enable office employees and retail visitors to access the site from key transit locations. All standard shuttle service funded in part by the Warriors development will be an integrated part of the TMA network and will continue to be free of charge for all residents and employees in Mission Bay, regardless of origin or destination. If the Warriors choose to fund incremental event-only shuttle service in partnership with the TMA, such service would be supported exclusively by the Warriors and limited to event attendees.

The site's design includes an additional TMA shuttle stop, located on the south side of South Street just east of 3rd Street, located by the lobby of one of the project's office/lab buildings. This stop may also serve developments on the UCSF campus to the west, the Gap (existing) and Uber (planned) office buildings on the north side of South Street, and the Bayfront Park nearby.

2.1.4 Bicycle Parking

Bicycle parking will be provided in an enclosed 300+ bicycle valet facility located on the 16th Street frontage just west of the southeast Event Center entrance. Valet doors will face east to direct departing cyclists towards the signalized intersection at Terry Francois Boulevard and 16th Street, where they can safely mount their vehicles. The bike valet facility will be available for self-park to arena and GSW employees for all-day use but will not be staffed during non-peak event times; it is assumed that the valet partner and the SFMTA will provide guidance on the most efficient secure storage system under these conditions. The bike valet is proposed to be staffed by a partner such as the San Francisco Bicycle Coalition (SFBC) for evening use by ticketholders during peak events such as NBA games and concerts. The valet parking facility will be attended from two hours before the start of peak events to approximately one hour after the event ends. Additional valet service will be provided by partners at temporary, staffed bike corrals of 50-100 bikes on plaza level in the southeast and west portions of the site for events where bike use is projected to exceed the supply provided by the permanent 300+ space bike valet facility. This additional bike corral will be positioned to be accessible to bicyclists, but not to interfere with pedestrian pathways or ADA access points. Additional bicycle parking will be located throughout the development for daily users, including a secure bike parking room for each office building for office and retail employees and bike racks at ground level on South Street, Terry François Boulevard, and 16th Street for all users. Bike rack design will be determined in consultation with SFMTA staff. Total proposed bike parking is in excess of 500 spaces (including temporary corrals).

In addition to the bicycle parking program, the Event Center Development program will include sponsorship for a Bay Area Bike Share station on or near the site, likely along Terry Francois Boulevard or South Street, and support in principle for additional stations in the project vicinity. Precise location of the Bay Area Bike Share station(s) will be determined through coordination between the Port of SF, the SFMTA, and the bike share operator.

2.1.5 Vehicle Parking

The current Event Center Development program includes an approximately 950-space parking structure with below-grade parking and an at-grade level located under the plaza podium, all concealed from the public's view. Access to the garage will be provided via two controlled driveway entrances, one on South Street at Bridgeview Way and the other on 16th Street across from Illinois Street.

The 16th Street driveway will serve as the primary access point for arena patrons, who will be required to show pre-purchased parking passes to Event Center staff located on the street prior to entering the driveway. Any parking passes can be scanned at the interior end of the driveway to allow more cars to queue upon arrival. Office workers will also use the 16th Street Driveway, where, Automatic Vehicle Identification System (AVI) or fob controls will enable access at an entry point at the interior end of the driveway. AVIs may also be used for select season ticket holders for Event Center uses. The South Street driveway will provide access to retail patrons on-site and will include a valet drop-off area within the garage able to serve up to 280 vehicles. Self-parking visitors to office or retail during daytime hours will utilize a more traditional system using ticket-issuing machines and pay-on-foot ticket kiosks located throughout the garage. Each driveway will feature one in-bound lane during event hours and two egress lanes during the post-event period.

There will also be 13 truck docks located below grade, with access via distinct driveway lanes at the 16th street entry. The truck dock is physically separated from the primary vehicle parking areas.

In addition, the Golden State Warriors organization has purchased the right to use 132 additional stalls located in the structured parking garage at 450 South Street, directly across the street from the site's northern boundary. These spaces will be used by daily office employees and/or Golden State Warrior employees, not by event attendees. The Warriors are open to working with additional third parties to accommodate excess parking demand if the need arises.

Event attendees who purchase reserved parking on-site will receive instructions for entering and exiting the Event Center garage with their ticket confirmation. They will also receive a dated parking pass to hang on their rear view mirror. Signage will be provided at both Event Center garage access points indicating event center parking is available for those attendees with pre-purchased tickets only. The parking operation on event days will consist of attendants checking entering vehicles for valid parking access to a space in the garage. The parking pass checks will be done by attendants stationed curbside at garage driveways along 16th Street and South Street so that vehicles without proper credentials will not be able to enter the parking garage driveway. If queues extend from the 16th Street garage driveway back onto 16th Street, this access will be temporarily closed and inbound event attendees will be directed to the South Street garage access. Vehicles without reserved parking passes will be directed to the north or to the west of the site to other nearby parking facilities off-site.

Parking for retail and restaurant customers will be available at the 950-space garage on no-event days, during daytime events, and on non-peak event evenings. Garage operation for these customers will consist of attended valet parking. The valet parking drop-off and pick-up area will be located within the garage via the South Street driveway where the majority of the retail uses are located. When parking in the garage is not available, and during peak events, valet attendants will park retail customers' vehicles at off-site locations, including public lots in the vicinity.

Retail and office employees with reserved parking will use the 16th Street entry to the parking garage across from Illinois Street. The garage operation at this location will be an automated electronic system (no attendants) to facilitate efficient entry/exit for these daily users.

As part of the proposed street restriping, on-street metered parking is planned to surround the site on three sides – South Street, Terry François Boulevard, and 16th Street. This on-street parking will be used for various parking and loading designations on event days. During no-event times, the on-street space may be used for general parking, as summarized in Table 2-1 and Figure 2-2. Pending Port approval, on-street spaces on blocks adjacent to the Event Center Development are likely to be marked with Special Event parking signs, similar to those found in the vicinity of AT&T Park, and carefully monitored for compliance.

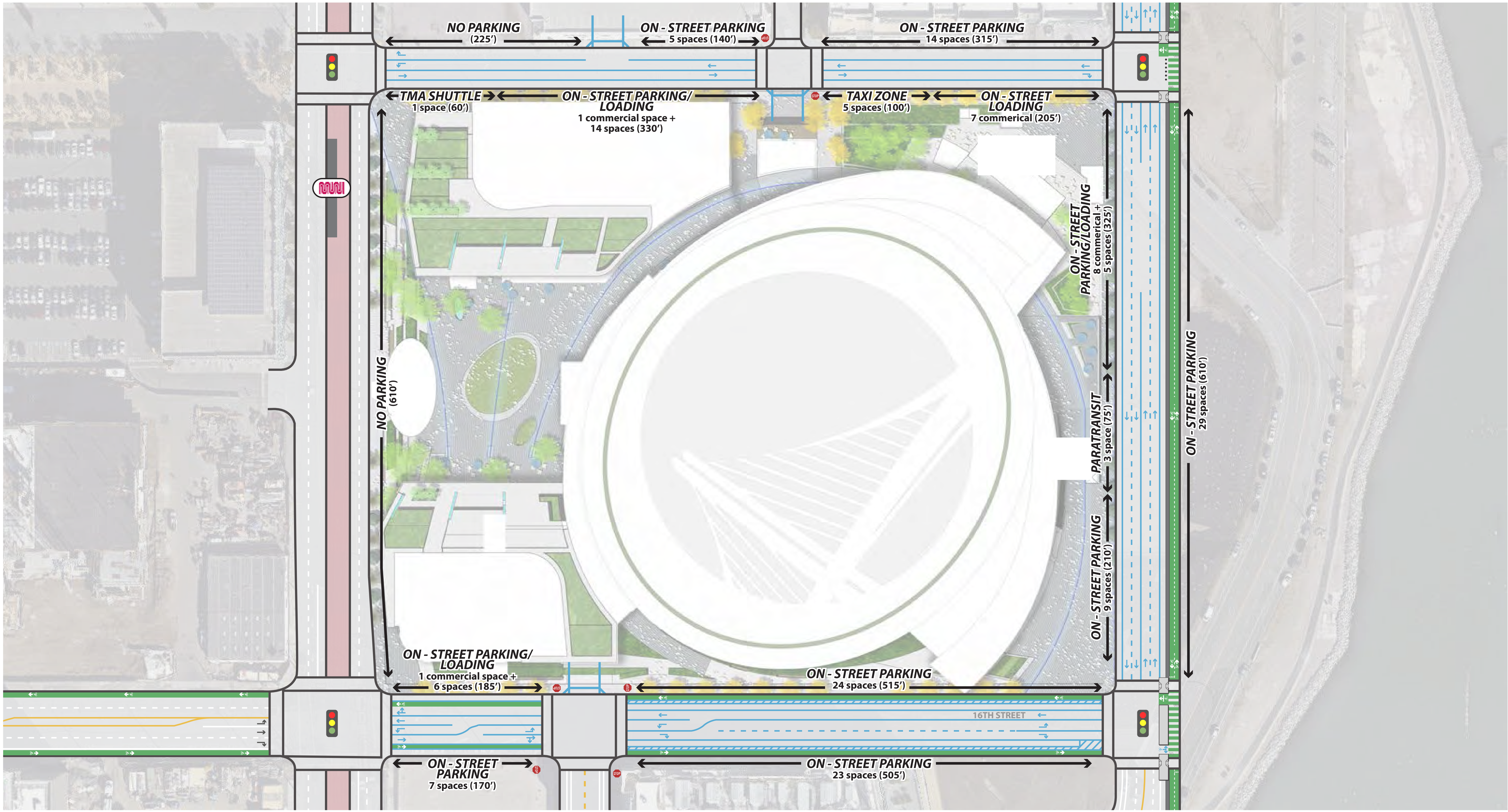
TABLE 2-1: NO-EVENT ON-STREET PARKING[3]

Street Segment		From	To	Length (ft.)	On-Street Parking Available[1,2]
South Street	North Side	3rd Street	450 South Street Garage Driveway	225	--
		450 South Street Garage Driveway	Bridgeview Way	140	5
		Bridgeview Way	Terry François Boulevard	315	14
	South Side	3rd Street	Bridgeview Way	410	15
		Bridgeview Way	Terry François Boulevard	305	--
Terry François Boulevard	East Side	South Street	16th Street	610	29
	West Side	South Street	16th Street	610	15
16th Street	North Side	3rd Street	Parking Garage Driveway	185	7
		Parking Garage Driveway	Terry François Boulevard	515	24
	South Side	3rd Street	Illinois Street	170	7
		Illinois Street	Terry François Boulevard	505	23

Notes:

1. On-street parking space = 15' for end stall; 20' for regular stall; 25' for loading stall
2. Red zone at each corner = 20'
3. Excludes TMA shuttle stop and no-event taxi zone, both also located on the south side of South Street, and select metered commercial loading zones on South Street and Terry Francois Boulevard. .

Source: Fehr & Peers, Golden State Warriors, SFMTA Parking Stall Standards.



Not to Scale

FEHR PEERS

SF13-0682 SF Warriors Arena\Graphics

ON-STREET PARKING - NO EVENT

FIGURE 2-2

2.2 EVENT SCENARIOS

The event scenarios and time periods analyzed in the TMP are designed to provide a range of typical scenarios, including several of those being studied for transportation impacts in the project SEIR. In full, this range of scenarios will offer a menu of options to event operators and City personnel to fit most event conditions. Transportation control measures for events not specifically described will be derived based on reviewing the plans for events with comparable attendance levels and time periods included in the TMP and making adjustments as needed.

The primary event scenarios that are addressed in this TMP are as follows:

- Typical No-Event Day
- Convention – weekday event with 9,000 attendees
- Arena Concert – an evening event with 14,000 attendees
- NBA Game – an evening Warriors game with 18,064 attendees
- Dual Event – NBA game or arena concert coinciding with an AT&T Park event (with 41,500 attendees)

2.2.1 Typical No-Event Day

The retail, restaurant, and office uses located adjacent to the Event Center will be open 365 days a year. Project sponsors anticipate daily activity from these users in addition to passive recreation or seasonal festivals in the open plaza areas and in Bayfront Park located across the street.

2.2.2 Small Event

Small events (3,000 to 9,000 attendees) may consist of conventions, small "arena theater" concerts, family shows, non-NBA sporting events, and other types of events to be decided. For the purpose of the TMP, a small event is defined as a daytime convention with an attendance of 9,000 people.

2.2.3 Arena Concert Event

Arena concert events are defined in this TMP as events with 14,000 attendees. The estimated 30 annual arena concerts (typically occurring on Friday and Saturday evenings within a 7:30 PM to 10:30 PM window) at the event center would vary in attendance levels, depending on the artist and stage configuration. The estimated average attendance level would be approximately 12,500 patrons. The event center design would allow for an end-stage concert configuration to accommodate a maximum of 14,000 patrons.

Occasionally, arena concerts would occur in a full 360-degree center-stage configuration which would allow for a maximum attendance above the seated capacity of 18,064 – up to 18,500 patrons. This would account for less than 10 percent of the total annual arena concerts (no more than four per year). Logistics for these larger arena concerts are considered as part of the peak event scenario.

2.2.4 Peak Event

Peak events are defined in this TMP as events where more than 90 percent of the seating capacity of the Event Center will be occupied (i.e. more than 16,200 attendees). These include all GSW pre-season, regular season, and post-season games as well as sold-out center stage concerts. The peak event analyzed in detail in the TMP is a sold out basketball game that fills the Event Center to capacity (18,064 attendees).

The NBA regular season consists of 41 home games.

The majority of games take place in the evening (7:30 PM tipoff). In the 2012-2013 season, there was one daytime game (1:00 PM tipoff) during the regular season and it took place on a holiday (Martin Luther King Day, 01/21/13). Since most concerts typically take place in the evening, most of the egress from the Event Center will occur at night, during off-peak traffic conditions. Some games and concerts, though, will have ingress activity during the weekday evening commute period. Most inbound pre-event traffic on weekdays will be traveling in the opposite direction of evening commute traffic that is exiting the area.

2.2.5 Peak Event Concurrent with Event at AT&T Park

The dual event scenario occurs when a high-attendance event at the Event Center (a sold-out NBA game or concert) and a baseball game or sold-out concert at AT&T Park occur at the same time. This combination of events, in which up to 18,064 persons would be at the Event Center and up to 41,500 persons at AT&T Park, would most likely occur on a weekend evening. Since the 2004 seasons, there have been 19 days in which both the Giants and Warriors have had overlapping regular season home games, for an average of approximately 2 such days per year. The transportation control strategies for a dual event scenario also apply when a baseball game or sold out concert at AT&T Park occurs at the same time as a 14,000 person concert at the Event Center.

2.3 TYPICAL ANNUAL EVENT DISTRIBUTION

It is anticipated that the Event Center will have a total of approximately 200-220 events each year, distributed as follows:

- 43-60 GSW home games (2-3 pre-season + 41 regular season + a maximum possible of 16 home playoff games), all taking place from 7:30 PM to around 9:40 PM.
- 45 Concerts, consisting of approximately 30 large arena concerts and 15 small "arena theater" concerts. These events will occur mostly on Friday and Saturday nights from 7:30 PM to 10:30 PM, concentrated during late fall, winter, and early spring.
- 55 Family Shows. Tours typically perform 10 shows in the building over 5 days (Wed-Sun) as described in Table 2-2.
- 31 Conventions/Corporate Events, distributed throughout the year as the building schedule permits.
- Approximately 30 other sporting events distributed throughout the year as the building schedule permits.

Table 2-2 summarizes the annual event distribution.

TABLE 2-2: TYPICAL ANNUAL EVENT CENTER EVENT DISTRIBUTION

Event Description	Quantity	Event Times	Daytime or Evening
Warriors Events	43-60		
Pre-season	2-3	7:30 PM – 9:40 PM	Evening
Season	41	7:30 PM – 9:40 PM	Evening
Post-season	0-16	7:30 PM – 9:40 PM	Evening
Non-Warriors Events	161		
Concerts	45		
"Arena Theater" Concerts (3,000 attendees)	15	Fri-Sat 7:30 PM – 10:30 PM	Evening
Arena Concerts (14,000 attendees)	30	Fri-Sat 7:30 PM – 10:30 PM	Evening
Family Shows	55	Typically 10 shows over 5 days (Wed. to Sun.): Wed. (1): 7:30 - 9:00 PM Thur. (1): 7:30 - 9:00 PM Fri. (2): 10:30 AM - Noon; 7:30 - 9:00 PM Sat. (3): 11 AM-12:30 PM, 3:00 PM - 4:30 PM; 7:00 PM -8:30 PM Sun. (3): 11 AM - 12:30 PM, 3:00 PM - 4:30 PM; 7:00 PM-8:30 PM	Both
Conventions/ Corporate Events	31	Variable	Both
Other Sporting Events	30	Variable	Both

Notes:

1. Of the peak events, it is anticipated that fewer than 10 will overlap with events at AT&T Park.

Source: Golden State Warriors.

CHAPTER 3. EXISTING CONDITIONS

Chapter 3 describes existing transportation systems serving the Event Center Development site, including the street network, freeways, transit hubs, bicycle facilities, and truck routes. Select commitments to make near-term significant changes in conditions that are certain and fully-funded are noted as many of these investments and changes in capacity and service will be completed by 2020 and will be key to assumptions about the operation and functionality of the transportation networks serving the Event Center Development. This Chapter is included in the TMP for contextual and informational purposes only. A full environment document will be prepared that includes a more complete and quantitative analysis of the existing conditions as they pertain to transportation.

3.1 PEDESTRIAN FACILITIES

Major pedestrian routes to the Event Center Development include 16th Street for east-west travel as well as 3rd Street and Terry François Boulevard/Bay Trail for north-south travel.

Within the project site area, sidewalks generally exist on both sides of the street, and are generally 12 to 15 feet wide. There is currently no sidewalk along the frontage of the project site except on 3rd Street; however sidewalks will be completed along 16th Street, South Street, and Terry François Boulevard adjacent to the site as part of the project. There are gaps in the sidewalk along nearby roadways that are currently under construction, including the south side of 16th Street between 7th and 3rd streets and the west side of 3rd Street between 16th and Mariposa streets. These sidewalk gaps will be closed upon completion of the adjacent buildings. All intersections surrounding the site have standard painted crosswalks and directional curb ramps. All signalized intersections include pedestrian signals with count down timers.

The Bay Trail is a planned 500-mile recreational shoreline corridor that, when complete, will encircle San Francisco and San Pablo Bays with a continuous network of bicycling and hiking trails. In the project vicinity, the Bay Trail will run along the east side of Terry François Boulevard, and is designated as a multi-use trail shared by pedestrians and bicycles. As a major mostly uninterrupted pedestrian facility, this path will carry a significant proportion of pedestrian flow to and from the Event Center and between the Event Center and major regional transit hubs and bike share stations, and certain segments along congested areas, such as the Embarcadero, are being designed to provide separate paths for bicyclists and pedestrians to improve safety.

3.2 TRANSIT NETWORK

This section discusses both regional and local transit provision to the proposed Event Center Development site. The site is well-served by both local and regional public transit. Local service is provided by Muni Bus, light rail lines, and the Mission Bay TMA shuttles. Regional service is provided by BART, Caltrain, AC Transit, Golden Gate Transit, SamTrans, and various ferry providers. Riders from these regional transit services would either walk or transfer to Muni or privately operated shuttles to access the Event Center Development. This section is organized in order of proximity to the site, starting with the transit hub that is furthest away (BART Stations) and ending with the one that is closest (Muni light rail platforms). Existing rail transit is shown in Figure 3-1 and existing bus transit is shown in Figure 3-2.

3.2.1 Bay Area Rapid Transit (BART, Regional)

BART provides regional commuter rail service in the Bay Area. San Francisco's Financial District is centrally located within the system, which provides service to the East Bay (Pittsburg/Bay Point, Richmond, Dublin/Pleasanton and Fremont) and to San Mateo County (San Francisco International Airport and Millbrae) with operating hours between 4:00 AM and midnight daily. In the Financial District, BART operates underground below Market Street. The Event Center Development can be most directly accessed from four BART stations including the Embarcadero (2.1 miles), Montgomery Street (1.8 miles), Powell Street (1.7 miles), and 16th Street Mission (1.7 miles) stations. When the Muni Central Subway opens in 2019, its connection to the BART Powell Street Station will likely make this a primary transfer station to the Event Center. During the weekday PM peak period, when many event-goers are expected to arrive, headways are generally 5 to 15 minutes for each line. Off-peak headways are generally 20 minutes for each line. BART trains range from 3 to 10 cars depending on time of day and demand. BART will extend its service to Warm Springs in 2015 and to San Jose in 2018 and to east Contra Costa County via eBART in 2016. BART is also proposing early phases of its "BART Metro" project (that increases Transbay Tube/SF frequency) and to introduce higher-capacity train cars within the next 5-10 years. BART is also performing a study to recommend measures to increase platform and station circulation capacity, particularly at Embarcadero and Montgomery Stations. The BART system map is illustrated below.

3.2.2 Ferry Building

WETA, Blue & Gold, and Golden Gate operate regular ferry service between the San Francisco Ferry Building (2 miles from the project site) and Vallejo, Larkspur, Sausalito, Tiburon, Oakland, Alameda and South San Francisco. Golden Gate and WETA also provide event-level service to AT&T Park, 2/3 mile from the project site. The Ferry Building is also a terminal / hub for Muni and Amtrak/Amtrak Capital Corridor service.

A Mission Bay ferry terminal near 16th Street has been identified in Water Emergency Transportation Authority (WETA) and MTC's 2040 Regional Transportation Plan "One Bay Area" planning documents as a potential future infrastructure investment, but there has not yet been an environmental assessment or full-funding strategy identified for the project. WETA plans to continue developing this concept.

3.2.3 Caltrain (Regional)

Caltrain provides passenger rail service on the Peninsula between San Francisco and Downtown San Jose with several stops in San Mateo and Santa Clara Counties. Limited service is available south of San Jose. Within San Francisco, Caltrain terminates at a station located on 4th Street between King and Townsend Streets, approximately 2/3 mile from the proposed Event Center Development site. The 4th/King station is served by local, limited, and "Baby Bullet" trains. The 22nd Street Station is also nearby, located directly underneath I-280, approximately one mile from the Event Center Development site, and is served by local, limited, and a few of the currently scheduled "Baby Bullet" trains.

Caltrain service headways in the northbound direction during the PM peak, which will serve Event Center weekday events, are variable depending on the specific service provided by the train (bullet or limited); however, there are typically 5 arrivals in one hour. Southbound headways after the PM peak are once per hour. Electrification of Caltrain by 2021 will allow implementation of increased train frequencies. On weekends, headways are once per hour, so most Event Center attendees will likely arrive in a single train. However some guests may come on an earlier train for weekend events to visit the city or the retail and restaurant uses on site. Finally, Caltrain currently provides special post-game train service following Giants games.

3.2.4 San Francisco Muni (Local)

Muni operates bus, cable cars, streetcars, and light rail lines within San Francisco. The line that most directly serves the proposed Event Center Development site is the T 3rd Street light rail line, which operates in a dedicated right-of-way in the center of 3rd Street. A couple of Muni bus lines, the 22 Fillmore and 10 Townsend, as well as the N Judah light rail line stop within 1 mile of the project site. Figure 3-1 shows rail lines and Figure 3-2 shows bus lines that provide service in the immediate project vicinity.

T 3rd Street – The T 3rd Street light rail route connects Visitacion Valley to Mission Bay via Bayview and Dogpatch. It also connects Balboa Park BART Station to Mission Bay through Downtown San Francisco as the K Ingleside route via St Francis Wood, West Portal, and the Castro. It operates weekdays and weekends from approximately 4:00 AM to 1:00 AM, mostly with one-car trains using platforms that are typically long enough for two car-trains in the vicinity of the Event Center. This line will be diverted to the Central Subway in 2019, will regularly be served by 2-car trains at a higher frequency than current scheduling north of Mariposa Street, and its UCSF Mission Bay station is located at the northwest corner of the project site.

The T 3rd Street line stops at side-running raised platforms located along 3rd Street at the following locations:

- Inbound/Outbound far-side curbside stops at South Street (at the northwest corner of the site)
- Inbound/Outbound far-side curbside stops at Mariposa Street (1/4-mile south of the site)
- Inbound/Outbound far-side curbside stops at 20th Street (1/2 mile south of the site)
- Inbound/Outbound far-side curbside stops at Mission Rock Street (1/3-mile north of the site)

In addition, all other Muni light rail lines and several east-west Muni bus lines overlap the T 3rd line at the Downtown stations, including the Embarcadero BART/Muni Station and other Market Street Muni bus/rail hubs that are within 2 miles away. Event-goers coming from other parts of San Francisco can transfer to the T 3rd line. Within five years, Muni expects to operate enhanced transit service described in the TEP, which could include the T 3rd and the 22 Fillmore trolley bus rerouted to run along 16th Street east of I-280 to Terry François Boulevard, with a more near-term plan to operate a Muni 55 motor coach line between the 16th Street BART and the Event Center until the trolley bus extension can be completed. The Muni 33 line may be extended to serve the segment in Potrero Hill currently served by the 22. Two new Muni Bus Rapid Transit corridors (Van Ness and Geary) will have at least one of the programmed lines terminate within 2/3 mile of the project site within the next 5-8 years. Lastly, many major Muni bus lines have current terminus stations at the Temporary Transbay Terminal, Caltrain Terminal and Ferry Building (see below).

3.2.5 Mission Bay TMA Shuttles

The Mission Bay Transportation Management Association (TMA) strives to reduce single-occupant vehicle trips by encouraging alternative modes of transportation for residents, employees and visitors to the Mission Bay development area. Mission Bay TMA currently provides two shuttle bus route services (east and west) between Mission Bay and the Powell Street BART Station and the 4th/King Caltrain Station. They are free of charge and open to all employees, residents, and visitors to the Mission Bay Area and the China Basin building at 185 Berry Street. The west route serves 16th and Illinois streets, while the east route serves 4th Street and Mission Bay Boulevard; both operate at 15-minute intervals from 7:00 to 10:00 AM and 3:45 to 8:15 PM. Figure 3-2 shows TMA Shuttle routes and existing stops.

The Golden State Warriors will join the Mission Bay TMA and the shuttles will be made available for employees and visitors. According to the Mission Bay TMA, the evening service is currently at or near capacity. After joining the TMA, shuttle routes, stops, and schedules may be reconfigured to better serve the site and Mission Bay. A new stop to serve the site is suggested on the south side of South Street near the intersection with 3rd Street.

If the Warriors choose to fund incremental event-only shuttle service in partnership with the TMA, such service would be supported exclusively by the Warriors and limited to event attendees.

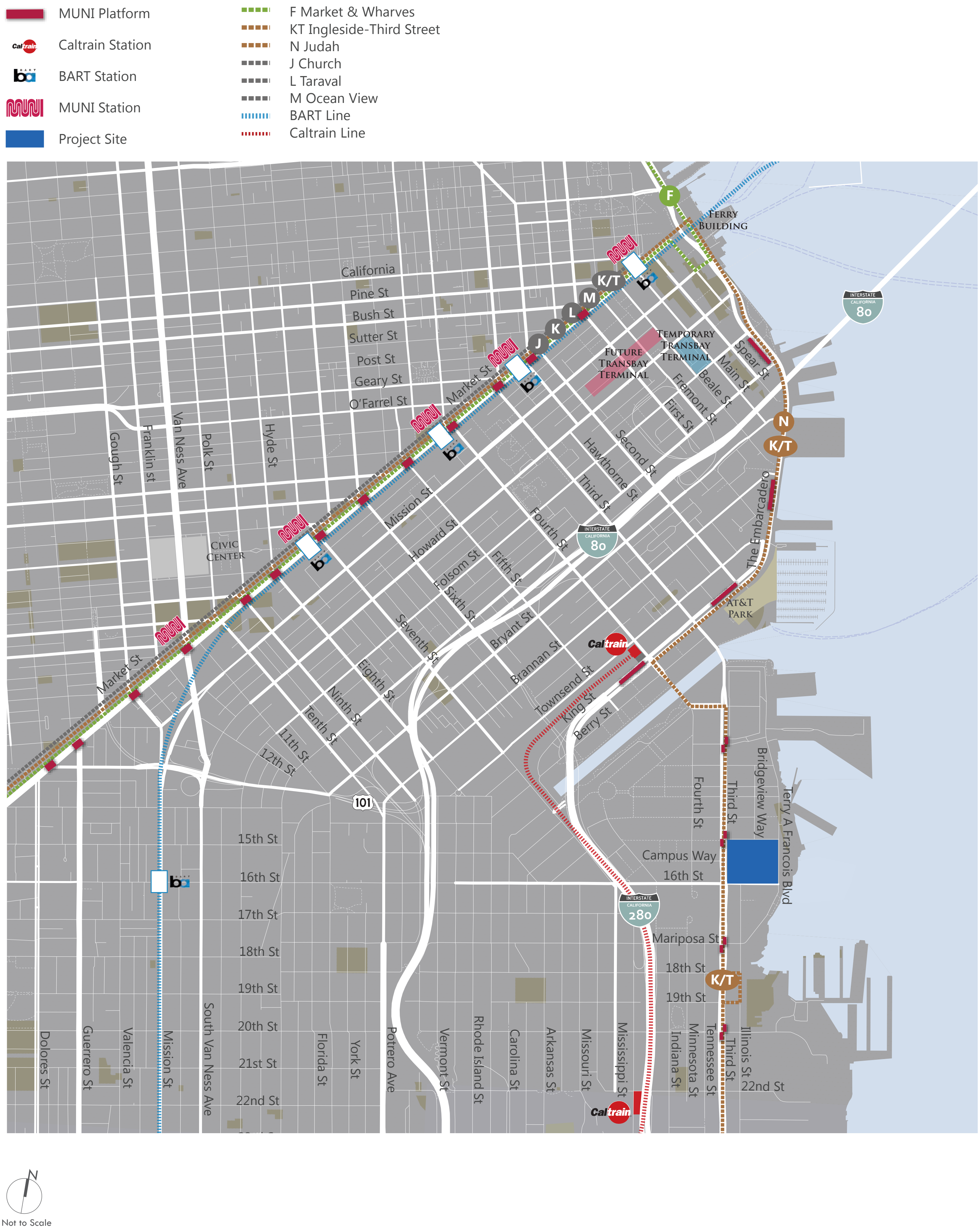
3.2.6 UCSF Campus-to-Campus Shuttles

UCSF provides shuttles for university personnel, including faculty, staff, technicians, and students, to travel between the university's campuses in San Francisco. These shuttles relieve capacity constraints for both the Mission Bay TMA shuttles and the road network via a reduction in single-occupant vehicle trips. Non-university affiliated personnel in the neighborhood are not permitted to ride UCSF shuttles.

3.2.7 Temporary Transbay Terminal

The Temporary Transbay Terminal provides temporary bus terminal facilities during construction of the new multi-modal Transbay Transit Center, which is scheduled for completion in 2017. The Temporary Terminal is located in the area bounded by Main, Folsom, Beale and Howard Streets, approximately 1.75 miles north of the project site. It currently serves AC Transit, WestCAT Lynx, Muni, Golden Gate Transit, and SamTrans passengers.

The new Transbay Transit Center will be located in an area bounded by Beale Street, 2nd Street, Minna Street, and Natoma Street and will serve the same transit providers as the Temporary Terminal plus capacity to accommodate Caltrain expansion and California High Speed Rail. Phase I of the project is expected to be completed by 2017.



EXISTING RAIL TRANSIT FACILITIES

FIGURE 3-1

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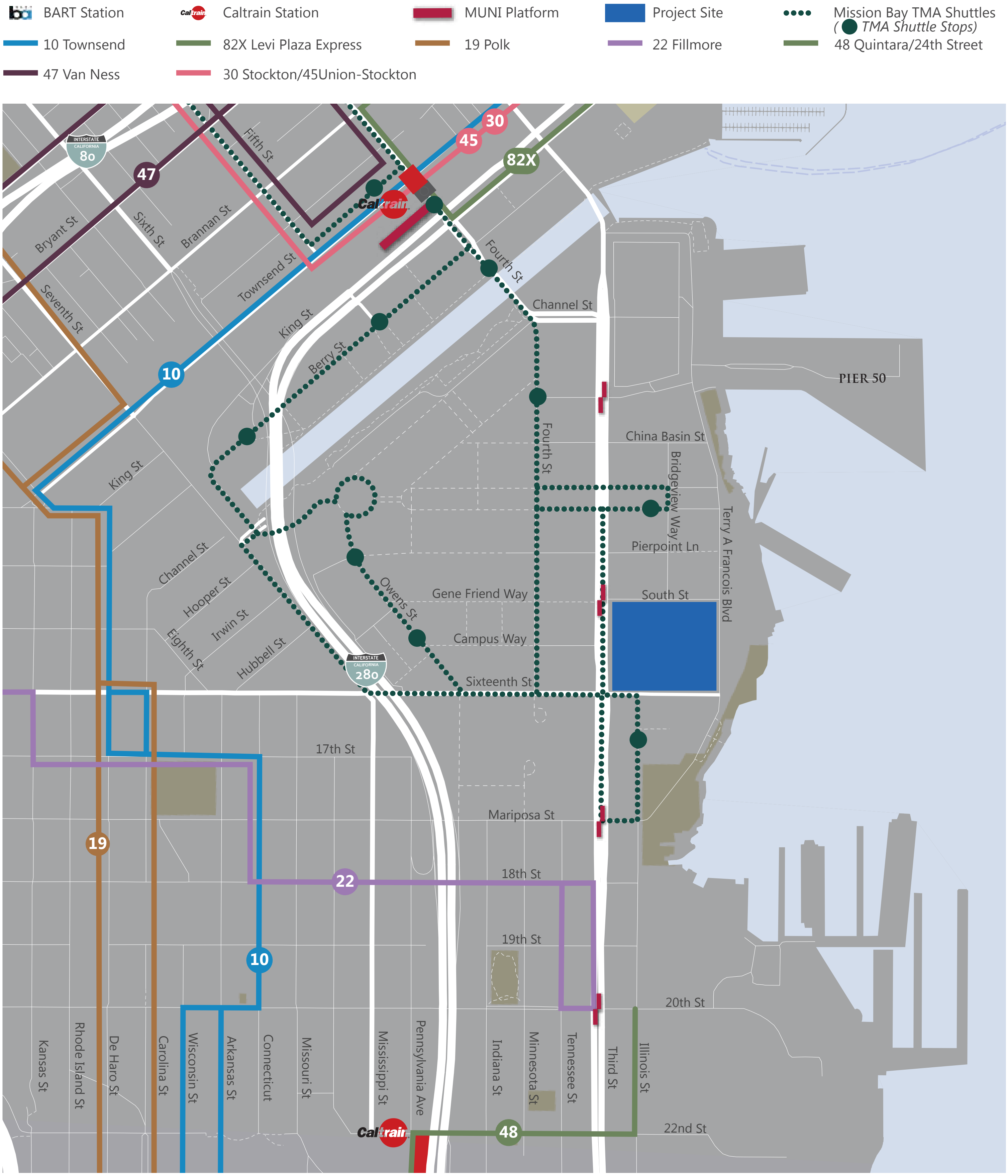

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EXISTING BUS TRANSIT FACILITIES

FIGURE 3-2

3.3 BICYCLE FACILITIES

Bicyclists may use all roadways in the city, not just designated bicycle routes; however, the City of San Francisco has an extensive bicycle network. The three classes of bicycle facilities are described below.

Class I (Multi-use paths) are paved multi-use facilities separated from roadways. The City of San Francisco has Class I facilities in large parks (e.g., Golden Gate Park or the Panhandle) and in areas where bicycling on the street would be challenging (e.g., US 101/Cesar Chavez Interchange).

Class I facilities are generally shared with pedestrians and may be adjacent to an existing roadway, or may be entirely independent of existing vehicular facilities.

Class II (Bicycle Lanes) are striped lanes on roadways designated for use by bicycles through striping, pavement legends, and signs.

Class III (Bicycle Routes) are designated roadways for shared bicycle/vehicle use indicated by signs only; may or may not include additional pavement width for cyclists. The majority of San Francisco's bicycle facilities are Class III facilities. In San Francisco, Class III Bicycle Routes are routinely striped with the shared-lane arrow, or "sharrow," reminding drivers and cyclists to share the roadway.

Current on-street bicycle facilities in the vicinity of the project are shown in Figure 3-3 and described below. The majority of the study area is flat, with limited changes in grade, facilitating bicycling within and through the area. However, dedicated bicycle lanes are not provided on all routes. For a description of planned bicycle projects which will add key links to the existing network including the Blue Greenway on Terry François Boulevard, refer to section 1.3.2.

The Bay Trail, described above, connects China Basin to Mission Bay across the Channel and runs along bicycle route #5. Additionally, the Embarcadero Enhancement project, now underway proposes to develop a conceptual design and cost estimate for a bikeway - a bicycle facility that is physically separated from moving or parked vehicles and pedestrians - along The Embarcadero from 3rd Street in South Beach to Powell and Jefferson Streets in the Fisherman's Wharf area. A bikeway is a bicycle facility that is physically separated from moving or parked vehicles and pedestrians. The SFMTA proposes to study a bicycle connection across the Lefty O'Doul Bridge that would connect the two waterfront bicycle facilities.

Route #5 runs north to south along Terry François Boulevard and Illinois Street as a Class II bike lane. This route connects China Basin to the north with the project site and Route #7 to the south.

Route #536 is a two-block section of northbound sharrows on 3rd Street between Terry François Boulevard and Townsend Street.

4th Street is a north-south bike route that extends from Berry Street to the north to 16th Street. 4th Street is designated as a Class III bicycle facility as it crosses Mission Creek until Channel Street, south of which it has Class II bike lanes.

Route #7 is primarily a north-south bike route that runs along Indiana Street as a Class III facility. At Mariposa St to the north, it merges with Route #23 and runs to the east to Illinois Street, where it continues north to the Event Center site. This route connects to Route #23 to the west as well as Route #5 and the Bay Trail to the east.

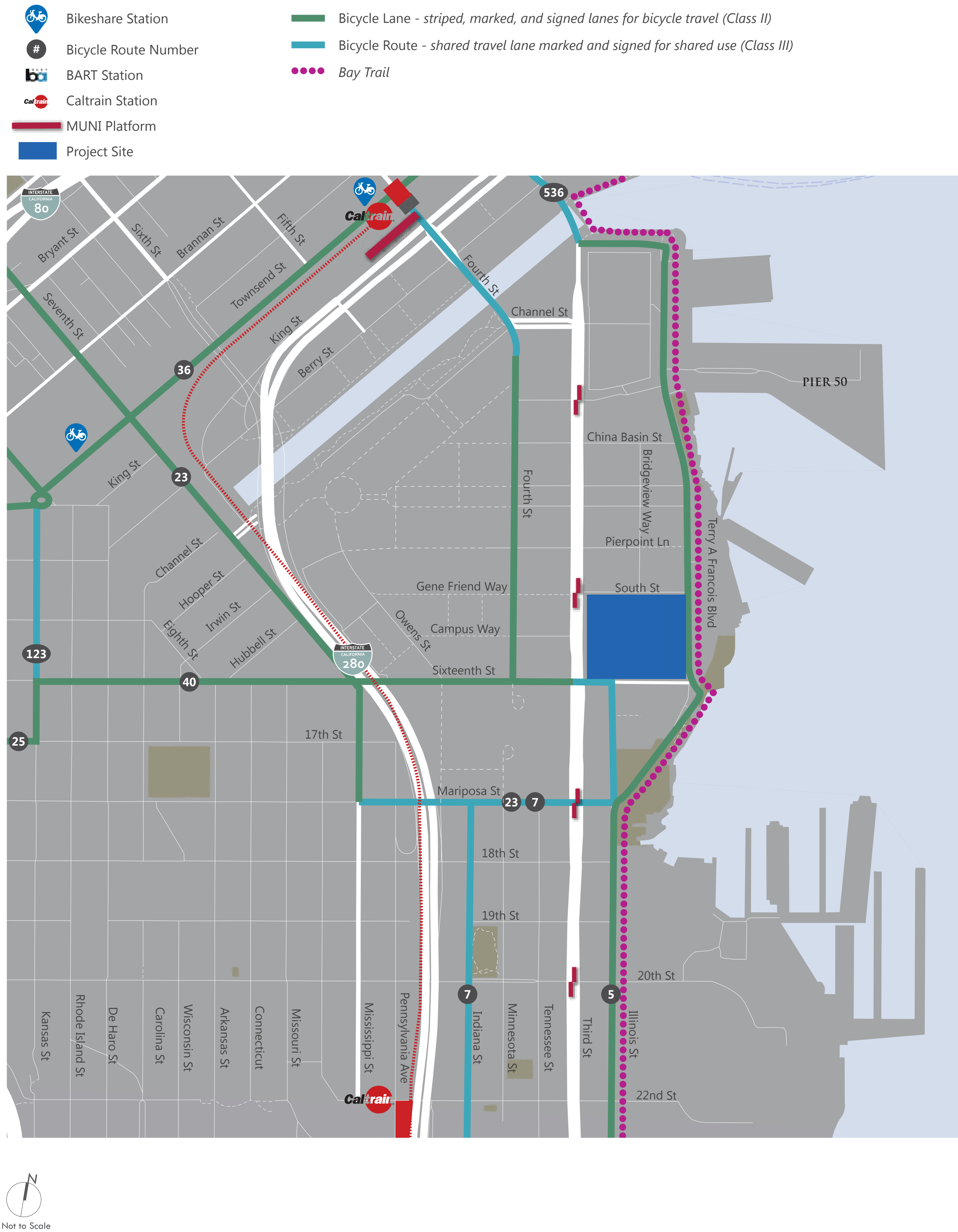
Route #23 is primarily a north-south bike route that extends along 7th Street from Brannan Street to 16th Street and down Mississippi Street to Mariposa Street with Class II bike lanes. At Mississippi Street and Mariposa, it runs east along Mariposa Street as a Class III facility and merges with Route #7.

Route #123 is a short north-south bike route that runs along Henry Adams/Kansas Street between Division Street and 16th Street as a Class III bicycle facility. It connects Routes #36 and #40.

Route #36 is an east-west bike route that runs along Townsend Street between The Embarcadero and 8th Street as a Class II bike lane. It connects the Caltrain Station at 4th and King Streets with Routes #23 and #123 to the west.

Route #40 is an east-west bike route that runs along 16th Street from Kansas Street to 3rd Street as a Class II bike lane. It continues for less than a block as a Class III bike facility from 3rd Street to the project site at Illinois Street. This route connects Route #25 and #123 to the west with Routes #23, 4th Street, and the project site to the east. Route #40 is planned to be moved to 17th Street between Kansas and Mississippi Streets before returning to 16th Street, where it will continue to Terry François Boulevard.

There is currently a **Bay Area Bike Share** (BABS) pod at the Caltrain Station and on Townsend Street between 7th and 8th streets, and at least one planned in the Mission Bay neighborhood near the UCSF residences. The Warriors are exploring locations for a new bike share station at or immediately adjacent to the Event Center or Bayfront Park.



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EXISTING BICYCLE FACILITIES

FIGURE 3-3

3.4 STREET NETWORK

Since the Event Center Development site is located at the eastern edge of the Mission Bay neighborhood, the street network serving it extends to the north, west, and south only. The project proposes to restripe the roads adjacent to the Event Center Development frontage, as discussed in more detail previously in Chapter 2.

3.4.1 Local Access

This section describes the existing streets that are most relevant for access to the immediate vicinity of the site and discusses their relevance for particular modes as appropriate.

16th Street is a four-lane east-west Secondary Arterial roadway with left turn pockets that extends to Castro Street to the west and currently terminates at Illinois Street in the east. Upon build out, 16th Street will continue along the south border of the project site to Terry François Boulevard. East of Illinois Street and along the majority of the corridor within the study area, on-street parking is prohibited on both sides of the street. On-street parking is currently allowed on both sides of the street between 3rd Street and Illinois Street. Muni line 22 currently runs along the length of 16th Street west of Kansas Street. Interim Muni line 55 is proposed to run along 16th Street to 3rd Street. Bicycle Route 40 is a Class II route that runs along 16th Street between 3rd and Kansas streets. Future plans will extend the route east along 17th to Mississippi where it will return to 16th Street. Sidewalks are generally provided on at least one side of the road within the study area (on the south side of the road to the east of 3rd Street and on the north side of the road west of 3rd Street). On-street bike lanes are planned along 16th Street between 3rd Street and Terry François Boulevard.

South Street borders the project to the north and runs for one block from Terry François Boulevard to 3rd Street. It is a four-lane road that transitions to a pedestrian plaza, Gene Friend Way, to the west of 3rd Street. Parking is prohibited on both sides of the street and wide sidewalks are provided on the north side. No bicycle facilities are provided on South Street.

3rd Street is a four-lane north-south roadway that extends from Market Street to Bayshore Boulevard. It is designated as a Primary Transit Important roadway in San Francisco's General Plan. Near the Event Center site, on-street parking is prohibited on both sides of the street. 3rd Street is designated as a Class III bike route with sharrows between King Street and Terry François Boulevard in the northbound direction only. The T 3rd Street light rail line operates along 3rd Street between Channel Street and Bayshore Boulevard along a physically separated median in the roadway. During peak events at AT&T Park, vehicle capacity across the 3rd Street Bridge is reduced to one lane in each direction to accommodate surges in pedestrian activity around the park.

Terry François Boulevard is primarily a four-lane road that runs north-south from Mission Rock Street to 3rd Street and borders the project site to the east. The road transitions to a two-lane road north of Mission Rock Street, where it curves to the west to its terminus at 3rd Street. Terry François Boulevard is part of the Bay Trail and Bicycle Route 5 (Class II in both directions). On-street parking is generally permitted on both sides of the street, except along the frontage of Pier 48 and Pier 50. During events at AT&T Park, Terry François Boulevard is closed to vehicle traffic from 3rd Street to Pier 48. The proposed Blue Greenway project will add a two-way bikeway along the east side of the street with a 4-foot buffer. As part of the Blue Greenway project, Terry François Boulevard will be realigned to create a regular block shape for Blocks 30 and 32 and to maximize the size of the Bayfront Park. The four travel lanes and on-street parking lanes on both sides will be maintained.

Bridgeview Way is a privately managed, narrow two-lane road that runs from South Street directly across from the north parking entrance for the Event Center Development, to China Basin Street. Parking is prohibited on both sides of the street and sidewalks are provided on both sides along the entire stretch. This road provides internal access and circulation for the residential and office uses along the corridor.

Illinois Street is a two-lane road that runs north-south from Cargo Way to 16th Street at the south parking entrance to the Event Center Development. Through the project area, parking is permitted on both sides of the street and the majority of the road. Parking is prohibited on the west side of Illinois between Mariposa and 18th streets during the post-event period when there are events at AT&T Park. Illinois Street also serves as Bicycle Route 5, with Class II facilities in both directions. Parking is prohibited on the west side of Illinois between Mariposa and 18th streets during the post-event period when there are events at AT&T Park.

4th Street is a two-lane north-south Primary Transit Important roadway that extends from Market Street to 16th Street. On-street parking is provided on both sides of the street. 4th Street is designated as a Class III bike route as it crosses Mission Creek, after which it transitions into Class II bike facilities (bike lanes) between Channel Street and 16th Street. The T 3rd Street light rail line operates on 4th Street between King Street and Channel Street. The 4th Street Bridge is closed to northbound traffic except transit, taxis and bikes during the post-event period for AT&T Park events. As part of the Mission Bay Redevelopment Plan, 4th Street will extend south of 16th Street to access a new UCSF hospital facility, but will not connect through to Mariposa Street.

7th Street is a two-lane north-south Secondary Arterial roadway that extends from Market Street to 16th Street. On-street parking is provided on both sides of the street between Irwin Street and 16th Street. 7th Street has Class II bike facilities between Brannan and 16th streets.

Mission Bay Boulevard North and South are a one-lane one-way east-west couplet Local Street that extends from Terry François Boulevard to 4th Street; right-turn only lanes are provided at intersections. It is located at the northern edge of the Mission Bay campus site and will be eventually extended to connect to the Mission Bay Circle in the future, located approximately 1,300 feet to the west, as part of the Mission Bay Redevelopment Plan. On-street parking is provided on the north side of the Mission Bay Boulevard North.

King Street is a five to six-lane Primary Transit Important east-west roadway that connects to the terminus of I-280 approximately 2/3 mile north of the project. The Muni line T 3rd Street operates in the median along King Street between The Embarcadero and 4th Street, where it continues down 4th Street to the Event Center site. AT&T Park, home of the San Francisco Giants, is located on King Street between 2nd and 3rd Streets. Caltrain has its terminus station on 4th Street between King and Townsend Streets. Although King Street is not directly adjacent to the Event Center Development project site, it plays a major role in providing access to and from the site. King Street is closed in eastbound direction between 3rd and 2nd streets during post-event period for AT&T Park events.

Berry Street is a two-lane east-west Local Street that extends from 3rd Street to Owens Street. Berry Street operates as an eastbound one-way street between 3rd and 4th Streets. On-street parking is provided primarily on the south side, though there are some areas that have on-street parking on both sides of the street.

Channel Street is a four-lane east-west Local Street that currently extends from west of 4th Street to 3rd Street. On-street parking is prohibited on both sides of the street between 3rd and 4th Streets, and permitted west of 4th Street. The T 3rd Street rail line operates on Channel Street between 3rd and 4th streets within a physically separated median in the roadway. Channel Street will be extended to the Mission Bay Circle in the future, as part of the Mission Bay Redevelopment Plan.

Mission Rock Street is a two-lane east-west Local Street that extends from Terry François Boulevard to 4th Street. On-street parking is provided on both sides of the street for most of the length, but is not available east of 3rd Street.

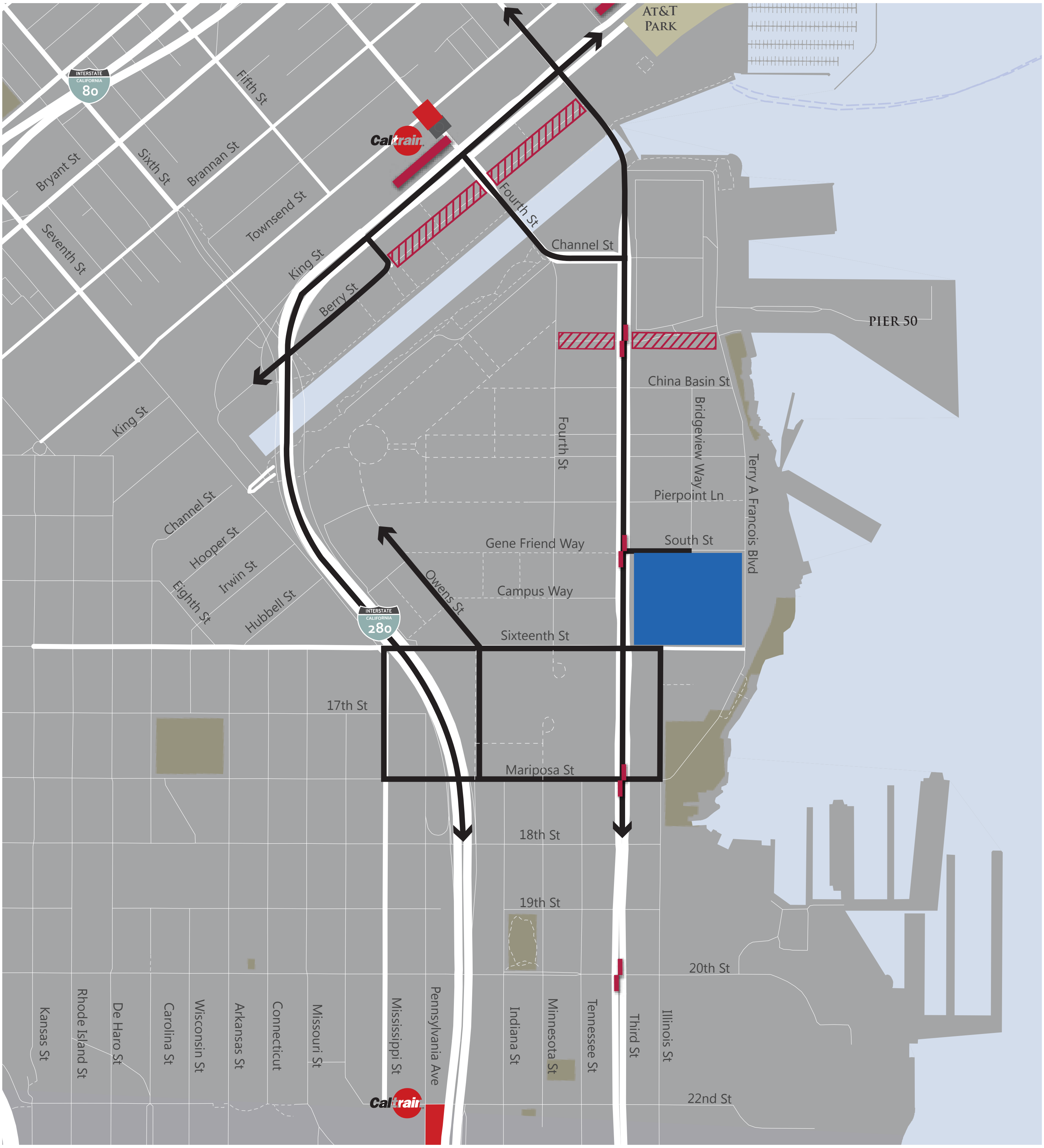
Mariposa Street is a two-lane east-west Local Street that extends from Illinois Street to Harrison Street. During special events, parking is prohibited to provide four travel lanes. The I-280 on- and off-ramps (southbound and northbound, respectively) are located immediately east of the intersection of Pennsylvania and Mariposa streets. The intersection of Mariposa Street and Fourth Street serves as a major access point to the UCSF hospital facilities currently under construction. Both sides of the street provide on-street parking. In addition, Mariposa Street is a designated Class III bike route with sharrows between Illinois Street and Mississippi Street. Mariposa Street will be widened to five lanes between 3rd Street and I-280 prior to opening of the Event Center.

Owens Street is a north-south roadway that runs from 16th Street north to a future roundabout, where it continues to the west until it runs into Mission Bay Drive. It operates as a two-way street with one travel lane in each direction. There are no Muni routes or bicycle designations on Owens Street. Owens Street sidewalk widths within the study area are generally adequate. Owens Street will be extended south to Mariposa Street and will connect with the I-280 off-ramp at Mariposa.

3.4.2 Truck Access

Major truck routes in Mission Bay are along I-280, King Street, Mariposa Street, 16th Street, and 3rd Street. These routes are illustrated in **Figure 3-4**. Primary truck access to the project site will be along Mariposa Street to Illinois Street, where direct access to the parking garage will be provided at the Illinois Street / 16th Street intersection. Secondary truck access to the site will be along Cesar Chavez Street to Illinois Street. Truck access to and circulation throughout the Event Center Development site is explained in further detail in Chapter 7.

BART Station
Caltrain Station
MUNI Platform
Project Site
Truck Route
No Thru Truck Traffic



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MISSION BAY TRUCK ROUTES

FIGURE 3-4

3.5 REGIONAL TRAFFIC

Interstate 80 (I-80): I-80 provides the primary regional access by car from the East Bay to the project area. It connects to the East Bay and other major freeways (I-580 and I-880) via the San Francisco-Oakland Bay Bridge. Within San Francisco, I-80 generally has eight lanes (four lanes in each direction). On- and off-ramps serving the site are located as follows:

- Off-ramps:
    - Westbound: Harrison Street at 5th Street; 8th Street at Harrison Street
    - Eastbound: 4th and Bryant, 7th and Bryant
- On-ramps:
    - Eastbound: Bryant Street between 1st and 2nd Streets; Essex Street at Harrison Street; , 1st Street at Harrison Street, 8th Street
    - Westbound: 7th Street and Harrison, 4th and Harrison

Interstate 280 (I-280): I-280 provides the primary regional access by car from the South Bay and the Peninsula to the project site and is generally a six-lane freeway. There is a freeway interchange between I-280 and Highway 101 (US 101) approximately 2.5 miles south of the site. US 101 also provides access to Cesar Chavez Street south of the site and Vermont Street west of the site. I-280 has a terminus (both on- and off-ramps) at 4th and King Streets, adjacent to the Caltrain Station, which results in the need to ensure safe pedestrian circulation at that intersection. The closest on- and off-ramp serving the site for southbound and northbound I-280 traffic is at Mariposa Street. Drivers will be encouraged to also use the ramp at Cesar Chavez St/Pennsylvania Avenue to reduce the impacts on the ramps before and after a peak event and distribute traffic more efficiently. On- and off-ramps serving the site are located as follows:

- Off-ramps:
    - Northbound: Cesar Chavez Street; Mariposa Street; 5th Street / King Street (terminus)
    - Southbound: 18th Street / Pennsylvania Avenue; Cesar Chavez Street / 25th Street
- On-ramps:
    - Northbound: 25th Street; 18th Street;
    - Southbound: 5th Street / King Street (terminus); Mariposa Street; Cesar Chavez Street

Regional auto traffic will seek parking in locations close to the Event Center. A total of 8,290 parking spaces exist in the area between the Event Center and I-280/King Street to the west and north. This includes 4,690 spaces in parking structures and 3,590 spaces in surface lots. Major parking facilities in the area include Lot A (2,300 space surface lot), the 1,400 space structure at 450 South Street, the 730 space UCSF garage at 3rd Street and Campus Lane, a 500 space structure at 499 Illinois Street, and an 800 space structure located behind 1650 Owens Street.

CHAPTER 4. TRAVEL DEMAND MANAGEMENT

The purpose of the strategies described in this chapter is to increase the level of access to the project by transit, bicycling and walking while discouraging the use of private automobiles, particularly by solo drivers. The strategies identified in this chapter will be reviewed and refined both during the Event Center's first year of the project's completion and as new transportation facilities are developed in the project vicinity.

4.1 GENERAL TRANSPORTATION MANAGEMENT STRATEGIES

Measures that will be implemented to support all public transit, bicycle, and automobile reduction strategies include:

1. Designate a TMP coordinator to: develop and implement marketing/communications/incentives programs, and coordinate with facility and tenants on policies and capital needs to support sustainable trip making by employees and event center visitors.

2. Develop means of in-building, on-site, and/or neighborhood communication (radio, TV, smart phone app, etc.) that give Event Center, office, or retail users multiple, real-time advisories about the status of the transportation system and event schedule to facilitate convenient transportation choices. Information provided may include availability of public transit and shuttle bus service, location and capacity of bike parking facilities, best walking paths, location of taxi stops, and limited extent of – or high price for – available parking.

3. Develop a crowd-sourced app that puts information on all transportation modes in the hands of event attendees with smart communication devices. This real-time information on travel conditions and travel times by mode will lead to a transportation system that will become increasingly more user optimized. The app may also be equipped to send notifications about event times and traffic conditions. The app will be free and available to anyone who wishes to download it, and will be useful for anyone working, living, or visiting the Mission Bay Area.

4. Provide extensive use of real-time transit info in public assembly areas that reflect the range of transit services in the area.

5. Install a machine to add value to Clipper Cards on-site.

6. Establish an annual TDM budget for all components of the TDM program applying to GSW employees and event center visitors.

4.2 EMPLOYEE TDM

The strategies described below are designed to reduce employee auto mode share.

4.2.1 Employee Public Transit Strategies

1. Participate in and promote pre-tax commuter benefits, a federal program that allows employees to reduce their commuting costs by up to 40 percent using tax-free dollars to pay for their commuting expenses.

2. Contribute to the Mission Bay TMA shuttle program; designate priority curb areas on-site for TMA shuttles.

3. Promote use of Mission Bay TMA shuttles to employees; notify them that they are eligible to ride the Mission Bay TMA shuttles, and provide information about routes, stop locations, and schedule.

4.2.2 Employee Bicycle Strategies

1. Provide indoor secure bicycle parking facilities for employees.
2. Provide shower and locker facilities for employee use.
3. Promote use of the indoor bicycle valet facility (approximately 300 bike spaces) (available to Event Center and GSW employees only during non-event hours and days).
4. Sponsor a Bay Area Bike Share station in the project vicinity.
5. Encourage all employees and visitors to participate in public events that promote bicycling such as the annual "Bike to Work" day.

4.2.3 Employee Automobile Reduction Strategies

Measures that will be implemented to reduce the effects of employee vehicular traffic include:

1. Enroll in free-to-employees ride-matching program through www.511.org.
2. Enroll in free-to-employers Emergency Ride Home program through the City of San Francisco (www.sferh.org).
3. Designate parking spaces for carpool/vanpool participants.
4. If applicable, comply with California's parking cash-out program.
5. Organize and publicize community efforts, such as Spare the Air days (as declared for the Bay Area region) or a Rideshare Week.
6. Encourage tenants to allow certain employees to work flexible schedules and telecommute, to the extent reasonable.

4.2.4 Additional Strategies

1. Identify potential tenants who may provide on-site amenities (such as fitness and exercise centers, food and beverage options, and/or automated banking resources) to encourage employees to stay on-site during the work day.

4.3 EVENT CENTER PATRON TDM

The strategies described below are designed to limit event patron auto mode split for peak-event travel (6:00 PM – 8:00 PM) to no more than 53 percent (weekday) or 59 percent (weekend). They should also reduce auto mode split for retail, restaurant, and other site visitors where applicable.

4.3.1 Patron Public Transit Strategies

Measures that will be implemented to increase the use of public transit among guests include:

1. Work with the City to identify arena event patrons arriving via transit and reward those patrons with promotional incentives that may include discounted food or beverage, team or venue merchandise, raffle entry, access to a "fast-track" security line or one or more other options. Market these incentives with a robust communications strategy prior to an event day so that guests can make choices accordingly.
2. Distribute GSW-branded Clipper Cards to encourage patrons to associate event attendance with transit usage during attendee's trip planning process.
3. Work with the SFMTA to determine the market feasibility and benefits of bundling the cost of a round0trip Muni fare into the cost of all ticketed events.
4. Encourage customers at point of ticket purchase to use sustainable modes via communications on the internet and through the ticket vendor.
5. Work with the SFMTA to brand transit stops/stations near the project site, covering any costs associated with re-branding.Utilize TVs and other screens inside the Event Center building to display real time transit information and prominent comparisons between transportation choices available to fans, employees, and visitors to the Event Center Development. Emphasize transit's lower-cost, higher sustainability, and other beneficial factors as compared with private autos.
6. Play recorded announcements during halftime (for games) or between opening and main acts (for concerts), and as Event Center attendees exit the building, to notify guests of non-auto travel options home, including real time transit and shuttle departure times.
7. Provide additional communication of transit options and wayfinding during playoff games for non-season pass holders who may be coming from out of town by providing information to, and coordinating displays within, hotels and local businesses in the Event Center vicinity

4.3.2 Patron Bicycle Strategies

Measures that will be implemented to increase the frequency and convenience of biking among Event Center patrons include:

1. Promote use of the indoor bicycle valet facility (approximately 300 bike spaces) on 16th Street. Identify and reward patrons of the bike valet with promotional incentives that may include discounted food or beverage, team or venue merchandise, raffle entry, access to a "fast-track" security line or one or more other options. Market these incentives with a robust communications strategy prior to an event day so that guests can make choices accordingly.
2. If and when peak event bicycle storage demand exceeds the 300-space enclosed valet facility and on-site bike rack capacity, provide additional temporary outdoor bike valet parking areas.
3. Provide outdoor bicycle storage/racks for Event Center and office, retail, or restaurant visitors.
4. Sponsor a Bay Area Bike Share station in the project vicinity.
5. Encourage all guests to participate in public events that promote bicycling such as the annual "Bike to Work" day

6. Provide a bicycle map, showing routes to the Event Center development site, on the Event Center web site, mobile applications, and in event literature and advertisements, when appropriate.

4.3.3 Patron Automobile Reduction Strategies

Measures that will be implemented to reduce the effects of visitor vehicular traffic include:

1. If parking is not bundled with ticket purchases for arena events (i.e., select event days and types), charge market-rate fees for on-site parking in connection with such arena events. Encourage off-site parking parnters to charge market-rate parking fees for all arena events.

2. Designate priority curb areas on-site for taxis, charter buses, and rideshare vehicles. Explore partnership options with rideshare/carpool/TNC companies to offer discounts to event attendees and other visitors and/or employees.

4.3.4 Patron Communication Strategies

1. Design a "Getting There" page for the venue website that lists multi-modal options and comparisons before showing preferred driving routes or available parking.

2. Promote transit access to project by providing: interactive trip-planning tools, transit maps, with recommended stops/stations for accessing site and best routes to the Event Center; and walking directions from transit stations/stops. Promote transit information on Event Center web site, mobile apps, on websites of events taking place at the site (to be required as a standard part of event contract), and in event literature and advertisements, when appropriate.

3. Provide real-time transit information, including train or bus arrivals and departures, in key Event Center locations (exit areas, gathering areas, etc.), inside the building (on TVs and other screens), and/or via mobile applications.

4. Make available additional communication of transit options and wayfinding during playoff games for non-season pass holders who may be coming from out of town by providing information to, and encouraging displays within, hotels and local businesses in the event center vicinity.

5. Create schedules of upcoming events for display on electronic message boards, to discourage auto use and parking in the Event Center vicinity.

4.3.5 Additional Strategies

1. Identify potential tenants who may provide on-site amenities (such as food and beverage options, and/or automated banking resources) to encourage Event Center patrons to stay on-site for longer post-event periods.

4.4 SPECIAL EVENT TRANSIT SERVICE PLAN

This section summarizes a preliminary Transit Service Plan (TSP) for the Warriors Event Center and Mixed Use Development as outlined by the SFMTA in a presentation on October 1, 2014.

4.4.1 Service Plan Objectives

The key objective for the TSP is as follows:

- Provide high quality service to event goers, without affecting service reliability for other Muni customers
- Accommodate a 35 percent transit mode share for peak event trips
- Develop a service plan that maximizes existing infrastructure and prioritizes operations efficiencies
- Develop a service plan adequate for peak event ridership volumes that is also scalable for small and medium events

4.4.2 Service Plan for Peak Event

The majority of regional transit riders will use Muni as a last-mile connection to the Event Center Development. Most Muni passengers will travel on the T 3rd southbound pre-event, and northbound post-event. The T 3rd service pre-event is expected to have excess capacity, while post-event excessive capacity will not be allocated from regular service, but rather will be served from additional trains and supplemental routes. The T 3rd service will be supplemented with bus service to respond to distributed customer demand, to minimize transfers made, and to minimize rail car demand. Inset 4-1 shows proposed routes for each of the supplemental shuttles. Supplemental bus routes include:

- T 3rd Supplemental Service
- Metro Shuttle via The Embarcadero
- 16th Street BART Station Shuttle
- Van Ness Avenue Shuttle
- Ferry Building / Transbay Terminal Shuttle

Inset 4-1 Supplemental Shuttle Routes

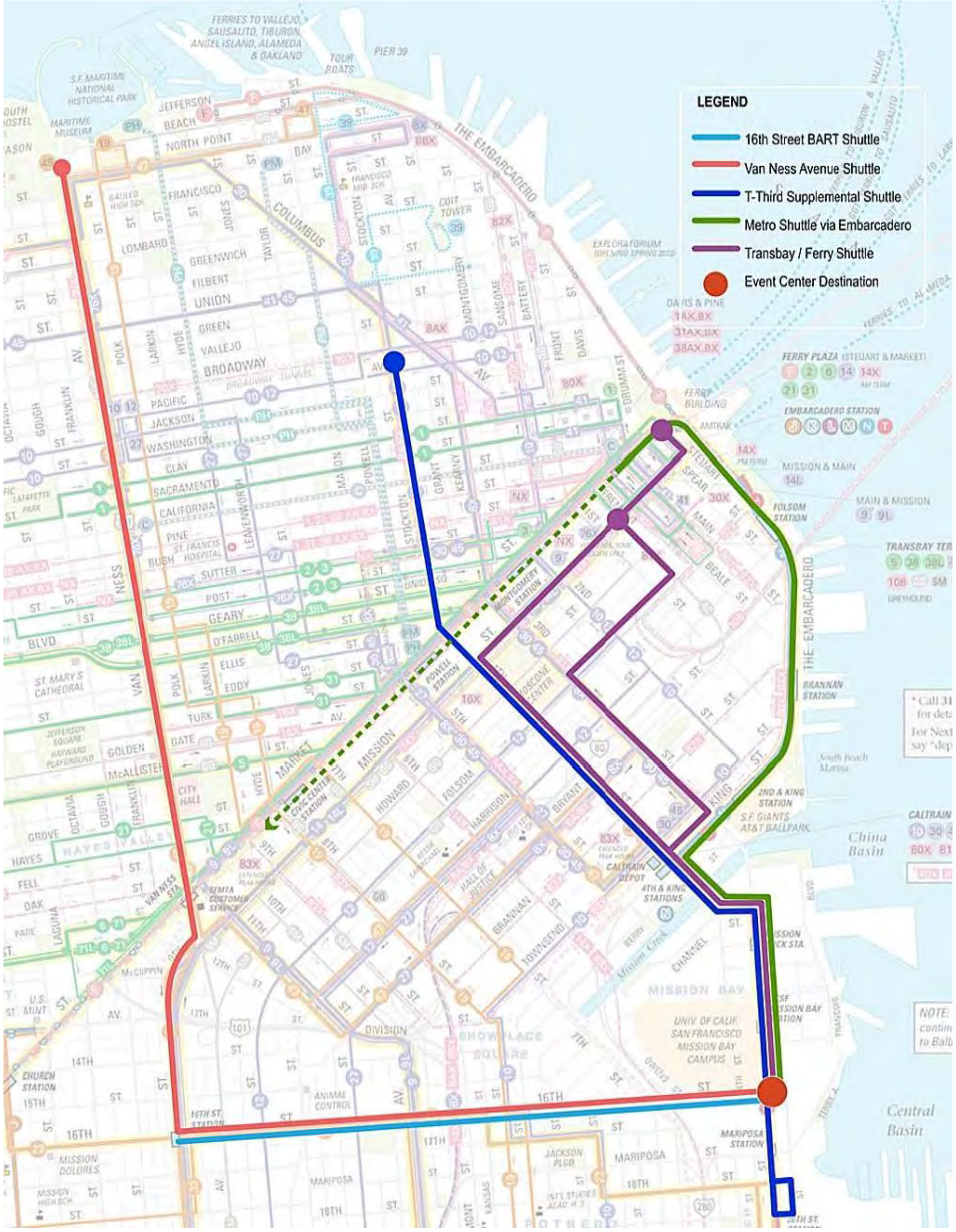


Table 4-1 summarizes the fleet of shuttle buses and light rail vehicles necessary for pre- and post-event scenarios.

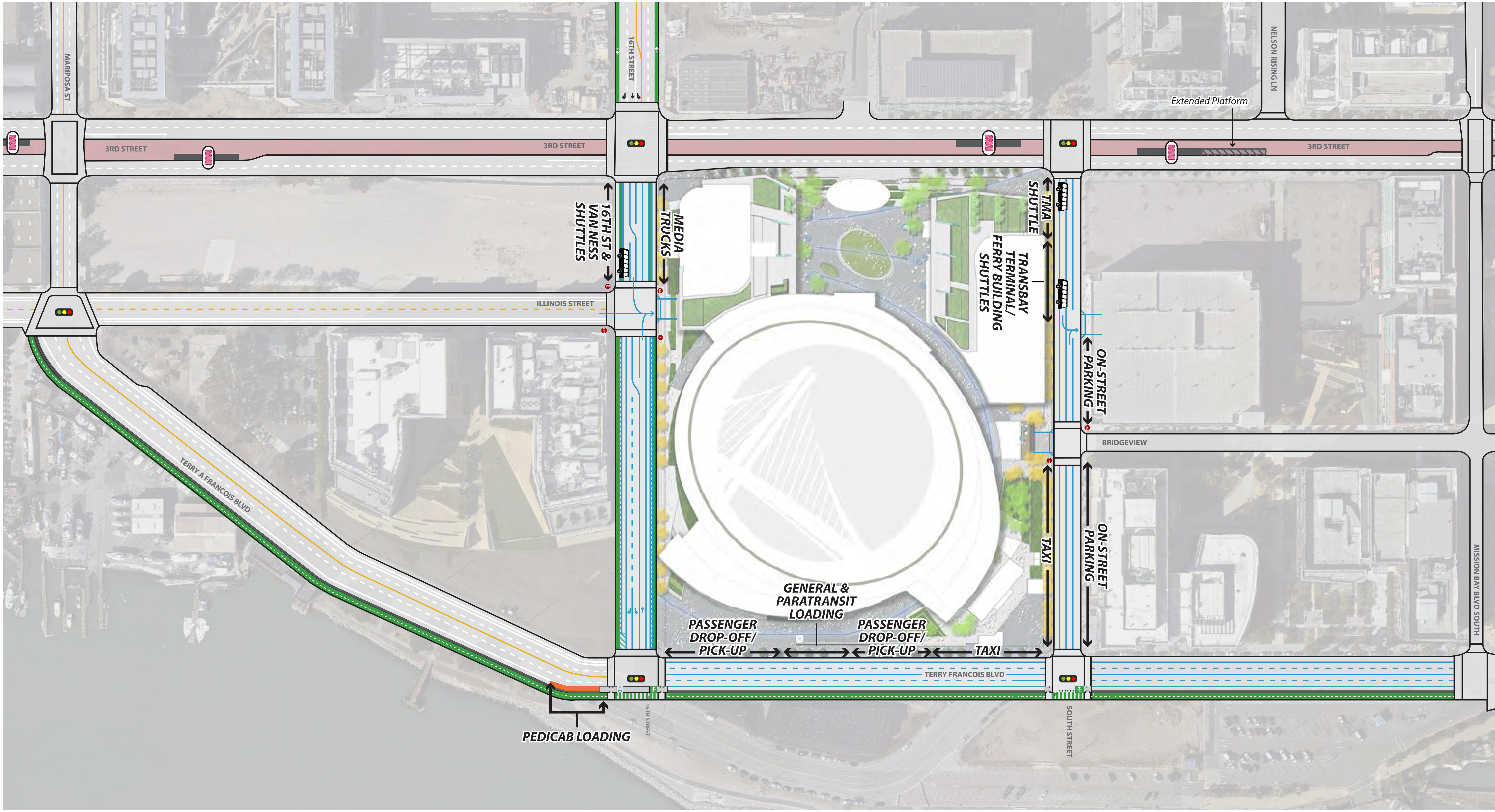
Figure 4-1 shows the pre-event shuttle plan, including stop locations at the site. Figure 4-2 shows the post-event shuttle plan; including shuttle stop locations, staging areas, and temporary lane closers, which are discussed in more detail in Chapter 6.

TABLE 4-1: PRELIMINARY TRANSIT SERVICE PLAN FOR PEAK EVENT[2]

	FLEET NECESSARY	
SERVICE	Pre-Event	Post-Event
T 3rd Supplemental Service	4 two car trains between Chinatown and Mission Bay Loop combined with 4 minute scheduled subway service	10 two car trains staged to clear event
Metro Shuttle via The Embarcadero	None – limited car availability	2 three car trains staged to clear event
16th Street BART Station Shuttle	4 articulated motor coaches operating between 16th Street BART and the arena every 7-8 minutes	4 articulated motor coaches + 1 standard motor coaches operating between 16th Street BART and the arena staged to clear event with half of vehicles returning for a second trip
Van Ness Avenue Shuttle	5 standard motor coaches operating every 12 minutes along the Van Ness corridor to arena via 16th Street	4 standard motor coaches operating to the Van Ness corridor via 16th Street staged to clear event
Ferry Building / Transbay Terminal Shuttle	6 standard motor coaches operating every 10 minutes via Ferry Plaza and the Transbay Terminal to the arena	6 standard motor coaches operating to Transbay Terminal and Ferry Building Plaza staged to clear event

Source: SFMTA (Oct. 1, 2014).

[2] The Transit Service Plan can also be modified and implemented to serve varying attendance size for small and medium events.



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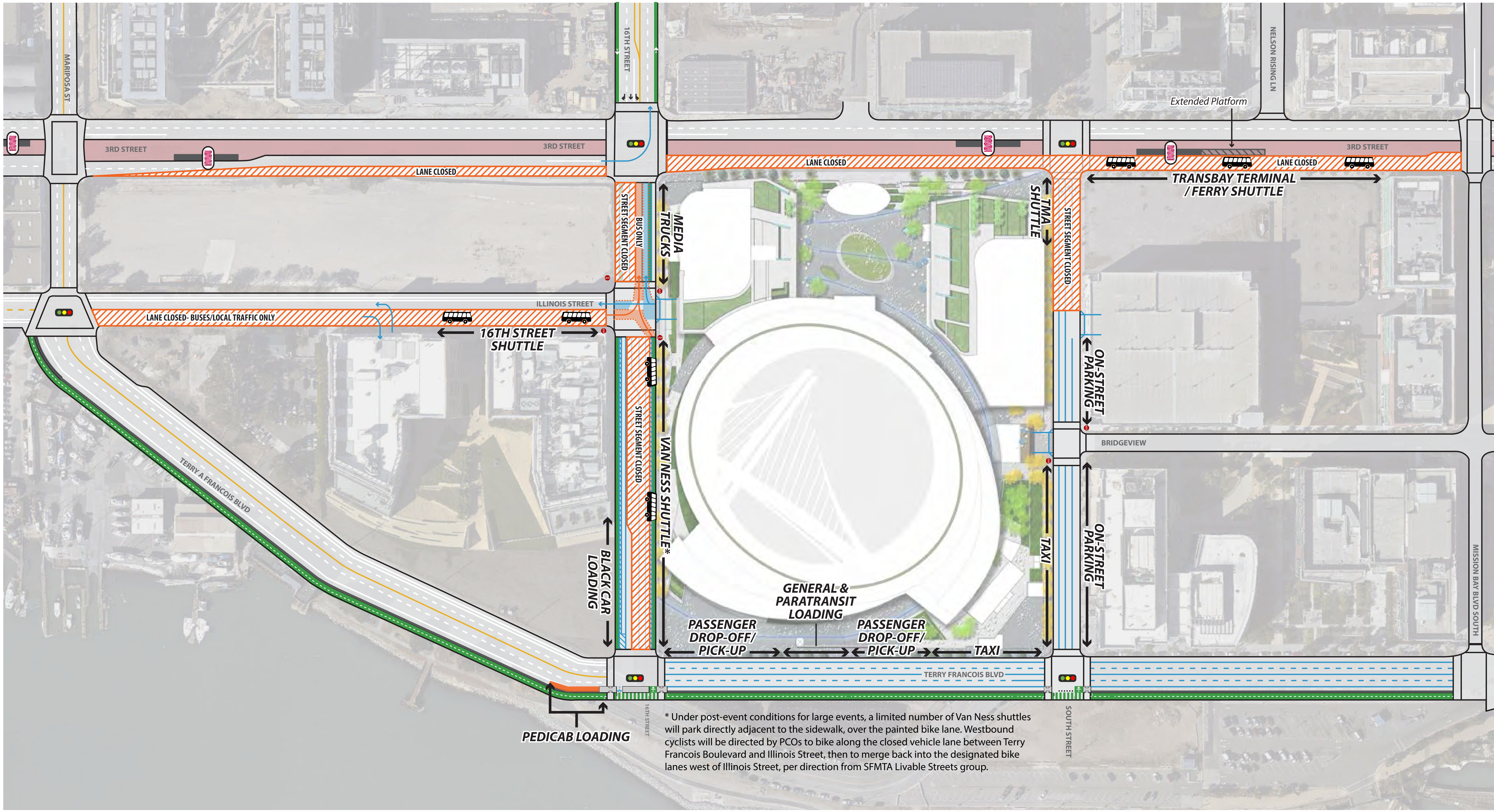
PRE-EVENT SHUTTLE PLAN

FIGURE 4-1



* Under post-event conditions for large events, a limited number of Van Ness shuttles will park directly adjacent to the sidewalk, over the painted bike lane. Westbound cyclists will be directed by PCOs to bike along the closed vehicle lane between Terry Francois Boulevard and Illinois Street, then to merge back into the designated bike lanes west of Illinois Street, per direction from SFMTA Livable Streets group.

Not to Scale

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POST-EVENT SHUTTLE PLAN

FIGURE 4-2

CHAPTER 5. TRAVEL CHARACTERISTICS OF EVENT CENTER ATTENDEES AND SITE USERS

This chapter describes the travel characteristics of current Oracle Arena attendees and the assumptions for the new Event Center based on the analysis prepared by the SEIR Team (as of December 2014), focusing on travel patterns typical of game days. For typical sequences of events on game and concert days, please see Appendix A. This Chapter is included in the TMP for contextual and informational purposes only. A full environment document will be prepared that includes a more complete and quantitative analysis of travel characteristics (i.e., projected mode split, intersection performance, parking demand, and traffic routing) as they pertain to transportation.

5.1 NBA EVENT ATTENDANCE LEVELS

The NBA regular Season consists of 82 games total with half of them played at the home Arena. Home games over the year would typically consist of the following:

- 2-3 pre-season home games;
- 41 regular season home games;
- 0-16 post-season home games (should the Warriors reach the playoffs, the minimum number of home games is 2 and the maximum is 16)

The monthly distribution of home games tends to be evenly spread at about 7 games/month over 6 months (November-April), with a typical month having 1-3 games on Fridays, 1-3 games on Saturdays, 0-1 game on Sundays, and 2-6 games on Mondays through Thursdays.

The capacity of the existing Oakland Arena is 19,596. Average attendance levels at home games over the last 10 years are summarized in Table 5-1.

TABLE 5-1: WARRIORS' HISTORIC GAME ATTENDANCE LEVELS BY YEAR

Season	Average Attendance	Occupancy
2012-13	16,831	86%
2011-12	16,749	86%
2010-11	16,399	84%
2009-10	14,884	76%
2008-09	17,573	90%
2007-08	18,120	93%
2006-07	16,024	82%
2005-06	16,173	83%
2004-05	14,471	74%
2003-04	14,370	73%

Source: GSW Attendance and Employment Memo (Feb. 7, 2014).

Based on the information above, games in many years have, on average, almost filled the Arena to capacity. As a result, the discussion and controls in the following sections are based on 18,064 attendees.

5.2 EVENT CENTER PATRON ARRIVALS

5.2.1 Trip Origins and Arrival Distribution

Table 5-2 summarizes the known origins of attendees who currently attend games at Oracle Arena and estimated origins of future attendees. As shown, it is anticipated that at the proposed new Event Center site, the breakdown of trip origins will shift considerably. It is anticipated that fewer attendees will come from the East Bay (33 percent vs. 53 percent) and that more attendees will come from San Francisco, the South Bay, and the North Bay.

TABLE 5-2: ORIGINS OF NBA EVENT ATTENDEES

Origin	Origins for Current Oakland Arena Location[1]	Weekday Inbound Forecast Origins for San Francisco Location[1]
San Francisco	16%	29.3%
Super District 1	N/A	14.8%
Super District 2	N/A	4.6%
Super District 3	N/A	5.5%
Super District 4	N/A	4.4%
North Bay	7%	8.9%
East Bay	53%	31.1%
South Bay	24%	26.7%
Out of Region	N/A	4%

Notes:

1. Source: *Technical Memorandum – Travel, Parking and Loading Demand Estimates for the Proposed Event Center & Mixed-Use Development at Mission Bay Blocks 29-32*, March 2015.

Assuming the pattern is similar for the proposed Event Center site, it can be expected that patron arrivals at the Event Center will begin approximately 2½ hours prior to event start, peak during the ½ hour prior to event start, and continue after the event is under way. Approximately 70 to 80 percent of attendees are assumed to depart in the hour immediately after the event ends.

For other events at the Event Center (e.g. family shows, theatre events) the arrival and departure distributions times are different compared to the peak NBA game event. Although the attendance levels will be lower for such events, due to the nature of the event and the audience it attracts, it is much more likely that all guests will arrive prior to the start time and will stay until the end.

5.2.2 Pedestrian Arrivals

Most attendees will take transit or drive and park at nearby garages and lots, and then walk to the Event Center. Transit and auto trips to games make up approximately 90 percent of all trips. Regardless of their primary mode of travel, most guests will walk the final leg of their trip. Figure 5-1 illustrates the projected routes that pedestrians will likely take as they walk from nearby transit stops/stations and the walking times associated with each route.

The main pedestrian entry points to the Event Center include the main plaza on the west side of the site with direct access from 3rd Street sidewalks, and the southeastern corner of the site with access from Terry François Boulevard, 16th Street, and the Bayfront Park. The majority of pedestrian traffic is expected to come from north of the site along The Embarcadero and the 3rd Street corridor, with its direct links to Market Street and major transit hubs. Some pedestrians walking from the Embarcadero may use Terry François Boulevard instead of 3rd Street. Upon completion of the Blue Greenway, Terry François Boulevard will become a much more attractive walking route to pedestrians coming to the site from the north or the south. The majority of pedestrians coming from the south and west are likely coming from nearby BART and Caltrain stations and will walk along 16th Street, 3rd Street, or Terry François Boulevard to the Event Center Development.

5.2.3 Transit Arrivals

Arrivals from Caltrain

Most attendees who choose to take Caltrain to the Event Center are expected to get off at the 4th & King Station (0.7 mile walk) during the peak pre-game hour, while a very few may choose to get off at the 22nd Street Station. On weekends, train headways are typically one per hour; thus, most attendees using Caltrain will likely arrive in a single train. However some guests may come on an earlier train for weekend events to visit the city or the shop at the retail and restaurant uses on site. On weekdays, 6-7 trains arrive between 6:00 and 7:00 PM. With future electrification, Caltrain anticipates an additional train per hour.

From 4th & King most pedestrians will cross King Street, walk along 4th Street, across the 4th Street Bridge to Channel Street, and finally along 3rd Street or Terry François Boulevard to the Event Center. Muni assumes that about half of Caltrain riders will get on the T 3rd at Caltrain and ride to the Event Center. Key intersections along pedestrian routes from Caltrain should be monitored to determine if additional traffic control is necessary.

Arrivals from UCSF Mission Bay Muni Platforms

Many event attendees coming from downtown San Francisco or BART or AC Transit or Golden Gate Transit will likely take Muni Metro (T 3rd Street Line) to the Event Center. Most Muni passengers are predicted to be coming from the north and will likely get off at the UCSF Mission Bay stop, located on 3rd Street south of South Street, approximately 500 feet away from the Event Center entry. Muni passengers coming from the south will either get off at the Mariposa Street stop and walk the remaining quarter mile to the arena, or will get off at the UCSF Mission Bay stop on 3rd Street north of South Street. To deter pedestrian crossings mid-block between South Street and 3rd Street, decorative fencing will be placed along the Muni transit right-of-way.

Because the UCSF Mission Bay platform will need to accommodate high volumes of pedestrians during the pre- and post-event period, the project will require the extension of the platforms at 3rd Street and South Street to provide longer, larger, and safer landing spaces for crowds. PCOs will also be positioned at key intersections and crossings to assist with safe pedestrian crossing and vehicle operations in the vicinity of the platforms during peak events. To deter pedestrian crossings mid-block between South Street and 3rd Street, decorative fencing will be placed along the Muni transit right-of-way.

Arrivals from Special Event Shuttles

Event attendees arriving from the Mission and 16th Street BART station or Van Ness shuttles will be dropped off along the south side of 16th Street, just west of Illinois Street. Pedestrian access to the Event Center will be provided at PCO-assisted crossings at either 3rd Street or Illinois Street. Transbay Terminal and Ferry Building shuttles will drop off patrons on the south side of South Street, just east of 3rd Street.

5.2.4 Bicycle Arrivals

Valet bicycle parking will be provided for peak events near the southeast corner of the site. A total of more than 300 attended, free, indoor valet bicycle parking spaces will be provided. Up to 200 additional bicycles (or more if demand exceeds this number) will be accommodated on game days through a combination of permanent independently accessible outdoor bike racks installed near on-site destinations and entries, and temporary staffed outdoor bike valet facilities. In addition, secure bike rooms located at grade in each office building will provide up to 80 total bicycle spaces for office users. The nearest bike share station is currently located at the 4th & King Caltrain Station, approximately 2/3 mile away, or a 15 minute walk. The project will sponsor a bike share station in the immediate vicinity of the Arena, likely along Terry Francois Boulevard.

Based on the mode splits for different events, the most bicycle traffic is expected during Saturday peak event days, resulting in approximately 250 bicycle trips, of which approximately half will arrive in the hour preceding game start. If all bicyclists choose to use the bicycle valet, then the bicycle valet will be nearly filled to capacity during most events.

Most bicyclists traveling north or south to the arena are expected to use the Terry François Blue Greenway when it is complete. Bicyclists traveling west to the arena are expected to use 16th Street. All bicyclists will be expected to walk their bikes across 16th Street or Terry Francois Boulevard at designated crosswalks to access the bike valet. Signage to direct this movement will be clearly displayed to ensure organized, safe movements of bicycles and to reduce conflicts with vehicles and pedestrians. Location and design of the bike valet and nearby landscaping will also direct the safe movement of pedestrians and cyclists.

Pedicabs, will be accommodated near the site, especially during peak events. Most pedicabs are expected to travel north/south to the site and are expected to use the Terry François Blue Greenway when it is complete. A pedicab staging area is proposed for the east side of Terry François Boulevard just south of 16th Street. This is consistent with the bicycle focus in the southeast corner of the site.

BART Station
Caltrain Station
MUNI Station
MUNI Platform
Project Site

Potential Pedestrian Path of Travel from Regional Transit

From BART
From Transbay Terminal
From Caltrain
From Ferry Building
min Walking Time to Warriors Arena

Not to Scale

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POTENTIAL PEDESTRIAN PATHS OF TRAVEL FROM REGIONAL TRANSIT

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FIGURE 5-1

5.2.5 Taxis and Charter Buses

An evening NBA game is not forecast to attract more than 2-3 large charter buses on average[3]; however they may become more relevant or necessary to help meet auto mode share goals in the future. A charter bus zone will be located along the north side of 16th Street close to Terry François Boulevard for drop-off/pick-up activity during small events. A total of 500 feet of curb space (accommodating 6-8 buses at a time) will be available on the north side of the street between Illinois Street and Terry François Boulevard. No additional off-site staging for the buses is necessary or anticipated at this time.

While conventions are expected to draw a much smaller number of visitors, nearly half of all trips are forecast to be taken by shuttle bus or taxi.

A staffed taxi zone will be designated along the west side of Terry François Boulevard and along the south side of South Street for all events to ensure taxi maneuverability from the Event Center in all directions, especially post event, and to increase the attractiveness of taxi options for patrons exiting daily retail and restaurant uses on-site. Access for passenger drop-off/pick-up activity during concerts and peak events will occur in a separately designated curb space on the west side of Terry François Blvd. This zone will be managed to avoid vehicle conflicts with surrounding traffic. Drop-offs will be located on the west side of the street and will minimize conflicts with cyclists on Terry François Boulevard. During non-peak events, taxis would load along the Terry François Boulevard frontage.

5.2.6 Vehicle Arrivals at Event Center

The Event Center parking garage will have approximately 950 parking spaces. 500 spaces will be available for pre-purchase by designated ticketholders, and others may be shared-use spaces for daytime office employees and evening Event Center patrons. Based on the arrival pattern of Event Center attendees, most vehicles will arrive at the garage in the hour preceding game tipoff. Parking pass-holders will self-park in the garage after having their credentials checked. Garage management procedures are described in Section 2.1.3 and Chapter 6.

The main garage access will be located on 16th Street, creating a 4-way stop controlled intersection at Illinois Street. Pre-event vehicle access to the garage will be distributed to a northbound through movement from Illinois Street, an eastbound left-turn movement from 16th Street, and a westbound right-turn movement from 16th Street. The Illinois Street intersection with the garage entrance/exit will be controlled by an all-way-stop, except for before and after large events, where it will be controlled by Parking Control Officers (PCOs). Operations will be monitored at this and other locations, and additional controls (e.g. signalization) may be added if deemed necessary to minimize conflicts between pedestrians and bicycles on the sidewalk/multi-use path and the vehicles entering the garage or exiting the site vicinity.

The suggested pre-event driving routes are shown on Figure 5-2. These routes will be provided to attendees prior to an event (via website, email, app, etc.) to encourage effective distribution of arrival traffic. In order to maintain clear access to the UCSF Campus and UCSF hospital center, guests traveling from south of the project site will not be encouraged to use Owens St. en route to the Event Center. Likewise, guests traveling from the west or north of the site will be encouraged to use alternatives to 16th Street to reduce congestion during UCSF shift changes (primarily the night shift nurse arrival period from 6:30 PM to 7:00 PM). The pre-event routes shown are subject to revision based on monitoring during the first four years of operations.

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[3] Golden State Warriors.

Parking facilities shown on Figure 5-2 are solely representative and do not pre-suppose third party agreements. The Warriors are exploring options for shared-use agreements to provide additional parking resources to guests and additional revenue to copious public and private lots in the vicinity. If parking demand is not met by supply in Mission Bay, the Warriors will secure agreements for satellite parking lots with transit or shuttle connections to the Event Center.

MUNI Platform
Caltrain Station
BART Station
Project Site
BART Line
Caltrain Line
Potential Pre-Event Driving Routes
Lane Closure
Representative Parking Facilities (to be confirmed)

Not to Scale

FEHR PEERS

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SUGGESTED PRE-EVENT DRIVING ROUTES

FIGURE 5-2

5.3 EVENT CENTER PATRON DEPARTURES

5.3.1 Trip Departure Distribution

For a weekend peak event, the distribution of event attendees to post-game destinations is forecast to be the same as the pre-game trip origin distribution, as summarized in Table 5-2.

The existing pattern of departures at the Oakland Event Center varies depending on game circumstances. In general, 30-40 percent of fans depart prior to the final buzzer while 60-70 percent stays through the end of the game. Periodically, there are also post-event activities that encourage some attendees to stay longer. The presence of retail uses on the San Francisco site provides incentives, which are not available in Oakland, for patrons to remain on site for a period of time after events. When this is the case, departure times are more spread out. Overall, the majority of departures occur over a shorter period of time than the 2-1/2 hour window of pre-event arrivals.

For the purpose of analyzing departures, the busiest post-game hour is the hour including the end of the game, when up to 80 percent of attendees will depart. This time period will require the highest level of traffic control given the concentration of pedestrian activity exiting the Event Center.

5.3.2 Pedestrian Departures

The main pedestrian exit points from the Event Center include the main plaza on the west side of the site with direct access to 3rd Street sidewalks and the southeastern corner of the site with access to 16th Street and Terry François Boulevard. Similar to pre-game conditions, pedestrians leaving the Event Center are expected to walk primarily along 3rd Street or Terry François Boulevard after the game, as illustrated in Figure 5-1. Event attendees will be directed to walk towards different exits depending on their mode of departure. Due to post-game distribution patterns, the volume of pedestrians leaving the Event Center post-game will be higher in the hour following a game than the volume arriving in the hour pre-game; following the first hour, the volume of pedestrians will drop significantly.

5.3.3 Transit Departures

<u>Departures towards Caltrain</u>

Attendees who will take Caltrain following game's end will most likely walk or take Muni to board at the 4th & King Station, and a small share of Caltrain riders are expected to board at the 22nd Street Station. It is likely that all attendees will board the same late service train, which may be provided by Caltrain specifically on event nights. SFMTA Parking Control Officers will be stationed at key intersections along pedestrian routes towards Caltrain to monitor these intersections and adjust controls as needed to ensure safe and efficient flow of all modes.

<u>Departures towards UCSF Mission Bay Muni Platforms</u>

Many event attendees departing towards downtown San Francisco, Caltrain, or BART will likely take Muni Metro (T 3rd Street Line) from the Event Center. Most Muni passengers are predicted to be leaving towards the north and will likely get on at the UCSF Mission Bay stop, located on 3rd Street at South Street, approximately 500 feet away from the Event Center Main Plaza. Muni passengers departing towards the south will likely get on at the Mariposa Street stop to avoid crowds at the closer UCSF Mission Bay stop. It is also predicted that some northbound passengers will walk south to the Mariposa Street stop to travel north in an attempt to avoid the large crowds at the UCSF Mission Bay stop. To deter pedestrian crossings mid-block between South Street and 3rd Street, decorative fencing will be placed along the Muni transit right-of-way.

Because the UCSF Mission Bay platform will need to accommodate high volumes of pedestrians during the pre- and post-event period, the project will require the extension of the platforms at 3rd Street and South Street to provide longer, larger, and safer landing spaces for crowds. Departures will be more concentrated than pre-game arrivals, so Parking Control Officers (PCOs) will be stationed at all nearby Muni platforms. Both northbound lanes on 3rd Street will be closed between 16th Street and Mission Bay Boulevard South to accommodate the pedestrian flow exiting the Event Center. A portion of South Street will also be closed to prevent vehicle conflict with pedestrians at the intersection with 3rd Street.

<u>Departures towards Special Event Shuttles</u>

Event attendees departing towards the Mission and 16th Street BART station will be directed to the Muni staging area along Illinois Street. Event attendees departing towards Van Ness will be directed towards the shuttle stop located on the north side of 16th Street east of the garage driveway. Northbound Illinois Street will be closed post-event to through traffic to allow unimpeded access for Muni. All traffic associated with adjacent office, clinic, or parking uses will be allowed full access at all times. Pedestrian access from the Event Center to the temporary Muni stop on Illinois will be directed either east or west along the north side of 16th Street to a pedestrian crossing located at the Illinois Street/parking garage driveway. The 16th Street north sidewalk will be designed with a minimum 15-foot clearance from the curb to provide adequate circulation and queuing space for pedestrians. Transbay Terminal and Ferry Building-bound attendees will be directed towards the shuttle stops located on the east side of 3rd Street north of South Street. Both northbound lanes on 3rd Street and all lanes on South Street west of 450 South St. will be closed to vehicle traffic to allow for safe and effective pedestrian access to special event shuttles.

5.3.4 Bicycle Departures

For those cyclists using the indoor bicycle valet, departures will be metered by the process of retrieving bicycles. It is forecast that approximately 300 bicycles will depart from the indoor valet bicycle parking facility over approximately 30 minutes with three staff retrieving a bike every 15-20 seconds. Some cyclists may utilize the planned bike share station after a game. Bicycles will also depart from nearby public bike racks and from the temporary outdoor bike valet area, when available.

Most bicyclists are expected to use the bikeway on Terry François Boulevard to travel north or south from the Event Center. Most cyclists traveling westbound will likely use the routes on 16th and 17th Streets. During peak event conditions, temporary lane closures will be in place on 16th Street and the westbound curb-side bike lane will be closed to accommodate shuttle bus loading. PCOs will use cones or other physical barriers to designate an alternate route for westbound cyclists through a closed vehicular lane from Terry François Boulevard to Illinois Street during post-event conditions. PCOs will facilitate safe access for cyclists along this segment of 16th Street.

Pedicabs, will be accommodated near the site, especially during peak events. Most pedicabs are expected to travel north/south to the site and are expected to use the Terry François Blue Greenway when it is complete. A pedicab staging area is proposed for the east side of Terry François Boulevard just south of 16th Street. This is consistent with the concentration of bicycle and cyclist-serving facilities in the southeast corner of the site.

5.3.5 Taxis and Charter Buses

During peak events, most taxi trips will occur immediately following the end of the event. On convention days, several hundred taxi trips will occur as attendees travel between the Event Center and nearby hotels and the Moscone Convention Center. Unlike game patron departures for an NBA event, which are heavily concentrated in the first hour following the end of a game, convention attendee departures will be more spread out.

A charter bus zone will be located along 16th Street for pick-off activity during both small events. A total of 500 feet of curb space (accommodating 6-8 buses) will be available on the north side of the street between Illinois St. and Terry François Boulevard.

Taxi zones will be designated for all events on the south side of South Street, east of Bridgeview Way and along the west side of Terry François Boulevard south of South Street. Terry François Boulevard will also include access for additional non-taxi pick-off activity at all times. This zone will be managed by PCOs and Event Center staff to avoid vehicle conflicts with surrounding traffic. This zone will be located on the west side of the street and will minimize conflicts with bicycles on Terry François Boulevard.

During a post-peak event scenario, when temporary lane closures are in place, taxis will have preferential treatment to access the designated taxi zones adjacent to the Event Center. PCOs will able to assist taxis arriving and departing the site to ensure safe, efficient, and convenient pick-up/drop-off operations.

5.3.6 Vehicle Departures from Event Center Garage

The intersection of 16th Street and Illinois Street at the garage driveway will be controlled by PCOs during the peak post-event period. Vehicles exiting from 16th Street will be forced to turn right (west – toward 3rd Street) or continue through to southbound Illinois Street. If this intersection becomes congested after events, Event Center staff may choose to direct some departing vehicles to the South Street garage access using signage inside the garage. Vehicle egress from both driveways is anticipated to take approximately twenty minutes in total.[4]

16th Street between 3rd Street and Terry François Boulevard will have restricted access, and will be used predominantly as a post-event shuttle staging area. Northbound lanes on Illinois Street (north of Mariposa Street) will be restricted to local traffic only and will also be used as a post-event shuttle staging area.

South Street, between 3rd Street and the 450 South Street Garage, will be closed post-event, and cars exiting the garages or coming from Bridgeview will be directed to travel east to Terry François Boulevard.

Vehicles with destinations along southbound I-280 will be suggested to travel either from 16th Street to the Owens Street extension, from Terry François Boulevard to Mariposa Street, or from 3rd Street to Cesar Chavez Street.

The suggested post-event driving routes are shown on Figure 5-3. These routes will be provided to attendees prior to an event to encourage effective distribution of departure traffic. All south-bound guests will be encouraged to use Mariposa Street, Illinois Street, or Third Street, not 16th Street and Owens Street, to access I-280 on-ramps. West-bound guests will not be encouraged to use Mission Bay Boulevard North, which is located close to several residential buildings. North-bound guests will be encouraged to leave the neighborhood

[4] Source: Parking garage schematic design studies, Walter P. Moore, 2014.

efficiently and quickly by utilizing all available connections out of Mission Bay, including Third Street and Seventh Street. The post-event routes shown are subject to revision based on monitoring during the first four years of operations and may be modified to reflect new or updated neighborhood parking agreements.

Parking facilities shown on Figure 5-2 are solely representative and do not pre-suppose third party agreements.

5.4 DAILY NON-EVENT ARRIVALS AND DEPARTURES

The project will provide a total of approximately 950 on-site parking spaces and 132 reserved spaces in the 450 South parking garage. Most of these spaces will be dedicated to office users (537), and arena use (283), with a limited number of valet parking spaces for retail users (130). The 132 reserved spaces in the 450 South Street parking garage will be dedicated to daily office and/or GSW employees only.

Office users are forecast to travel to the site primarily by auto and transit modes, with the balance walking and taking other modes. Retail users are forecast to have a slightly lower auto and transit share, with a higher share of patrons arriving by walking or other modes. As described above, TDM programs are proposed to increase above the forecasted proportion of office users who bicycle, walk or take transit to the site, and reduce the proportion who drive and park.

MUNI Platform

Caltrain Station

BART Station

Project Site

BART Line

Caltrain Line

Potential Post-Event Driving Routes

Lane Closure

Representative Parking Facilities (to be confirmed)

Not to Scale

FEHR & PEERS

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SUGGESTED POST-EVENT DRIVING ROUTES

FIGURE 5-3

CHAPTER 6. CONTROLS BY EVENT SCENARIO

This chapter describes controls to be implemented around the Event Center Development given the range of scenarios previously described, starting with a typical, no-event day; and ending with a day when an Event Center event coincides with an event at AT&T Park. The primary goals of these controls are to ensure safety through reduction of conflicts between modes, manage all modes of traffic to ensure orderly access and egress reflecting transportation mode priority, and reduce nuisance and inconvenience to surrounding residents and businesses. The level of controls needed increases with the intensity of the scenario; thus, as events get larger, all controls listed for the smaller events are required, and additional controls are added.

The purpose of the transportation controls described in this chapter is to outline the necessary processes in order to meet the primary goals as described above.

The planned traffic control type (signalized or stop-controlled) for each intersection discussed in this section will be the following:

Traffic Signal

- 3rd Street / 16th Street (existing)
- 3rd Street / South Street (existing)
- 3rd Street / Mariposa Street (existing)
- Terry François Boulevard / South Street (current side-street stop control)
- Terry François Boulevard / 16th Street
- Terry Francois Boulevard / Illinois Street / Mariposa Street (current stop control)

All-way Stop Control

- 16th Street / Illinois Street / Event Center Development Garage Entrance (current side-street stop control)

While the initial traffic control for the 16th Street / Illinois Street / Event Center Development Garage Entrance intersection will be an all-way stop, conditions at the intersection will be monitored during various event and no-event days, and the GSW will install a traffic signal if needed.

Side-Street Stop Control

- South Street / Bridgeview Way / Event Center Development Garage Entrance

The Event Center Transportation Coordinator (ECTC), designated by the GSW for the project site, will communicate regularly with SFMTA to provide information on events and identify those events that require traffic control. A summary of the traffic control strategies identified in this chapter for the various event scenarios is provided in Table 6-1.

TABLE 6-1: SUMMARY OF TRAFFIC CONTROL STRATEGIES BY EVENT TYPE

	EVENT SCENARIOS				
TRAFFIC CONTROL STRATEGY	No Event	Convention/ Small Event (Weekday Daytime)[1]	Arena Concert (Evening)[2]	Peak Event/ NBA Game (Evening)	Dual Event With AT&T Event
Coordination with SFMTA and Mission Bay Ballpark Transportation Coordinating Committee (MBBTCC)		√	√	√	√
Muni Ticket Sales at Event Center Box Office		√	√	√	√
Taxi Zone on Terry François Boulevard		√	√	√	√
Taxi Zone on South Street	√	√	√	√	√
Designated Commercial loading zone (non-event hours)	√	√	√	√	√
Dedicated TMA Shuttle Stop	√	√	√	√	√
Dedicated Charter Bus Stop on 16th Street		√			
Dedicated Shuttle Zone for Connection to 16th BART Station			√	√	√
Dedicated Paratransit Stop on Terry François Blvd, north of 16th Street (serving up to three vans)	√	√	√	√	√
Dedicated Media Truck Zone				√	√
PCO Supervisor at Event Center TMC			√	√	√
PCOs positioned at key locations throughout the surrounding intersections and transportation network		See Figures 6-1 and 6-2 for locations and times	See Figures 6-4 and 6-6 for locations and times	See Figures 6-8 and 6-10 for locations and times	See Figures 6-11 and 6-12 for locations and times
Event Center staff positioned at key locations throughout the site to facilitate crowd control, wayfinding, and curb management		√	√	√	√
Post-Event Temporary Lane Closure: NB lanes on 3rd Street between 16th Street and Mission Bay Boulevard South			√	√	√
Post-Event Temporary Lane Closure: South Street between 3rd Street and 450 South Street garage entrance			√	√	√
Post-Event Temporary Lane Closure: NB Illinois Street between Mariposa Street and 16th Street, except for local traffic and Shuttle staging ad loading			√	√	√
Post-Event Temporary Lane Closure: WB lanes on 16th Street between Terry François Boulevard and Illinois Street, and EB lanes on 16th Street between 3rd Street and Illinois Street, Except for Shuttle staging and loading			√	√	√
Coordinate with BART, Caltrain, Muni			√	√	√

TABLE 6-1: SUMMARY OF TRAFFIC CONTROL STRATEGIES BY EVENT TYPE					
Coordinate with Giants Special Events Staff	√	√	√	√	√

1. The 55 family shows held each year, with an average of about 5,000 attendees, are expected to require similar controls to the small event.
2. Arena Concert is assumed for events of average 12,500 attendees.
Source: Fehr & Peers, 2014.

6.1 CONTROL RECOMMENDATIONS FOR NO-EVENT DAY SCENARIO

The number of trips generated by the Event Center office, retail and restaurants on a typical no-event day does not warrant special traffic controls. The Event Center Development garage will be staffed on a typical day to monitor access for delivery vehicles. Signage will be posted to direct traffic to the parking garage entrances as well as to a valet parking stand located inside the parking garage, which will be staffed during a typical day.

Curb designations on the Event Center Development frontage will be as follows:

- Metered On-Street Parking on north side of South Street: north side of South Street from 450 South Street garage entrance to Terry François Boulevard. On-street parking may be prohibited along this stretch shorty before, during, and after events to allow the option for a second travel lane.
- TMA Shuttle Stop on South Street: south side of South Street, east of 3rd Street (all days/hours).
- Metered On-Street Parking on south side of South Street: from TMA shuttle stop to Bridgeview Way.
- Commercial Loading Zones: south side of South Street, just east of TMA Shuttle Stop (one designated space) and between Taxi Zone and Terry François Boulevard (seven designated spaces).
- Commercial Loading Zone on Terry François Boulevard: on west side of Terry François Boulevard, just south of South Street (eight designated spaces).
- Commercial Loading Zone on 16th Street: on north side of 16th Street, between 3rd Street and Illinois Street (one designated space).
- Taxi Zone on South Street: on the south side of South Street between the Event Center garage access (opposite Bridgeview Way) and the commercial loading zone.
- Metered On-Street Parking on Terry François Boulevard: on portions of the west side from South Street to 16th Street, with the exception of the centrally located paratransit vehicle stop area. On-street parking will be prohibited along this stretch after 5:00 PM to allow event pick-up/drop-off.
- Paratransit Bus Stop on Terry François Boulevard: west side of Terry François Boulevard, north of 16th Street (all days/hours, serving up to three paratransit vans).
- Metered On-Street Parking on 16th Street: north and south sides of 16th Street from Illinois Street east to Terry François Blvd., and the north side of 16th Street from 3rd Street to Illinois Street. On-street parking will be prohibited along this stretch after 5:00 PM on event days. The segment between Illinois Street and Terry François Boulevard on the north side of this segment will be reserved for post-event shuttles and charter buses during events.

- Media Trucks on 16th Street: the north side of 16th Street between 3rd Street and Illinois Street will be reserved for media trucks for NBA events.

Valet parking will be provided for the retail visitors along the South Street frontage, just inside the Event Center parking garage entry opposite Bridgeview Way.

Accessible passenger loading zones will be provided consistent with the requirements as outlined in the Draft Pedestrian Right of Way Accessibility Guidelines (PROWAG).

On-street parking is not currently permitted on the east side of 3rd Street adjacent to the site, and will continue to be prohibited. Signage will be placed along the east side of 3rd Street that prohibits stopping at all times, including passenger loading or unloading, under no-event and all event scenarios. Enforcement will be provided to prohibit any drop-off or pick-up activity.

Figure 2-2 summarizes on-street parking restrictions and availability for no-event conditions.

6.2 CONTROLS FOR CONVENTION SCENARIO

For the purposes of this TMP, a small event scenario is a 9,000 person convention. Conventions will be staffed by up to 6 Parking Control Officers (PCOs). The Event Center Development garage access and valet parking stand will be staffed as described above for a typical day.

6.2.1 General

PCO Supervisor

A PCO Supervisor will be stationed in the Transportation Management Center starting at least one hour prior to the convention start time and until pedestrian and vehicle volumes on-street have returned to typical no-event conditions following event's end. The PCO Supervisor will deploy up to 6 PCOs and assign transportation control tasks pre-event; monitor traffic conditions before, during, and after the event; and deploy PCOs and assign transportation control tasks post-event, as needed.

The PCO Supervisor will have radio contact with the Field Supervisor and all PCOs on the street and phone contact with relevant city agencies and departments (Muni, SFMTA Signal Shop, SFPD, SFFD), transit operators (Muni, BART, Caltrans) and Event Center staff (security, valet attendants, etc.). The PCO supervisor will also have authority and discretion in how PCOs are deployed, and may adjust the controls described below as conditions warrant.

6.2.2 Pre- and Post-Event Controls

Figures 6-1 and 6-2 show the location of temporary charter bus drop-off/pick-up locations for convention events. Convention events are expected to generate a large number of charter bus and taxi trips. Taxi trips will be served on the designated curb zone located on the south side of South Street and the west side of Terry François Boulevard.

All curbside parking and loading areas described for no-event conditions will convert to the event curb zones described below at 5:00 PM (before an evening event beginning 7:00 PM or later), or two hours before an event (starting at all other times). Event curb zone designations will revert back to no-event parking and loading conditions ninety minutes following an event's end.

Charter Bus Stop Zone

To serve the demand for increased charter bus service, a bus stop zone will be designated along a portion of westbound 16th Street. This curbside zone will be 500 feet (accommodating 6-8 buses at a time) in length and will be designated for charter bus pick-up/drop-off activity during a convention.

PCO Locations

PCOs' primary task will be to direct shuttle and taxi traffic that will be bringing attendees from area hotels and the Moscone Convention Center. Up to six PCOs will be stationed at the following locations:

- 3rd Street and South Street
- South Street and Terry François Boulevard
- 3rd Street and 16th Street
- 16th Street and Illinois Street
- 16th Street and Terry François Boulevard

The PCO locations listed in this document are solely representative and will remain flexible to respond to changing traffic conditions once the Event Center Development is complete. The number of PCOs per suggested location will be determined in consultation with the SFMTA and refined based on monitoring during the first four years of operations.

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SMALL EVENT: PRE-EVENT CURB MANAGEMENT

FIGURE 6-1

SMALL EVENT: POST-EVENT CURB MANAGEMENT

FIGURE 6-2

FEHR PEERS

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6.3 CONTROLS FOR ARENA CONCERT SCENARIO

This section addresses controls for a 14,000 person arena concert.

6.3.1 General

PCO Supervisor

A PCO Supervisor will be stationed in the Transportation Management Center (TMC) starting at least two hours prior to the concert start time and until pedestrian, bicycle, and vehicle volumes on-street have returned to typical no-event conditions following event's end. The TMC will be housed within the security center in the Event Center, though the TMC's final design will be developed through coordination with SFMTA Enforcement. The PCO Supervisor/Field Supervisor will deploy up to 17 PCOs to locations and assign transportation control tasks pre-event; monitor traffic conditions before, during, and after the event; and deploy PCOs and assign transportation control tasks post-event. The number of PCOs estimated for deployment are based on information available at this time and may be adjusted both prior to and during venue operations as more detailed information and observations allow.

The PCO Supervisor will have radio contact with the Field Supervisor and with all PCOs on the street, and phone contact with relevant city agencies and departments (Muni, SFMTA Signal Shop, SFPD, SFFD), transit operators (Muni, BART, Caltrans) and Event Center staff (security, valet attendants, etc.). The PCO supervisor will also have authority and discretion in how PCOs are deployed, and may adjust the controls described below as conditions warrant.

Transit loading may also be monitored by Transit Fare Inspectors (TFIs) and SFMTA Passenger Assistance Program staff (MTAPs) stationed at Muni platforms. The appropriate number of staff stationed in these roles will be determined in consultation with the SFMTA prior to the project opening.

6.3.2 Curb Management

All curbside parking and loading areas described for no-event conditions will convert to the event curb zones described below at 5:00 PM (before an evening event beginning 7:00 PM or later), or two hours before an event (starting at all other times). Event curb zone designations will revert back to no-event parking and loading conditions ninety minutes following an event's end.

Pre-event and post-event curb management for the concert scenario is shown in Figures 6-3 and 6-5. In order to manage the increased volume of attendees using regional transit, the concert scenario will also include designated curb space for a Muni bus that will travel back and forth to the 16th Street BART station exclusively. This pre-event bus stop will be 150 feet in length along the south side of 16th Street for BART passenger drop-off before concert events. These buses will then continue south on Illinois Street to Mariposa Street to return to the BART station. Post-event curb management will include a bus layover zone on northbound Illinois Street, where buses will layover to pick up passengers after a concert event. Post-event bus staging and passenger loading will be along the eastern side of Illinois Street and the north side of 16th Street east of Illinois St.

A concert event will also include increased drop-off/pick-up activity as attendees are shuttled to and from the event in passenger vehicles. To accommodate this, the 550 feet of "flex space" on Terry François Boulevard will include passenger drop-off/pick-up activity to be shared with taxis along the west side of the street. During concerts, as during Peak events, a taxi zone will also be located on the south side of South Street.

To provide a safe location for the high volumes of pedestrians to queue that are destined for the Muni station in the median of 3rd Street, and in consultation with the SFMTA, temporary lane closures will be implemented on northbound 3rd Street between 16th Street and Mission Bay Boulevard South, on westbound and eastbound on South Street from 3rd Street to the 450 South Street garage. Traffic exiting the 450 South Street garage, the north exit of the Event Center garage or Bridgeview Way will be directed east to Terry François Blvd. It is anticipated that the temporary lane closures will be in place for approximately 30-45 minutes during the peak post-event period, until most event attendees are able to board Muni trains on 3rd Street and most shuttle riders have boarded shuttles. It is anticipated that the no-event traffic volumes on the streets adjacent to the Event Center Development will be light after a typical concert event, so impacts to the existing traffic as a result of the temporary closure of northbound 3rd Street will be low. Traffic on Bridgeview Way will be monitored by PCOs and will be signed to encourage access for local traffic only to the uses within that block, including the 450 South Street Garage. Variable Message Signs (VMS) and detour signs that will be programed and/or placed well in advance of the temporary closures to notify drivers of alternate routes, including those depicted in Figure 6-10. Proposed locations for permanent Variable Message Signs are listed below:

- Northbound 3rd Street – South of Mariposa (existing VMS)
- Westbound 16th Street – East of I-280 (proposed new VMS)
- Southbound 3rd Street – South of Lefty O'Doul Bridge (proposed new VMS)
- Eastbound Mariposa Street – East of I-280 (proposed new VMS)

Based on operating conditions for AT&T Park, it is assumed that SFMTA staff will set up and store barricades to mark and enforce temporary lane closures. Barricade equipment may be temporary stored in a truck at the southern end of Illinois St., just north of Mariposa, and/or in a storage facility located on-site.

The UCSF Women's Cancer & Children's Hospital, scheduled to open on February 1, 2015, is located on the west side of 3rd Street between 16th Street and Mariposa Street. Access to the hospital will be provided from, both 16th Street and Mariposa Street via an extension of 4th Street. Emergency vehicles traveling to the hospital will not be affected by the post-game partial street closures on northbound 3rd Street (north of 16th Street) described above, as multiple other routes to the hospital's major access points will main open. Emergency vehicles exiting the hospital may need to travel northbound on 3rd Street, north of 16th Street, where the temporary closures are planned. In those situations, PCOs may remove temporary barriers and allow emergency vehicles to use northbound 3rd Street, or emergency vehicles may use the southbound lanes of 3rd Street to travel northbound. The Event Center Transportation Coordinator will provide the hospital with a list of dates and times during which partial street closures are anticipated. Post-event traffic will be directed to use both 16th Street and Mariposa Street to access I-280 ramps to enable fast and efficient departures from the site. Northbound traffic will be directed to westbound 16th Street and north on 7th Street, east on Bryant Street to the I-80 ramp at 5th Street.

6.3.3 Pre-Event Controls

Pre-event controls are detailed here and illustrated on Figures 6-3 and 6-4.

PCO Locations

Up to 17 PCOs will be stationed at key locations, as determined by the PCO Supervisor before, during, and after events, such as those listed below. Their primary task will be to manage pedestrian and vehicle traffic.

- 3rd Street and South Street
- South Street and Bridgeview Way
- South Street and Terry François Boulevard
- 3rd Street and 16th Street
- 16th Street and Illinois Street
- 16th Street and Terry François Boulevard
- Mariposa Street and I-280 northbound ramps/Owens Street
- Mariposa Street and 3rd Street
- Mariposa Street and 4th Street
- Mariposa Street and Illinois Street
- Channel Street and 3rd Street
- Channel Street and 4th Street
- Mission Bay Boulevard North and Terry Francois Boulevard
- Mission Bay Boulevard South and Third Street
- One roving PCO (or more if necessary) to monitor general parking issues and respond to complaints called in throughout the neighborhood

The PCO locations listed in this document are solely representative and will remain flexible to respond to changing traffic conditions once the Event Center Development is complete. The number of PCOs per suggested location will be determined in consultation with the SFMTA and refined based on monitoring during the first four years of operations.

<u>UCSF Mission Bay Muni Platform</u>

PCOs will be stationed at the intersection of South Street and 3rd Street to facilitate pedestrian crossings to/from the Muni platforms and minimize conflicts with vehicles and light rail cars.

<u>Event Center Garage Driveway on 16th Street</u>

Concert attendees with pre-sold parking passes for the Event Center garage will enter via the left turn lane on eastbound 16th Street leading to the garage driveway or from northbound Illinois Street to self-park. Event Center staff will check parking passes before vehicles enter the garage.

PCOs will be stationed at the Event Center garage driveway to facilitate vehicle egress (office employees leaving on weekday evenings) and ingress (event attendees entering the garage), minimize conflicts with pedestrians and bicycles on 16th Street, and coordinate with PCOs located at the adjacent 3rd Street / 16th Street intersection. A key goal of the PCOs located at the adjacent intersections on 16th Street will be to give priority to the eastbound left turn movements from 16th Street into the garage to ensure that this inbound event traffic entering the Event Center garage does not queue back to the 16th Street / 3rd Street intersection. PCOs will also work in conjunction with Event Center staff that will be checking attendees' tickets for valid access to the garage on the day of the concert. Drivers who enter the eastbound left-turn pocket or are stationed to enter the garage on Illinois Street without a valid parking pass will be redirected to drive east on 16th Street to Terry François Boulevard towards other nearby garages or parking lots.

3rd Street / 16th Street Intersection

PCOs will be stationed at the intersection of 3rd Street and 16th Street to maintain the flow of Muni trains on 3rd Street, provide for the safe movement of pedestrians and bicyclists, and facilitate the flow of vehicles to eastbound 16th Street to access the Event Center parking garage. PCOs will work to ensure that the intersection does not become blocked with vehicles. As noted above, the PCO stationed at 3rd Street/16th Street will work in conjunction with the PCO at the Event Center garage entrance to coordinate the flow of traffic into the garage.

Drop-Off on Southbound Terry François Boulevard

Event Center ticket holders may be dropped off on the west side of Terry François Boulevard between South Street and 16th Street as shown on Figure 6-3. This curbside area will be shared with taxis.

6.3.4 Post-Event Controls

Many of the post-event controls are similar to the pre-event controls but are repeated here for ease of understanding, and the post-event curb and lane configurations are illustrated on Figures 6-5 and 6-6.

PCO Locations

PCOs will be stationed at all of the same locations as identified previously for the pre-event scenario, with one exception. The PCO(s) located at the intersection of Mariposa Street and I-280 northbound ramps/Owens Street during the pre-event period will relocate to the intersection of 16th Street/ Owens Street during the post-event period.

UCSF Mission Bay Muni Platform

Muni tickets will be sold at the Event Center box office before, during, and after events.

PCOs will be stationed at the intersection of 3rd Street and South Street to manage pedestrian flow to/from the Muni platforms and minimize conflicts with vehicles and light rail cars. Temporary lane closures will also be in effect for enhanced pedestrian safety on northbound 3rd Street north of 16th Street and on South Street west of the 450 South St. garage exit. Muni staff will also be stationed to check transit tickets and manage the boarding process.

Event Center Garage Driveway on 16th Street

During no-event conditions, traffic at the 16th Street / Illinois Street intersection will be managed by an all-way stop control. During events, the PCOs will be able to direct traffic at the intersection during event conditions to allow continuous flow on individual movements as needed. PCOs at the garage driveway located at the intersection will have the following objectives:

- Managing alternating flows of vehicle traffic exiting the garage with pedestrian-bicycle flows along 16th Street

- Managing alternating flows of vehicle traffic exiting the garage with shuttle traffic and occasional westbound traffic flow on 16th Street to accommodate safe and efficient shuttle loading and departure.
- Coordinating with PCOs located along 16th Street so that they stop pedestrian crossings of 16th Street during the same windows of time that vehicles are released from the Event Center garage onto east- and westbound 16th Street
- Maintaining vehicle access to garages for the 409 and 499 Illinois Street buildings, as well as future UCSF buildings on Blocks 33 and 34, from 16th Street and Illinois Street.

Post-events, southbound traffic exiting the Event Center garage will be advised to travel west on 16th Street to southbound Owens Street to access I-280. Any traffic heading to the north from the parking garage will be advised to travel west on 16th Street to northbound 7th Street due to the temporary northbound closure on 3rd Street.

3rd Street / 16th Street

PCOs will be stationed at the intersection of 3rd Street and 16th Street to facilitate the flow of vehicles from westbound 16th Street from the parking garages, along with Muni trains, bicyclists, and pedestrians while preventing event traffic from going north on 3rd Street. They will work in conjunction with the PCO at the garage entrance to stop pedestrians crossing 16th Street during the same window that vehicles are exiting the garage on 16th Street, and prohibit northbound traffic from accessing 3rd Street north of 16th Street due to the temporary lane closures and direct traffic to northbound Terry François Boulevard.

Temporary Lane Closures

Up to 17 PCOs will be stationed at key locations to redirect traffic due to the temporary lane closures. The PCO station located on South Street east of 3rd Street will manage the South Street partial closure as well as Bridgeview Way. The PCOs will direct all traffic exiting the 450 South Street and Event Center garages to Terry François Boulevard via eastbound South Street, and restrict northbound traffic from using Bridgeview Way except for neighborhood traffic. The PCOs will also direct any southbound traffic on Bridgeview Way left onto eastbound South Street

PCOs will also be stationed at the Terry François Boulevard / South Street intersection to manage traffic exiting the garages on South Street. They will direct traffic either north or south on Terry François Boulevard, and restrict vehicle access onto westbound South Street. They will also manage alternating flows of pedestrian crossings of South Street and vehicles turning onto Terry François Boulevard.

PCOs will be stationed on 3rd Street at Mariposa Street to direct no-event northbound traffic to alternative routes in advance of the temporary closure on northbound 3rd Street, to reduce congestion at the intersection of 3rd Street / 16th Street. Northbound traffic will be redirected east along Mariposa Street to northbound Terry François Boulevard. Variable message signs will also direct no-event through traffic to Terry François Boulevard in advance of the intersection of 3rd Street / Mariposa Street. All PCOs stationed at locations along 3rd Street will also assist emergency vehicles and autos needing emergency access to the UCSF Medical Center to navigate congested conditions and utilize closed travel lanes as needed. New permanent Variable Message Signs (VMS) will be added at three locations, and existing VMSs will operate to provide traffic alerts, messages, and alternative driving routes for neighborhood residents at the following locations:

- Northbound 3rd Street – South of Mariposa (existing VMS)

- Westbound 16th Street – East of I-280 (proposed new VMS)
- Southbound 3rd Street – South of Lefty O'Doul Bridge (proposed new VMS)
- Eastbound Mariposa Street – East of I-280 (proposed new VMS)

Based on operating conditions for AT&T Park, it is assumed that SFMTA staff will set up and store barricades to mark and enforce temporary lane closures.

Temporary Turn Restrictions

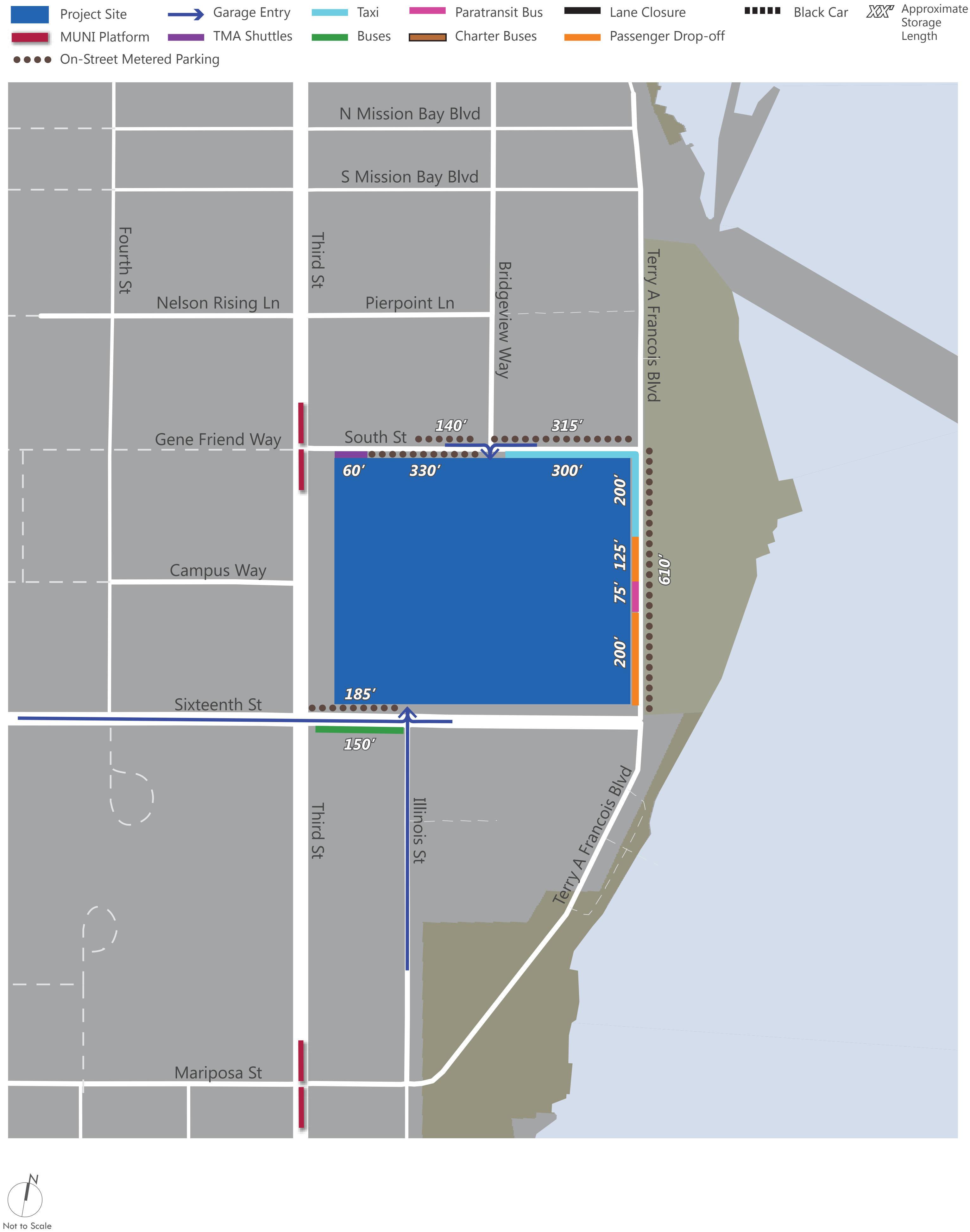
Temporary turn restrictions will be in place post-event to discourage vehicles traveling westbound on 16th Street from turning left onto 3rd Street, Owens Street or Mississippi Street. PCOs will be responsible for coning off left turn pockets at these three intersections and enforcing left-turn restrictions. Signage will be provided inside event garages to direct vehicles destined for I-280 to use Terry François Boulevard to Mariposa Street as the primary access.

Passenger Pick-Up on Terry François Boulevard

The passenger pick-up location will be the same as the pre-event drop-off location – on the west side of Terry François Boulevard. This location will also include Paratransit loading, however each space will be designated and separated.

Terry François and 16th Intersection

PCOs will be stationed at the intersection of Terry François Boulevard and 16th Street following a concert to manage bicycle and pedestrian flows, detour traffic from the temporary lane closures on South Street and 3rd Street, as well as event traffic from nearby parking facilities. Traffic will be directed mostly north and south on Terry François Boulevard to avoid adding to the congestion on 16th Street and to avoid conflicts with shuttle buses. Post-event PCO controls are proposed to be the same and are illustrated on Figure 6-6.



CONCERT EVENT: PRE-EVENT CURB MANAGEMENT

FIGURE 6-3

FEHR PEERS

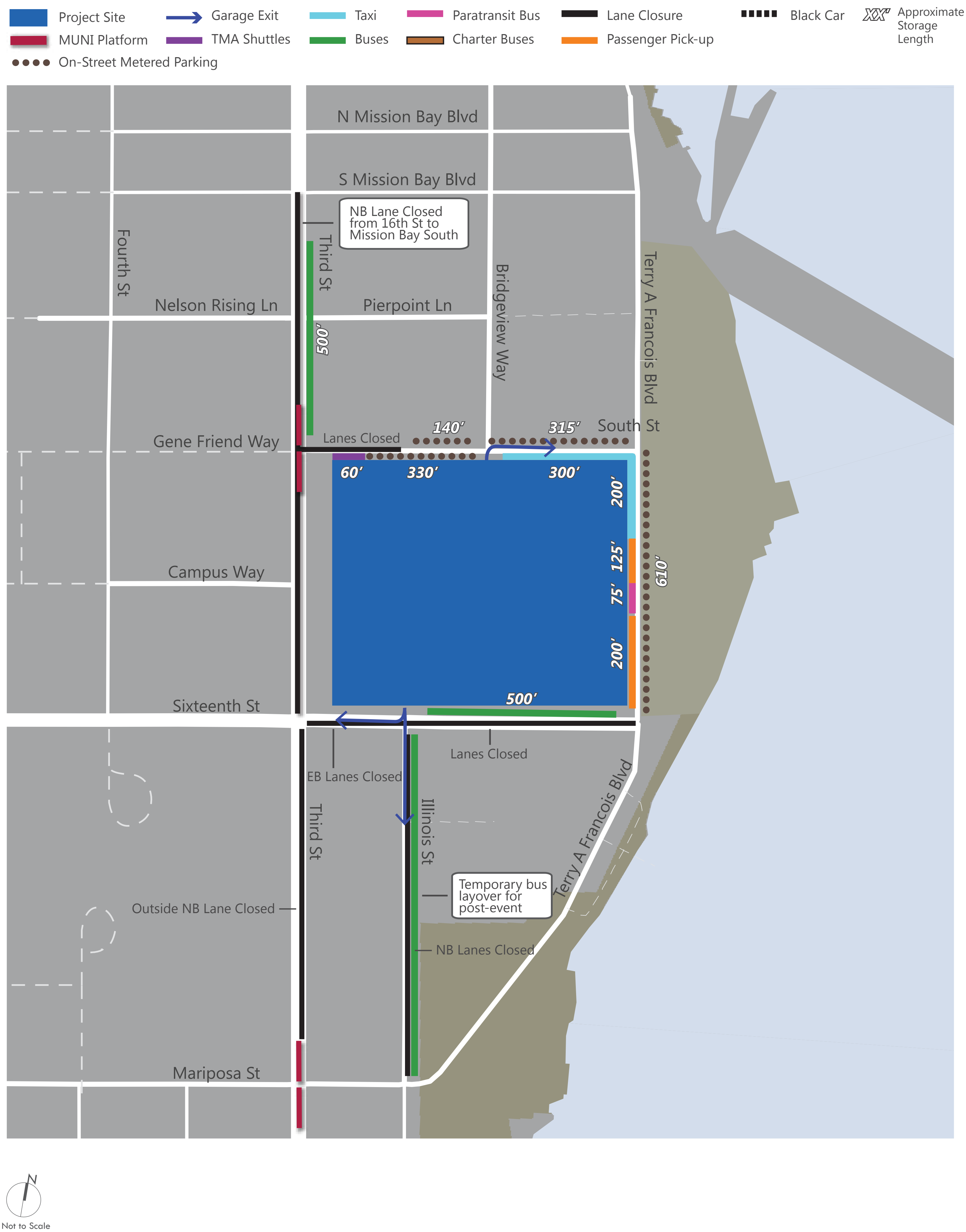
SF13-0682_SF Warriors Arena TMP\Graphics

FEHR & PEERS

SF13-0682_SF Warriors Arena TMP\Graphics

CONCERT EVENT: PRE-EVENT CONTROLS

FIGURE 6-4



FEHR PEERS

CONCERT EVENT: POST-EVENT CURB MANAGEMENT

FIGURE 6-5

SF13-0682_SF Warriors Arena TMP\Graphics

FEHR & PEERS

SF13-0682_SF Warriors Arena TMP\Graphics

CONCERT EVENT: POST-EVENT CONTROLS

FIGURE 6-6

6.4 CONTROLS FOR PEAK EVENT SCENARIO

6.4.1 General

PCO Supervisor

As with a concert event, a PCO Supervisor will be stationed in the Transportation Management Center and/or in the field starting at least two hours prior to the event's start time and until pedestrian, bicycle, and vehicle volumes on-street have returned to typical no-event conditions following event's end. The PCO Supervisor will deploy up to 18 PCOs to locations and assign transportation control tasks pre-event monitor traffic conditions before, during, and after the event; and deploy PCOs and assign transportation control tasks post-event.

Transit loading may also be monitored by Transit Fare Inspectors (TFIs) and SFMTA Passenger Assistance Program staff (MTAPs) stationed at Muni platforms.

6.4.2 Curb Management

All curbside parking and loading areas described for no-event conditions will convert to the event curb zones described below at 5:00 PM (before an evening event beginning 7:00 PM or later), or two hours before an event (starting at all other times). Event curb zone designations will revert back to no-event parking and loading conditions ninety minutes following an event's end.

Pre-event curb management will be the same as that shown for the concert scenario with one addition. GSW games will require media coverage and designated curbside parking for media satellite trucks. The total curb length required will be up to 200 feet during regular season games, which includes parking for 2 uplink trucks and 4 ENG trucks. This will be provided on the north side of 16th Street starting just east of 3rd Street. A curb distance of 150 feet will be designated for media trucks, as shown in Figure 6-7.

Post-event curb management will be the same as that shown for the concert scenario with the exception of 16th Street. The media satellite truck parking detailed above in the pre-event curb management for the peak event will also be implemented in the post-event curb management. All other post-event curb designations for a peak event are the same as the post-event concert scenario, including the temporary lane closures on South, 3rd, and Illinois Streets, the special event shuttle stops, and the additional passenger pick-up zone on Terry François Boulevard. These are shown on Figure 6-9.

To increase safety for the high volumes of pedestrians walking to the Muni Station on 3rd Street, temporary lane closures will be implemented on northbound 3rd Street between 16th Street and Mission Bay Boulevard South, on westbound and eastbound South Street west of the parking garages. It is anticipated that the background traffic volumes will be light after a game, so impacts to the existing traffic patterns will be low. Variable message and detour signs will be placed well in advance of the temporary closures to notify drivers of alternate routes. Proposed locations for permanent variable message signs are listed below:

- Northbound 3rd Street – South of Mariposa (existing VMS)
- Westbound 16th Street – East of I-280 (proposed VMS)
- Southbound 3rd Street – South of Lefty O'Doul Bridge (proposed VMS)
- Eastbound Mariposa Street – East of I-280 (proposed VMS)

Emergency vehicles exiting the UCSF hospital west of 3rd Street between 16th Street and Mariposa Street will be granted access to northbound 3rd Street during the post-event street closure described above. PCOs may remove temporary barriers and allow emergency vehicle access to northbound 3rd Street in those situations, or emergency vehicles may drive in the southbound lanes to travel northbound. GSW staff will provide the hospital with a list of dates and times of post-event street closures.

6.4.3 Pre-Event Controls

Pre-event controls will be the same as the concert scenario, but are repeated here and illustrated on Figure 6-8.

PCO Locations

Up to 17 PCOs will be stationed at key locations, as determined by the PCO Supervisor before, during, and after events, such as those listed below. Their primary task will be to manage pedestrian and vehicle traffic.

- 3rd Street and South Street
- South Street and Bridgeview Way
- South Street and Terry François Boulevard
- 3rd Street and 16th Street
- 16th Street and Illinois Street
- 16th Street and Terry François Boulevard
- Mariposa Street and I-280 northbound ramps/Owens Street
- Mariposa Street and 3rd Street
- Mariposa Street and 4th Street
- Mariposa Street and Illinois Street
- Channel Street and 3rd Street
- Channel Street and 4th Street
- Mission Bay Boulevard North and Terry Francois Boulevard
- Mission Bay Boulevard South and Third Street
- One roving PCO (or more if necessary) to monitor general parking issues and respond to complaints called in throughout the neighborhood

The PCO locations listed in this document are solely representative and will remain flexible to respond to changing traffic conditions once the Event Center Development is complete. The number of PCOs per suggested location will be determined in consultation with the SFMTA and refined based on monitoring during the first four years of operations.

UCSF Mission Bay Muni Platform

PCOs will be stationed at the intersection of South Street and 3rd Street to facilitate pedestrian crossings to/from the Muni platforms and minimize conflicts with vehicles and Muni trains.

Event Center Garage Driveway on 16th Street

Game attendees with pre-sold parking passes for the Event Center garage would enter via the left turn lane on eastbound 16th Street leading to the garage driveway or from northbound Illinois Street to self-park. GSW staff will check parking passes before vehicles enter the garage.

PCOs will be stationed at the Event Center garage driveway to facilitate vehicle egress (office employees leaving on weekday evenings) and ingress (event attendees entering the garage), minimize conflicts with pedestrians and bicyclists on 16th Street, and coordinate with PCOs located at the adjacent 3rd Street / 16th Street intersection. A key goal of the PCOs located at the adjacent intersections on 16th Street will be to ensure safety to all modes by minimizing conflicts between modes while ensuring the flow of vehicles into the garage does not result in queues that back up into adjacent intersections. They will also work in conjunction with Event Center staff that will be checking attendees' tickets for valid access to the garage on game day. Drivers who enter the eastbound left-turn pocket or are stationed to enter the garage on Illinois Street without a valid parking pass will be redirected to drive east on 16th Street to Terry François Boulevard towards other nearby garages or parking lots.

3rd Street / 16th Street Intersection

PCOs will be stationed at the intersection of 3rd Street and 16th Street to maintain the flow of Muni trains on 3rd Street, and provide for the safe movement of pedestrians, bicyclists, and vehicles. PCOs will work to ensure that the intersection does not become blocked with vehicles. As noted above, the PCO stationed at 3rd Street/16th Street will work in conjunction with the PCO at the Event Center garage entrance.

Drop-Off on Southbound Terry François Boulevard

Event Center ticket holders may be dropped off on the west side of Terry François Boulevard between South Street and 16th Street as shown on Figure 6-7. This curbside area will be separately designated, but shared.

6.4.4 Post-Event Controls

All of the post-event controls are generally the same as the post-event controls for a concert scenario but are repeated here for ease of understanding when reviewing all controls for the peak event exclusively. The post-event curb and lane configurations are illustrated on Figures 6-9 and 6-10.

Muni tickets will be sold at the Event Center box office before, during, and after events.

PCOs will be stationed at the intersection of 3rd Street and South Street to manage pedestrian flow to/from the Muni platforms and minimize conflicts with vehicles and Muni trains. Temporary lane closures will also be in effect for enhanced pedestrian safety on northbound 3rd Street north of 16th Street and on South Street east of 3rd Street. Muni staff will also be stationed to check tickets and manage the boarding process.

<u>PCO Locations</u>

PCOs will be stationed at locations determined by the PCO Supervisor, which may include those identified previously for the pre-event scenario, with two exceptions. At least one PCO will be located at the intersection of 16th Street/Owens Street to facilitate heavy left turn flows from westbound 16th Street onto southbound Owens Street and access to I-280. One PCO will also be located at the intersection of Fifth Street/Bryant Street/I-80 eastbound ramps.

<u>Event Center Garage Driveway on 16th</u>

PCOs at the Event Center garage driveway at the intersection of 16th Street / Illinois Street will have the following objectives:

- Managing alternating flows of vehicle traffic exiting the garage with pedestrian-bicycle flows along 16th Street
- Managing alternating flows of vehicle traffic exiting the garage with shuttle traffic and occasional westbound traffic flow on 16th Street to accommodate safe and efficient shuttle loading and departure.
- Coordinating with PCOs located along 16th Street so that they stop pedestrian crossings of 16th Street during the same windows of time that vehicles are released from the Event Center garage onto east- and westbound 16th Street
- Maintaining vehicle access to garages for the 409 and 499 Illinois Street buildings, as well as future UCSF buildings on Blocks 33 and 34, from 16th Street and Illinois Street.

To extend the effective length of the westbound left turn pocket at the 16th Street / 3rd Street intersection, temporary cones will be placed to close the eastbound left turn lane on 16th Street into the Event Center garage entrance after a game, if necessary, extending the turn pocket to 160 feet. The extended turn pocket will be used for westbound vehicles making a left turn onto southbound 3rd Street. Motorists wishing to enter the Event Center garage from eastbound 16th Street will be able to make a left turn from the eastbound through lane.

Southbound traffic exiting the Event Center garage will be advised to travel west on 16th Street to southbound Owens Street to access I-280. Any traffic heading to the north from the parking garage will be advised to travel west on 16th Street to northbound 7th Street due to the temporary northbound closure on 3rd Street.

<u>3rd Street / 16th Street</u>

PCOs will be stationed at the intersection of 3rd Street and 16th Street to facilitate the flow of vehicles from westbound 16th Street from the parking garages, along with Muni trains, bicyclists, and pedestrians while preventing event traffic from going north on 3rd Street. They will work in conjunction with the PCO at the garage entrance to stop pedestrians crossing 16th Street during the same window that vehicles are exiting the garage on 16th Street, and prohibit northbound traffic from accessing 3rd Street north of 16th Street due to the temporary lane closures and direct traffic to northbound Terry François Boulevard.

<u>Temporary Lane Closures</u>

Up to 17 PCOs will be stationed at key locations to redirect traffic due to the temporary lane closures. The PCO station located on South Street east of 3rd Street will manage the temporary South Street lane closure as well as Bridgeview Way. The PCOs will direct all traffic exiting the 450 South Street (office and retail employees) and Event Center (event attendees) garages to Terry François Boulevard via eastbound South Street, and restrict northbound traffic from using Bridgeview Way, except for neighborhood traffic. These PCOs will also direct any southbound traffic on Bridgeview Way left onto eastbound South Street.

PCOs will also be stationed at the Terry François Boulevard / South Street intersection to manage traffic exiting the garages on South Street. They will direct traffic either north or south on Terry François Boulevard, and restrict vehicle access onto westbound South Street. They will also manage alternating flows of pedestrian crossings of South Street and vehicles turning onto Terry François Boulevard. PCOs will also allow for local traffic to access garages on 16th Street and Illinois Street.

PCOs will be stationed on 3rd Street at Mariposa Street to direct no-event northbound traffic to alternate routes in advance of the temporary closure on northbound 3rd Street to reduce congestion at the intersection of 3rd Street / 16th Street. Northbound traffic will be redirected east along Mariposa Street to northbound Terry François Boulevard. Variable message signs (VMSs) will also direct traffic to Terry François Boulevard in advance of the intersection of 3rd Street / Mariposa Street. VMSs and detour signs will be programed and/or placed well in advance of the temporary closures to notify drivers of alternate routes, including those depicted in Figure 6-10. Permanent Variable Message Signs will be placed at the following locations to notify drivers of detours in advance:

- Northbound 3rd Street – South of Mariposa (existing VMS)
- Westbound 16th Street – East of I-280 (proposed VMS)
- Southbound 3rd Street – South of Lefty O'Doul Bridge (proposed VMS)
- Eastbound Mariposa Street – East of I-280 (proposed VMS)

All PCOs stationed at locations along 3rd Street will also assist emergency vehicles and autos needing emergency access to the UCSF Medical Center to navigate congested conditions and utilize closed travel lanes as needed.

<u>Temporary Turn Restrictions</u>

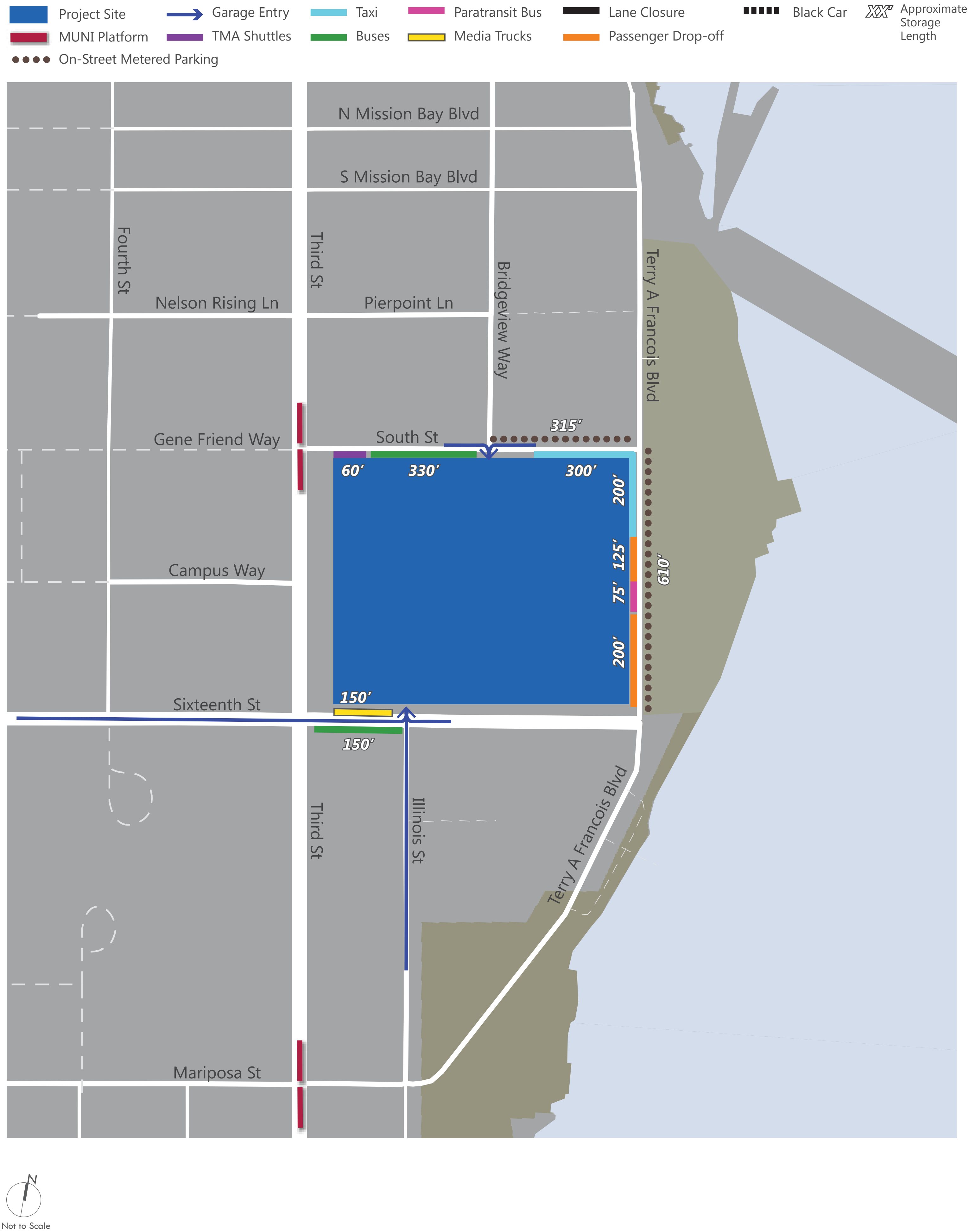
Temporary turn restrictions will be in place post-event to discourage vehicles traveling westbound on 16th Street from turning left onto 3rd Street, Owens Street or Mississippi Street. PCOs will be responsible for coning off left turn pockets at these three intersections and enforcing left-turn restrictions. Signage will be provided inside event garages to direct vehicles destined for I-280 to use Terry François Boulevard to Mariposa Street as the primary access.

<u>Passenger Pick-Up on Terry François Boulevard</u>

The passenger pick-up location will be the same as the pre-event drop-off location – on the west side of Terry François Boulevard. This location will also include Paratransit loading.

<u>Terry François and 16th Intersection</u>

PCOs will be stationed at the intersection of Terry François Boulevard and 16th Street following a game's end to manage bicycle and pedestrian flows, detour traffic from the temporary lane closures on South Street and 3rd Street, as well as event traffic from nearby parking facilities. Traffic will be directed mostly north and south on Terry François Boulevard to avoid adding to the congestion on 16th Street and to avoid conflicts with shuttle buses.



FEHR PEERS

SF13-0682_SF Warriors Arena TMP\Graphics

PEAK EVENT: PRE-EVENT CURB MANAGEMENT

FIGURE 6-7

FEHR PEERS

SF13-0682_SF Warriors Arena TMP\Graphics

PEAK EVENT: PRE-EVENT CONTROLS

FIGURE 6-8

FEHR PEERS

SF13-0682_SF Warriors Arena TMP\Graphics

PEAK EVENT: POST-EVENT CURB MANAGEMENT

FIGURE 6-9

FEHR PEERS

SF13-0682_SF Warriors Arena TMP\Graphics

PEAK EVENT: POST-EVENT CONTROLS

FIGURE 6-10

6.5 CONTROLS FOR PEAK EVENT COINCIDING WITH AT&T PARK EVENT SCENARIO

See Section 2.2 for a description of the scenario in which a peak Event Center event coincides with an AT&T Park event.

6.5.1 General

On days where Event Center events coincide with AT&T Park events, pedestrian, bicycle, and vehicle volumes along Terry François Boulevard and 3rd Street will be greater. Controls implemented as part of the Event Center TMP will not change, but should be coordinated with controls implemented as part of the AT&T Park standard TMP so that:

- Efforts are not duplicated; and
- Controls are complementary rather than contradictory.

The Warriors support the formation of a working group, comprised of the Warriors, Giants, SFMTA, Mission Bay CAC, UCSF, MBBTCC, and other stakeholders, to regularly discuss potential overlaps and the resulting traffic and transit conditions, and to propose solutions on an individual event basis. For example, if the AT&T Park TMP includes PCO control at any PCO intersections listed in this document and events' start or end times coincide, no additional PCOs will be necessary at that location. Figures 6-11 and 6-12 show where PCOs would be stationed pre- and post-event during a dual event scenario, including a new post-event dual event location for a PCO at Mariposa Street and Fourth Street.

Transit loading may also be monitored by Transit Fare Inspectors (TFIs) and SFMTA Passenger Assistance Program staff (MTAPs) stationed at Muni platforms.

DUAL EVENT WITH AT&T: PRE-EVENT CONTROLS

FIGURE 6-11

FEHR & PEERS

SF13-0682_SF Warriors Arena TMP\Graphics

FEHR & PEERS

DUAL EVENT WITH AT&T: POST-EVENT CONTROLS

SF13-0682_SF Warriors Arena TMP\Graphics

FIGURE 6-12

CHAPTER 7. FREIGHT LOADING

7.1 FREIGHT ACCESS FOR EVENT CENTER DEVELOPMENT (BLOCKS 29-32)

Freight access to the Event Center Development site located on Blocks 29-32 will be provided as described below and as shown on Figure 7-1.

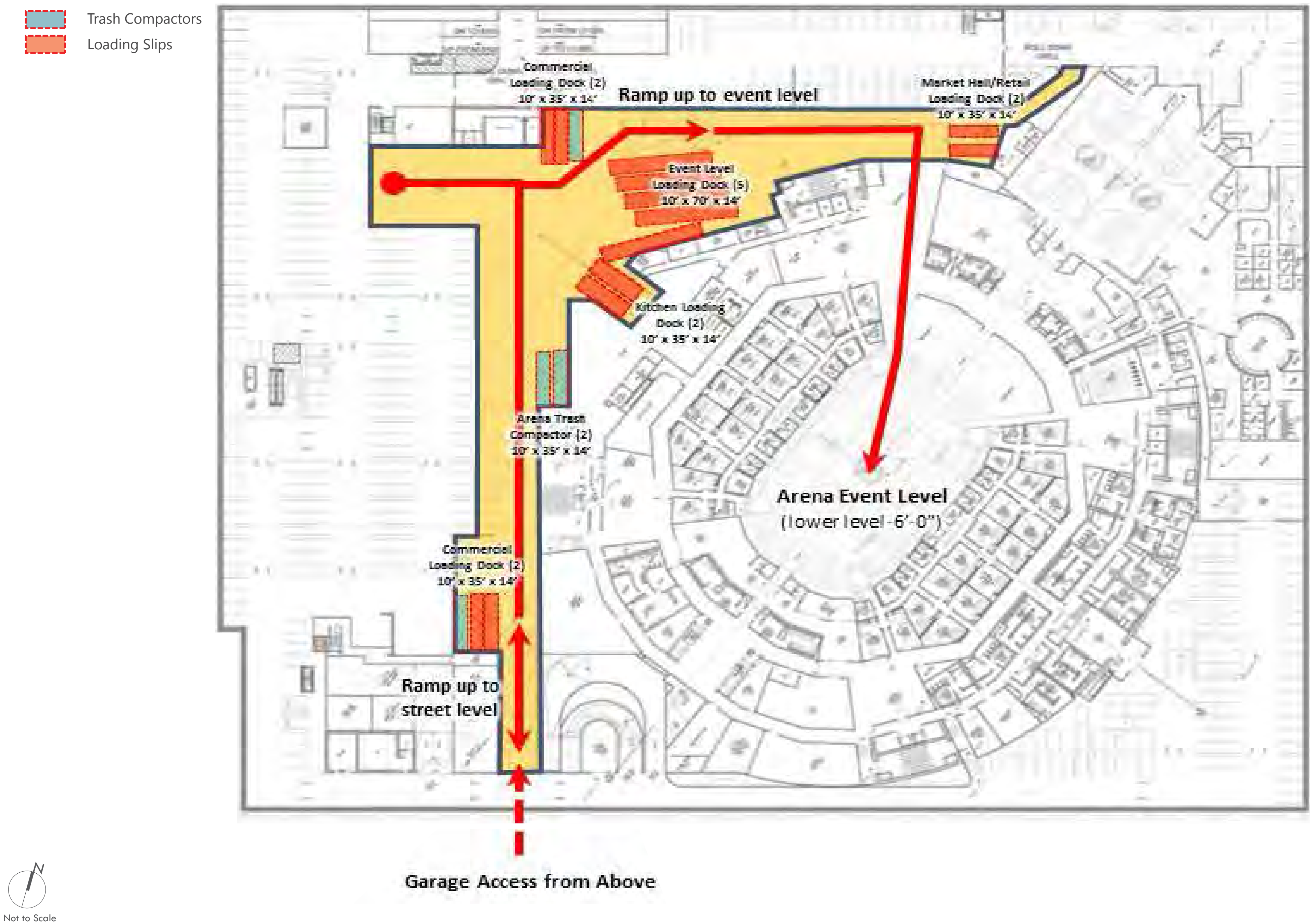
- Event Center Loading Docks – A formal truck loading area will be located on the lower level of the parking structure. Trucks will enter and exit the loading dock via access-controlled truck-only lanes in the parking structure's driveway on 16th Street at Illinois Street. All trucks that service events at the Event Center, including semi-trailer trucks, single unit trucks, and trash trucks, will use the loading dock area. The loading area will provide a "hammerhead" turnaround area so that trucks can easily maneuver into and out of the loading slips. Truck access will be limited to the extent feasible during pre- and post-event times to minimize potential conflicts with vehicles arriving or departing the garage.

- Retail Truck Loading Docks – Smaller loading docks for single unit trucks will be located on the Lower Level of the parking structure. This area will be available for use by the visitor-serving retail uses. Trucks will enter and exit the loading area via the access-controlled truck-only lanes in the driveway on 16th Street at Illinois Street.

- Office Truck Loading Docks – Loading docks for the office towers will be located on the Lower Level of the parking structure in two areas. Three loading docks for the South Street office tower will be provided in the northwest corner of the loading area and one loading dock for the 16th Street office tower will be located in the southwest corner of the loading area, just to the left of the first garage ramp. Both loading areas will also include trash compactors for the office towers. Trucks will enter and exit the loading area via the access-controlled truck-only lanes in the driveway on 16th Street at Illinois Street.

- South Street and Terry François Boulevard Commercial Curbside Loading – Parking along portions of the Event Center Development frontage will be designated for commercial truck deliveries for retail uses. On-street commercial loading zones will be designated as active loading zones all hours.

- Market Hall Loading – There will also be a small separate loading area, exclusive to the Market Hall uses, for which small delivery vehicles will enter via the South Street garage entrance.



EVENT CENTER FREIGHT ACCESS

FIGURE 7-1

CHAPTER 8. EMERGENCY VEHICLE ACCESS

The Event Center Development is served by the San Francisco Fire Department (SFFD) and the San Francisco Police Department (SFPD). A new SFFD fire house and SFPD headquarters building is being constructed at Block 8 in the Mission Bay South area on China Basin Street east of 3rd Street.

The Event Center Development project also anticipates installing on-site generators capable of providing up to three megawatts (MW) of emergency, standby and optional power in the case of temporary loss of normal utility power. The on-site generators would provide power to the Transportation Management Center (TMC) during such an emergency to facilitate efficient communication between TMC staff and emergency service personnel.

8.1 EMERGENCY VEHICLE ACCESS FOR EVENT CENTER

Emergency vehicle access to the Event Center Development site will be provided as described below and shown on Figure 8-1.

- SFFD vehicles from the new fire house on China Basin Street would access the Event Center Development via southbound 3rd Street or Terry François Boulevard. Direct access to the Event Center Arena will be provided via the southeast corner plaza on the corner of Terry François Boulevard and 16th Street. Fire Department vehicles traveling south on 3rd Street would make a left at 16th Street. Fire Department vehicles traveling south on Terry François Boulevard would make a right turn onto 16th Street. Emergency vehicles servicing office buildings will use either 16th Street or South Street. SFPD vehicles or supplemental SFFD vehicles from other fire houses would access the western plaza via 3rd Street either from 16th Street (for vehicles traveling from the west via 16th Street) or from 3rd Street (for vehicles traveling from the north or from the south via 3rd Street). Exclusive transit rights-of-way along 3rd Street and 16th Street will accommodate emergency vehicles when traffic congestion might otherwise impair access, and emergency vehicles will be permitted on closed-streets as needed.

Staff in the TMC will also closely coordinate with emergency service personnel to facilitate access as needed.

8.2 EMERGENCY VEHICLE ACCESS FOR UCSF HOSPITAL

The UCSF Women's Cancer & Children's Hospital, scheduled to open on February 1, 2015, is located on the west side of 3rd Street between 16th Street and Mariposa Street. Access to the hospital will be provided from both 16th Street and Mariposa Street via extensions of 4th Street. Pre- and Post-event curb management and controls as related to the UCSF Hospital access for patients and staff are described in Chapter 6.

EMERGENCY VEHICLE ACCESS

FIGURE 8-1

FEHR PEERS

SF13-0682_SF Warriors Arena TMP\Graphics

CHAPTER 9. COMMUNICATION

9.1 OUTREACH

Outreach can provide useful trip planning information to guests and employees, in order to minimize confusion and risk of conflicts by providing advanced information on transportation choices for accessing the Event Center; and by alerting attendees to the location and purpose of temporary controls and measures. The following is an outreach strategy to accompany Event Center events. Outreach about transportation will promote use of non-auto modes to the Event Center.

Ticket purchase confirmation will include the following information:

- In addition to the option to pre-purchase parking at the Event Center, all attendees will receive a statement explaining that parking will be extremely limited on site and may not be available, an explanation of transit and bicycle resources, and detailed information about options for getting to the Event Center, including:
    - List of transit options available, including links to trip planning tools, schedules, fare information, and forms of payment (i.e. Clipper card brochure)
    - Location of real time transit information displays on the Event Center site
    - Reminder that Muni fares will be checked on the street, prior to walking up the Muni platform; that Muni tickets must be purchased ahead of time, and that they may be purchased at the Event Center box office
    - Links to web-based trip planning tools and resources (by transit, walking , bicycling, and driving)
    - Information on how to use transit (fare and payment information), best stops and stations for accessing the Event Center, walking routes to the Event Center from transit hubs
    - Recommended walking paths to the Event Center from transit hubs and other origins
    - Information on bicycle routes (i.e. link to San Francisco's Bicycle and Walking Map) and free bicycle valet services
    - Directions to general pick-up/drop-off location along Terry François Boulevard
    - Information on TMA shuttles (routes, times, stop locations)
    - Information on parking availability and pricing, and ability to pre-purchase parking at event center [this should be last on our list, as it will be last on our customers']
- For attendees who do purchase parking in the garage with their ticket:
    - Directions to the Event Center from different origins and instructions describing the best path to access the Event Center garage
    - Information on controls that will be in place following game's end and how to most effectively exit the Event Center garage towards desired destinations

9.2 WAYFINDING

Wayfinding can support easy, safe walking and bicycling trips, and reduce the risk of conflicts for all modes by directing people away from potential conflict points. The following is a wayfinding strategy to accompany Event Center events.

9.2.1 Pre-Event Wayfinding

- Signage, in accordance with San Francisco standards, directing visitors to arena, transit, taxi stands, identifying bikeways, locations of bicycle parking, bike share pods, etc. within ¼ mile of arena
- Build a base of permanent, intuitive wayfinding network that highlights local transit hubs and major destinations, and includes estimates of walking times along the most comfortable pedestrian corridors.
- Wayfinding efforts will be increased or emphasized during playoff NBA games due to these events attracting out of town attendees who will presumably be unfamiliar with the transportation network and transit options. These efforts may include additional temporary signage in the Event Center vicinity.
- Signage at all corners of the site directing walk-up attendees to Event Center entrances along routes that minimize pedestrian crossings of the Event Center garage driveway.
- Signage directing bicyclists to the indoor bicycle valet parking or temporary bicycle corrals. Signage will be placed at the following locations:
  - Northbound Illinois Street before the entry to the garage
  - Northbound and Southbound Terry François Boulevard just before the site
  - Eastbound 16th Street just before the site
- Signage directing eastbound bicyclists along 16th Street to walk up the sidewalk on the east side of 3rd Street to access bicycle rack parking located in the west plaza.
- Signage that directs vehicles towards the event center garage or other nearby garages/lots, including wayfinding signage on I-280 to direct vehicles to the best exit to access the site.

9.2.2 Post-Event Wayfinding

- Signage at Event Center exits that directs pedestrians leaving the site away from the Event Center garage driveway and towards key destinations such as BART (west and north), Caltrain (north), 22 Fillmore bus route (west) and Muni South Street stop (northwest corner).
- Signage outside bicycle valet parking directing bicyclists to use the Blue Greenway along Terry François Boulevard.
- Signage that directs vehicles towards the suggested post-event route, including garage exit wayfinding.

CHAPTER 10. MONITORING, REFINEMENT, AND PERFORMANCE STANDARDS

The Golden State Warriors will monitor and refine the TMP in conjunction with the City of San Francisco and the various transit providers throughout the life of the project through monitoring during the project's first four years of operations and an annual surveying and reporting program thereafter. The TDM plan will be continually refined by improving existing measures and introducing new strategies.

10.1 PURPOSE

The monitoring and refinement of the TMP will be conducted to accomplish the following objectives.

1. Weekday Event Auto Mode Share: Targeted average auto mode share should be no greater than 53 percent for weekday peak event arrivals (6:00 PM – 8:00PM).
2. Weekend Event auto Mode Share: Targeted average auto mode share should be no greater than 59 percent for weekend peak event arrivals (6:00 PM – 8:00PM).
3. Vehicle Queuing on City Streets: Traffic entering the parking garage from eastbound 16th Street does not spill back to 16th Street or into the Third Street intersection due to garage ingress.
4. Vehicle Queueing on City Streets: Event traffic does not block access to the UCSF emergency room entrance for emergency vehicles or patients on Mariposa Street between I-280 and Third Street.
5. Pedestrian Flows: Pedestrians do not spill out of sidewalks onto streets with moving vehicles, or out of crosswalks when crossing the street.
6. Bicycle Parking: Signage is clearly visible to direct bicyclists to event valet and other bicycle parking, and ensure that adequate bicycle parking supply is provided to accommodate a typical peak event.
7. Transit Mode Share: All Muni light rail and special event shuttle passengers are able to board their transit vehicle within 45 minutes following an event.
8. Good Neighbor: Mission Bay TMA shuttles continue to run and maintain capacity for simultaneous neighborhood use.

10.2 MONITORING METHODS

The following methods will be employed to monitor TMP strategies.

1. Quarterly Coordination Meetings – the on-site Transportation Coordinator and key Event Center staff will meet quarterly with the City's designated representative, SFMTA TDM Manager, other key City staff, and other transportation service providers to evaluate the TMP strategies throughout the life of the project.
2. Inaugural Event Monitoring – a designated team of Event Center and City staff will monitor pre-event and post-event transportation conditions at several of the first Warriors' games and concerts held at the Event Center, per Performance Standards described in Section 10.4 and relevant adopted City standards.

3. Subsequent Event Monitoring - a designated team of Event Center and City staff will monitor pre-event and post-event transportation conditions intermittently during the first four years of operation at the Event Center, per Performance Standards described in Section 10.4 and relevant adopted City standards.

4. Curb Pick-Up and Drop-Off Operations – the on-site Transportation Coordinator will regularly monitor curb operations during the first year of operation.

5. Event Attendee Surveys – annual travel surveys of at least 600 attendees[5] will be conducted at five weekday evening games and at one of each other event type (including a dual-event scenario, if one occurs) at the Event Center. The surveys will identify such data as pre-event origin and post-event destination, arrival and departure times, arrival and departure modes, transit provider, parking location, number of vehicle occupants (auto mode), etc.

6. Event Center Development Employee Surveys – annual travel surveys of permanent and temporary employees will be conducted to identify the same travel information for Warrior employees as well as to determine their awareness of alternative modes and travel demand management programs that are available to them. Warriors will commit to a minimum of 60 percent survey completion rate.

7. Mission Bay Neighbor Surveys – travel surveys will be conducted during the initial year at the Event Center to identify the same travel information for local residents and employers, who will be contacted via the Mission Bay Citizens Advisory Committee (CAC) distribution list. The results of these surveys will be shared and discussed with the CAC as requested.

8. UCSF Surveys –travel surveys will be conducted during the initial year at the Event Center to identify the adequacy of access for emergency vehicles and personal to the UCSF hospital center and children's emergency room. Surveys will include UCSF campus staff and emergency personnel.

9. Parking Strategies – data will be collected on parking utilization rates, and effectiveness of on-site and off-site remote parking strategies, for all event and no-event types.

10.3 MONITORING DOCUMENTATION

The results of the monitoring process will be documented as follows.

1. TMP Travel Survey Memo – a memorandum will be prepared within three months of the inaugural events (NBA game, concert, and convention) that documents the results of the travel surveys as well as ongoing event monitoring.

2. TMP Monitoring Report – a report will be developed and submitted to OCII annually, beginning at the end of the first year of operation of the Event Center Development, that addresses how effectively the TMP is meeting the monitoring objectives described above, while also proposing changes, adjustments, and improvements to the TMP and TDM as needed. The survey will be developed in coordination with SFMTA and OCII.

[5] Comparable to surveys conducted at other new, urban multi-purpose venues (including Barclays Center in Brooklyn, NY).

10.4 PERFORMANCE STANDARDS

The TMP includes various performance measures once the project is in operation and initial monitoring results are available, the results will be measured against these criteria. If not achieved, the Warriors will be required to work with the appropriate agency or stakeholder group to ensure that the standards are met. The following performance standards have been developed:

1. Weekday Auto Mode Share: Targeted average auto mode share should be no greater than 53 percent for weekday peak event arrivals (6:00 PM – 8:00PM).

2. Weekend Auto Mode Share: Targeted average auto mode share should be no greater than 59 percent for weekend peak event arrivals (6:00 PM – 8:00PM).

3. Vehicle Queuing on City Streets: Traffic entering the parking garage from eastbound 16th Street does not spill back to 16th Street or back to the 3rd Street intersection due to garage ingress.

4. Vehicle Queuing on City Streets: Event traffic will not block access to the UCSF Emergency Room entrance for emergency vehicles or patients on Mariposa Street between I-280 and 3rd Street.

5. Pedestrian Flows: Pedestrians do not spill out of sidewalks onto streets with moving vehicles, or out of crosswalks when crossing the street.

6. Bicycle Parking: Signage is clearly visible to direct bicyclists to event valet and other bicycle parking, which has an adequate supply to accommodate a typical peak event.

7. Transit Mode Share: All Muni Metro and additional shuttle passengers are able to board their transit vehicle within 45 minutes following an event.[6]

8. Good Neighbor Policy: Mission Bay TMA shuttles continue to run and maintain capacity for simultaneous neighborhood use.

In the event that ongoing monitoring shows at any time that the performance standards outlined above are not being met, the Warriors will explore additional travel demand strategies, operational efforts, or minor redesigns to meet the goals of this TMP. Revisions to policy will be brought before the Mission Bay CAC, which includes representatives from UCSF, as requested by that body for public comment prior to implementation. A representative list of possible strategies is as follows:

1. Increase Warriors contribution to the Mission Bay TMA to directly fund incremental, event-only service, which may include additional shuttle bus purchases and/or expanded hours of operation.

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[6] 45 minutes has been deemed an appropriate period of time given the anticipated time patrons will spend egressing from the building, crossing the 3.2 acre plaza, locating the appropriate transit stop for their final destination, and queuing accordingly. It reflects anticipated delay by some patrons who may remain in the Event Center following an event's end to take advantage of promotions, watch post-game interviews, etc., and by other guests who may patronize the retail businesses located on-site following an event but prior to leaving Mission Bay.

2. Establish a partnership with a private shuttle provider for incremental, event-only service to and from satellite parking locations (if designated) or transit centers.

3. Facilitate charter bus/private shuttle program purchases for group ticket sales and/or suite purchases for events. Reduce the project parking demand through a variety of mechanisms, including pricing.

4. Explore partnerships with car-sharing services (e.g., Zipcar, City CarShare) for spaces on-site to reduce car ownership amongst employees.

5. Expand media campaigns, including in social media, which promote walking and/or bicycling to the event center.

6. Conduct cross-marketing strategies with event center businesses (e.g., 10 percent off merchandise/food if patrons arrive by transit and/or bike or on foot).

7. Carry out public education campaigns.

8. Offer special event ferry service to the closest ferry station to the project site (similar to the existing service provided between AT&T Park and Alameda, Marin and Solano Counties by Golden Gate Transit, Alameda/Oakland and Vallejo ferry service).

9. Provide transit fare subsidies to event ticket holders.

10. In consultation with the SFMTA, remove any street furniture or landscaping obstructing pedestrian paths of travel or Muni staging areas.

11. Cooperate with future City efforts for active interventions to effectively manage and price the parking supply in the project vicinity to reduce traffic congestion.

APPENDIX A:
EVENT ACTIVITY SEQUENCES

Typical Warriors Game Sequence (7:30 pm tip off)

Day Prior 2 to 4 pm	If the game is nationally televised (5-7 games per year), 1-2 TV trucks for the national broadcaster(s) will typically arrive the day before the game. Trucks are parked in the loading dock and technicians will begin to setup for game broadcast.
Game Day 7 am to noon	Game day food service deliveries at loading dock (scheduled around TV broadcast and team arrival and departures). Average Time of delivery is scheduled to avoid peak commute hours and other factors that may influence efficiency and impact. Average individual deliveries required per Warriors game is six. Most if not all are scheduled to occur the day prior.
9 am	Food service prep team arrives. Typically 25 to 35 game day personnel plus approximately 30 baseline staff. Staff will arrive on foot and be encouraged to use public transit. Home and visiting team TV trucks *(2 trucks)* arrive and deploy in the loading dock. If trucks are in market and the dock is available, they may arrive the day before the event. Typical call is morning on game day. The trucks can arrive as late as early afternoon.
10 am	TV broadcasting crew arrives one hour following TV truck arrival and begins to prepare for the game broadcast. Typically 40 personnel total. The crew arrives via the loading dock. Pre-game shoot around. Visiting teams will in some cases use an off-site venue for shootaround. Specific times vary. The window is typically 10 am to 1 pm. Typically 25 personnel per team. Visiting team arrives in two buses. Home team arrives individually. After pre-game shoot around, visiting players and coaches and home team players will typically leave the building. The visiting team arrives and departs via the loading dock. The home team will either use the loading dock or segregated parking in the Event Center garage.
1 pm	Building pre-cleaning crew arrives. This practice varies from building to building and is more common for outdoor venues. Personnel vary based on event type and general building practice. Likely 15 to 20 total. In some cases, there is no pre-clean. In others, the pre-clean happens early in the morning on game day. The crew will arrive at the staff entrance on foot and be encouraged to use public transit.
5 to 5:30 pm	Teams return for the game. The visiting team will arrive in two buses via the loading dock. The home team will either use the loading dock or segregated parking in the Event Center garage.
5 to 6 pm	Game day building staff arrives. Includes guest service and food service personnel. Typically 500 to 600 total. Staff will arrive at the staff entrance on foot and be encouraged to use public transit.
5:30 to 6 pm	Police, building security, and guest services personnel deploy to manage guest ingress approximately 30 minutes prior to doors.

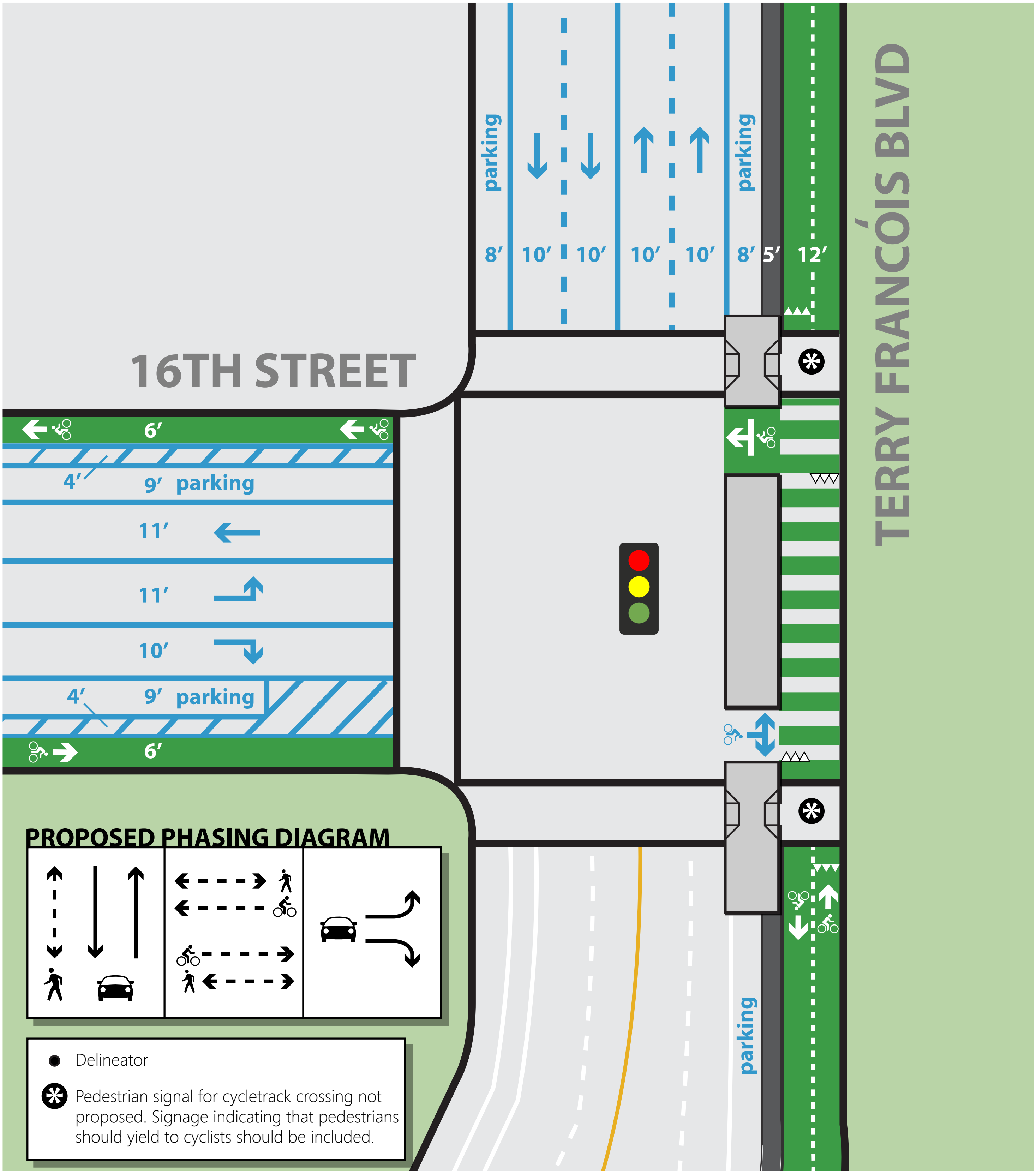
6 to 6:30 pm	Doors open 60 to 90 minutes prior to tip off. Guests begin to arrive. We anticipate that approximately 80% of guests will access the building via the entrance at the main plaza. Arrival distribution varies slightly based on day of week and market dynamics. 80% to 90% of guests are in the building by tip off. Final guests typically enter by the end of the first quarter.
7:30	Tip off.
9:30 pm	Police, building security, and guest services personnel deploy to manage guest egress approximately 30 minutes prior to anticipated game end.
10 pm	Game ends. Broadcast technicians immediately begin load-out.
	Cleaning crew arrives and immediately begins post-show clean. Typically 25 to 50 personnel. The crew will arrive at the staff entrance on foot and be encouraged to use public transit.
	Change over crew arrives and immediately begins change over. Typically 20 personnel. The crew will arrive at the staff entrance on foot and be encouraged to use public transit.
11 to 11:30 pm	Venue clear of guests and all event staff.
Day After Game	
11:30 pm to 12 am	TV trucks leave the venue.
2 to 3 am	Post-game clean complete, cleaning crew leaves the building.
4 am	Change over complete. Crew leaves the building.

Typical Concert Sequence (7:30 pm Show Time)

Event Day	
4 to 8 am	Show trucks (which carry all show components including the stage, sound equipment and controls, video equipment and controls, props) arrive in market. They will typically stage somewhere off site but close to the venue. The number of trucks varies based on the size and complexity of the show. An A list show will usually require approximately 20 trucks Once trucks have been unloaded, they are driven off site and will not return until the show is complete and the load-out process begins.
6 to 8 am	The production team (15 to 30 personnel for A list shows) arrives at the venue as does the local stagehand crew. Initial production trucks access the loading dock and show load-in commences. The production team will arrive in tour buses and access the building via the loading dock. The stagehand crew will arrive on foot and be encouraged to use public transit. The show trucks enter and exit the venue as the show components are unloaded. Load-in typically occurs over approximately four to six hours.
7 am to noon	Event day food service deliveries at loading dock (scheduled around other event related arrivals and departures). Average individual deliveries required are six. Most if not all are scheduled to occur the day prior.
9 am	Food service prep team arrives. Typically 25 to 35 event day personnel plus approximately 30 baseline staff. Staff will arrive on foot and be encouraged to use public transit.
1 pm	Building pre-cleaning crew arrives. This practice varies from building to building and is more common for outdoor venues. Personnel vary based on event type and general building practice. Likely 15 to 20 total. In some cases, there is no pre-clean. In others, the pre-clean happens early in the morning on event day. The crew will arrive at the staff entrance on foot and be encouraged to use public transit.
2 to 4 pm	Performer(s) arrive(s) for sound check. Sound check typically lasts 30 to 60 minutes. The performer(s) will arrive in tour buses via the loading dock.
5 to 6 pm	Event day building staff arrives. Includes guest service and food service personnel. Typically 500 to 600 total and varies based on show type and expected attendance. Staff will arrive at the staff entrance on foot and be encouraged to use public transit.
5:30 to 6 pm	Police, building security, and guest services personnel deploy to manage guest ingress approximately 30 minutes prior to doors.
6 to 6:30 pm	Doors open 60 to 90 minutes prior to show time. Guests begin to arrive. We anticipate that approximately 80% of guests will access the building via the main entrance for Event Center shows, and 80% will access the building via the main theatre entrance for theatre shows. Arrival distribution varies slightly based on day of week and market dynamics. 90%+ of guests are in the building by show time. Final guests typically enter within another 30 minutes following show time.
7:30 pm	Show time.

10 pm	Police, building security, and guest services personnel deploy to manage guest egress approximately 30 minutes prior to anticipated show end.
10:30 pm	Show ends. Production team immediately begins load-out.
	Cleaning crew arrives and immediately begins post-show clean. Typically 25 to 50 personnel. The crew will arrive at the staff entrance on foot and be encouraged to use public transit.
	Change over crew arrives. Typically 20 personnel. The crew will arrive at the staff entrance on foot and be encouraged to use public transit.
11:30 to 12 am	Venue clear of guests and all event staff.
Day After Event	
1 to 3 am	Show trucks leave the venue.
2 to 3 am	Post show clean complete, cleaning crew leaves the building.
4 am	Change over complete. Crew leaves the building.

APPENDIX B:
INTERSECTION CONCEPT LEVEL FIGURES



N

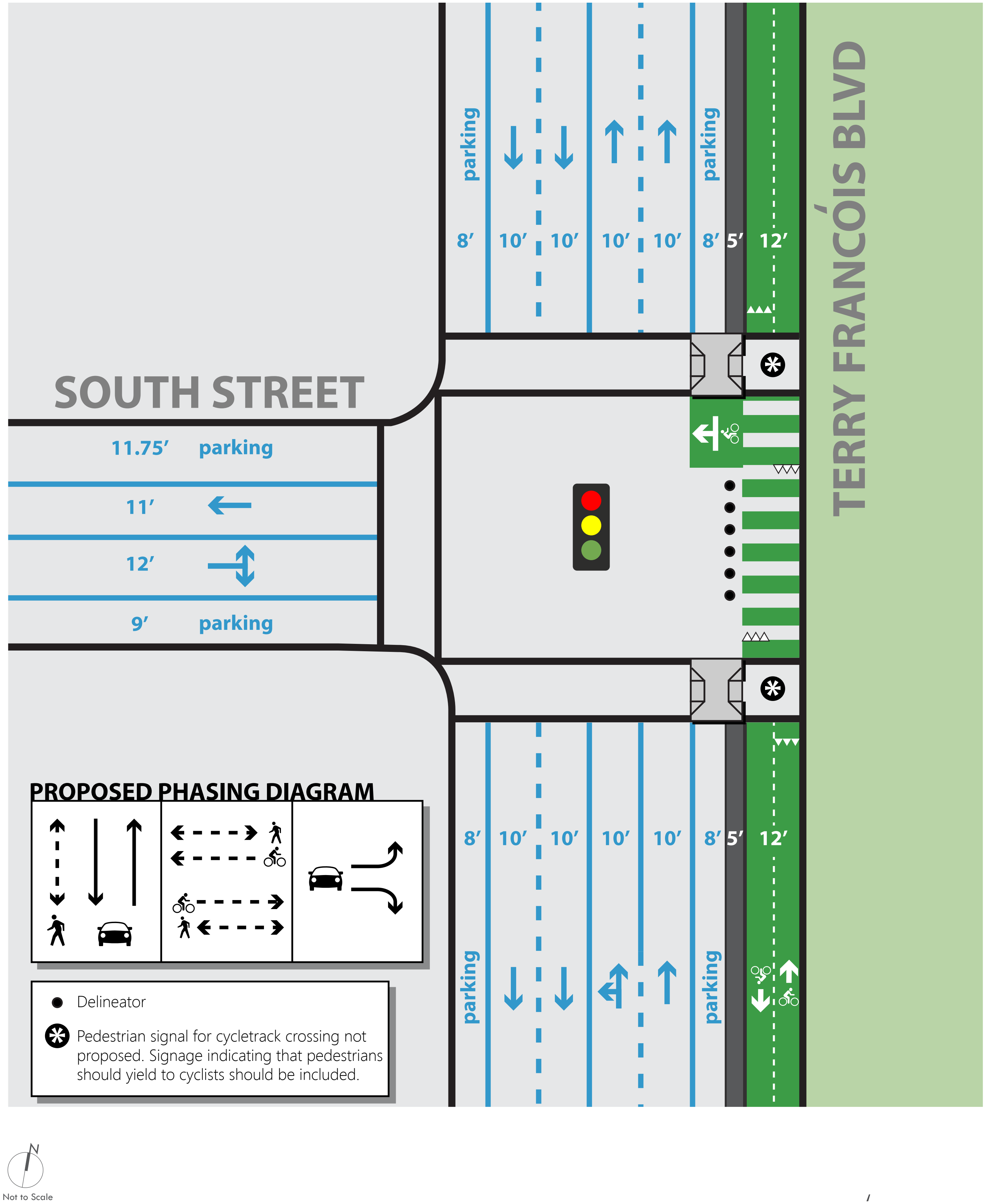
Not to Scale

16TH STREET & TERRY FRANCÓIS BLVD

FIGURE 1

FEHR PEERS

SF13-0682_SF Warriors Arena TMP\Graphics



SOUTH STREET & TERRY FRANCÓIS BLVD

FIGURE 2

FEHR & PEERS

SF13-0682_SF Warriors Arena TMP\Graphics

APPENDIX TR

Transportation Technical Appendix

APPENDIX TR

TRANSPORTATION TECHNICAL DATA

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TRANSPORTATION ANALYSIS SCOPE OF WORK

SAN FRANCISCO
PLANNING DEPARTMENT

TRANSPORTATION STUDY
SCOPE OF WORK
ACKNOWLEDGEMENT AND APPROVAL

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Date: August 19, 2014

Transmittal To: LCW and Adavant Consultants, Transportation Consultants

The proposed scope of work for the Golden State Warriors Event Center and Mixed Use Development on Mission Bay Redevelopment Area Blocks 29-32, dated August 2014 is hereby

☒ Approved as submitted

☐ Approved as revised and resubmitted

☐ Approved subject to comments below

☐ Not approved, pending modifications specified below and resubmitted

Signed: [signature] Transportation Planner [signature] Environmental Review Planner

Note: A copy of this approval and the final scope of work are to be appended to the transportation study. The Department advises consultants and project sponsors that review of the draft transportation report may identify issues or concerns of other City agencies not addressed in the scope of work hereby approved, and that the scope of work may need to be modified to accommodate such additional issues.

LCW Consulting

Adavant Consulting

Scope of Work

Transportation Analysis for the proposed Event Center and Mixed Use Development at Mission Bay South Area Blocks 29-32 EIR

Final: August 13, 2014

Adavant Consulting and LCW Consulting are pleased to submit this scope of work to prepare the transportation section of the Environmental Impact Report (EIR) for the proposed event center and sports arena to be located in the Mission Bay South Area of San Francisco. This scope of work follows the San Francisco Planning Department's "Transportation Impact Analysis Guidelines for Environmental Review, October 2002" (*SF Guidelines*), as applicable.

Task 1 – Conduct Project Scoping

The San Francisco Planning Department requires that the scope of work for the transportation analysis be reviewed and approved by the designated transportation planner and environmental staff coordinator prior to commencement of any work by the transportation consultants. The transportation consultants will meet and consult with Environmental Planning staff, the Office of Community Investment and Infrastructure (OCII), and other city agencies, as determined by Environmental Planning to review, discuss and modify the draft scope of work and define the required level of detail for the transportation analysis. The discussions will focus on items such as:

- Project definition and components, including alternatives;
- Data collection (traffic counts, locations, day of week, and time of day);
- Assumptions (study area, land use types, cumulative growth, etc.);
- Methodology (trip generation methodology and appropriate sources, travel forecasts, etc.);
- Analysis scenarios (future years, development and transportation network and transit service assumptions);
- Extent of analysis of the alternatives to the proposed project; and
- Transportation section schedule and deliverables.

Task 2 – Develop Project Description and Analysis Methodology

The transportation consultants will review the project definition, land use, and transportation circulation assumptions prepared by the project sponsor and will provide written request for clarification and additional data needs that might be necessary to conduct the transportation analysis.

The transportation consultants will meet with Environmental Planning staff to confirm the definition of analysis scenarios and direction on the analysis methodologies proposed for the transportation impact assessment. The travel demand analysis of the land use program of the proposed project (e.g., office, retail, restaurant, movie theater) will be conducted using the *SF Guidelines*, while the travel demand analysis for the arena and other ancillary sport uses will be conducted based on proposed arena seated capacity, travel characteristics at similar facilities (e.g., mode of travel, trip distribution, vehicle occupancy, parking demand, etc.), anticipated transportation infrastructure improvements, and proposed access and egress routes to and from the site. For the live theater use, the travel demand analysis will be based on the number of seats, sell-out conditions with one performance on weekdays and two performances (one matinee and one evening) on a Saturday. The analysis will assume movie theater and live theater functions taking place concurrently with an event at the event center.

The transportation consultants will define the analysis scenarios in detail. Table 1 on the next page presents the list of transportation analysis scenarios for the proposed project components.

The transportation consultants will prepare a technical memorandum documenting the travel demand methodology, and assumptions for the arena and other proposed uses. The memorandum will include a description of each of the analysis scenarios and assumptions used for the impact analysis, including land use, background, project-related transportation improvements, background traffic assumptions, and parking assumptions. The proposed project travel demand will be presented for each analysis scenario. This technical memorandum will be presented to the Planning Department for review and approval prior to proceeding with the transportation impact analysis. It is anticipated that SFMTA will also review and provide feedback on this technical memorandum.

The transportation consultants will work with Environmental Planning and the project sponsor to develop the definition of the project alternatives.

Table 1 - Scenarios for Transportation Analysis
Event Center at Mission Bay Blocks 29-32

	WEEKDAY PERIODS						SATURDAY		
	PM COMMUTE (4 To 6 PM)		EVENING (6 to 8 PM)		LATE PM (9 - 11 PM)		EVENING PERIOD (7 to 9 PM)		
SCENARIOS	w/out SF Giants Game	with SF Giants Game	w/out SF Giants Game	with SF Giants Game	w/out SF Giants Game	with SF Giants Game	w/out SF Giants Game	with SF Giants Game	Number of Analysis Scenarios
Existing Scenarios									
Existing	1	1	1	1	1	1	1	1	8
Project Scenarios									
Existing + Project w/out events at arena	1						1		2
Existing + Project w/ Basketball Game	1	1	1	1	1	1	1	1	8
Existing + Project w/ Convention Event	1								1
Future Year 2040 Cumulative									
Project - No Event at arena	1						1		2
Project – with Event at arena									
- with Basketball Game	1						1		2
- with Convention Event	1								1
TOTAL	**7**	**2**	**2**	**2**	**2**	**2**	**5**	**2**	**24**

Task 3 – Data Collection

Traffic, pedestrian, bicycle and off-street parking data collection will be conducted for the following time periods:

- Weekday p.m. peak commute period (4 to 6 p.m.) with no event at AT&T Park
- Weekday evening period (6 to 8 p.m.) with no event at AT&T Park
- Weekday late evening period (9 to 11 p.m.) with no event at AT&T Park
- Saturday evening (7 to 9 p.m.) with no event at AT&T Park
- Weekday p.m. peak commute period (4 to 6 p.m.) with game at AT&T Park
- Weekday evening period (6 to 8 p.m.) with game at AT&T Park
- Weekday late evening period (9 to 11 p.m.) with game at AT&T Park
- Saturday evening (7 to 9 p.m.) with game at AT&T Park

Traffic: The transportation consultants will obtain intersection turning movement volume counts at the 21 study intersections listed in Table 2a for the proposed project site from previously collected traffic count efforts, supplemented with new counts performed in May (May 15th, 20th, 21st, 27th, 29th, and 31st) and June (June 7th and 11th) 2014, as appropriate (and previously approved by the Planning Department).

Table 2a - Intersection Analysis Locations

Location		Location	
1	King St/Third St	11	Terry Francois Blvd/16th St [a]
2	King St/Fourth St	12	Illinois St/16th St
3	King St/Fifth St/I-280 on-/off-ramps	13	Third St/16th St
4	Fifth/Harrison/I-80 WB off-ramp	14	Fourth St/16th St
5	Fifth/Bryant.I-80 EB on-ramp	15	Owens St/16th St
6	Third St/Channel St	16	Seventh St/Mississippi St/16th St
7	Fourth St/Channel St	17	Illinois St/Mariposa St
8	Seventh St/Mission Bay Drive	18	Third St/Mariposa St
9	Terry Francois Blvd/South St	19	Mariposa St/I-280 NB off-ramp
10	Third St/South St	20	Mariposa St/I-280 SB on-ramp
		21	Third St/Cesar Chavez St

Note:
[a] Future analysis location - not currently an intersection. Sixteenth Street is not continuous between Illinois Street and Terry François Boulevard and will be extended from Illinois Street to Terry François Boulevard as part of the proposed project.

The transportation consultants will also gather on-ramp and off-ramp traffic data from Caltrans and from peak period turning movement volume counts at ramp touchdown intersections for the I-80 and I-280 ramp locations shown in Table 2b. Freeway on-ramps and off-ramps will be analyzed based on peak hour volumes. Freeway ramp volume data will be obtained from the intersection traffic counts listed in Table 2a and supplemented, as necessary.

Table 2b – Freeway Ramp Analysis Locations

Location		Location	
1	I-80 EB on-ramp at Sterling/Bryant	4	I-280 SB on-ramp at Pennsylvania
2	I-80 EB on-ramp at Fifth/Bryant	5	I-280 NB off-ramp at Mariposa
3	I-80 WB off-ramp at Fifth/Harrison	6	I-280 SB on-ramp at Mariposa

Transit: Transit data will be obtained from SFMTA and regional transit operators, as appropriate, for weekday p.m., evening, late evening, and Saturday evening conditions. The transportation

consultants will compile data on all Muni bus routes and rail lines (including motor coach, trolley coach, and light rail service) and stop locations within a study area generally bounded by Townsend Street, Seventh Street, Mississippi Street, and 18th Street.

This work will include a description of Muni's transit route service hours, peak periods, stops and headways on weekdays and Saturdays for the bus routes and rail lines within the study area. The latest available weekday p.m., weekday evening, late evening, and Saturday evening peak hour ridership and capacity utilization at the maximum load points (MLP) for the Muni routes and lines serving the transportation study area will be requested from Muni for the days and time periods listed in Table 1 (p. 3).

Existing ridership and capacity utilization information for the Muni bus routes and rail lines will be provided individually, as well as combined, based on access between the transportation study area and the four San Francisco superdistricts.

Preliminary corridor grouping of Muni routes and lines for the project site (subject to discussion with the SFMTA):

- North/South: K Ingleside, T Third, N Judah, 30 Stockton, 45 Union Stockton.
- East/West: 10 Townsend, 22 Fillmore, 47 Van Ness.

The transportation consultants will also compile data on regional transit operators (BART, AC Transit, Golden Gate Transit bus and ferry service, SamTrans and Caltrain) including the nearest transit stop location within the study area boundary and the latest scheduled operations on weekdays and Saturdays. Weekday and Saturday ridership and capacity utilization for the regional service providers for the analysis periods identified in Table 1 (p. 3) will be obtained from the regional operators.

The two existing shuttle systems (i.e., the Mission Bay Transportation Management Association and the UCSF shuttle systems) in the vicinity of the project site will be described (e.g., routes, headways, hours of operation, restrictions on use, and ridership and capacity, if available).

Existing Muni and regional service provider weekday p.m. peak hour screenlines will be obtained from the Planning Department.

Pedestrians: The transportation consultants will collect pedestrian counts at 15-minute intervals for the days and time periods listed in Table 1 (p. 3) at the locations shown in Table 3, with the exception that weekday late evening period (9 to 11 p.m.) without a game at AT&T Park will not be conducted because very few pedestrians are present at the study locations during the late evening period. Effective sidewalk widths will be measured at each sidewalk analysis location, and in the vicinity of the project site.

Table 3 - Crosswalk and Sidewalk Analysis Locations [a]

Location	Location
Crosswalk Analysis [a]	**Sidewalk Analysis**
1 Third St/South St	1 Both sides of Third St between South and 16th streets
2 Third St/16th St	2 North side of 16th St [b]
3 Terry Francois Blvd/South St [b]	3 South side of South St [b]

Notes:
[a] All crosswalks at the listed intersections.
[b] Future analysis location.

Bicycles: The transportation consultants will conduct bicycle counts at 15-minute intervals for the days and time periods listed in Table 1 (p. 3) at the locations shown in Table 4, with the exception that weekday late evening period (9 to 11 p.m.) counts without a game at AT&T Park will not be conducted because very few bicyclists are present at the study locations during the late evening period.

Table 4 - Bicycle Analysis Locations

Location
1 Both sides of Third Street between South and 16th streets
2 Both sides of 16th Street between Third and Fourth streets
3 Terry Francois Boulevard between South and 16th streets

Parking: The parking study area is generally bounded by Townsend Street, Seventh Street, Mississippi Street, and 18th Street. The transportation consultants will collect off-street public parking supply and occupancy for the days and time periods listed in Table 1 (p. 3) from available sources such as the SF*park*, SFMTA, data previously collected for the Piers 30-32 site, and other project technical studies, and conduct additional surveys for facilities and time periods for which parking supply and occupancy data is not available. Current hours of operation and characteristics such as whether they are publicly accessible, of the off-street facilities will be identified.

The transportation consultants will also document current on-street parking regulations and illegal parking on the blocks adjacent to the proposed project, and generally describe the on-street parking regulations and parking occupancy within the parking study area. Any loading observations will also be noted.

Task 4 – Document Existing Conditions

Using the data collected in Task 3, the transportation consultants will document existing traffic, transit, parking, pedestrian, bicycle, loading, and emergency vehicle access conditions within the transportation study areas and at the study intersections shown in Table 2a, including:

- A base map and text for the study area, describing the street designations, street names, number of lanes and traffic flow directions;
- A description of existing uses and vehicular access to the project site;
- An assessment of existing parking operations at the project site, including hours of operation, supply and hourly utilization;
- Intersection level of service (LOS) conditions during the peak hours at the study intersections identified in Table 2a using the 2000 Highway Capacity Manual operations methodology (HCM 2000) and the Synchro traffic analysis software;
- Freeway on-ramp and off-ramp LOS conditions during the peak hours at the study locations identified in Table 2b using the 2000 HCM methodology and the HCS analysis software. Freeway on-ramp junctions will be quantitatively evaluated based on the HCM 2000 merge/diverge methodology. Vehicle queuing at freeway off-ramps will be quantitatively assessed based on field observations and intersection HCM 2000 LOS results.
- Graphics indicating the existing peak hour traffic volumes and lane configuration at the study intersections identified in Table 2a;
- A map and discussion of Muni and regional transit services within the transportation study area, including bus routes and bus stop locations, as well as conditions at each route's maximum load point. A quantitative description of weekday p.m. commute period, weekday evening, weekday late evening and Saturday evening peak hour transit conditions will be provided for Muni and the regional transit service as available. Planned changes to Muni service in the Transit Effectiveness Program (TEP) will also be described. Identification of any operational conflicts between buses or streetcars and other vehicles will be described.
- Pedestrian LOS analyses at the study locations identified in Table 3 using the HCM 2000 methodology. A qualitative assessment of pedestrian conditions (conflicts, safety and operational issues) will also be conducted;
- Bicycle flows at the study locations identified in Table 4, and a qualitative discussion of general bicycle circulation conditions and the identification of any safety and right-of-way issues in the vicinity of the project site, including the description and mapping of bicycle routes. A description of changes to the bicycle network within the transportation study area being considered by the San Francisco Bicycle Plan and other City proposals;
- A qualitative assessment of existing weekday and Saturday on-street commercial loading conditions within the transportation study area;
- A description of the existing emergency vehicle access routes to the project site;
- Passenger loading, including disabled loading and parking; and

- Quantitative assessment of off-street parking supply and utilization within the parking study area, and qualitative discussion of on-street parking regulations and utilization.

Task 5 – Determine Project and Project Alternatives Travel Demand

The future travel demand estimates will be developed by the transportation consultant, and reviewed and approved by Planning Department staff prior to use in the transportation impact assessment. Travel demand estimates will be provided for vehicular, transit, pedestrian, and bicycle modes, and will include internal and external trips for each project component listed in Table 1, as appropriate.

Sports Arena: Since sports arenas are considered "special generators," each with unique trip generation and travel behavior patterns, the analysis of their impact cannot follow some of the methodologies presented in the *SF Guidelines*. Thus, the travel demand analysis for the operation of basketball games, conventions, and other events will be conducted based on proposed arena seated capacity, typical weekday and weekend start times of the games/events, available travel characteristics of other venues such as AT&T Park and other comparable venues (e.g., mode split, trip distribution, vehicle assignment, parking demand, transit demand), anticipated transportation infrastructure improvements, and proposed ingress and egress routes for the new arena. Loading demand for the arena will be based on information obtained from the project sponsor.

Other Project Land Uses: The transportation consultants will estimate the travel demand for standard proposed land uses (i.e., retail, office, restaurant, movie theater) using the methodology and information provided in the *SF Guidelines* (trip generation rates, mode splits, trip distribution, loading demand, parking demand). For the live theater use, trip generation will be based on the number of seats, sell-out conditions with one performance on weekdays and two performances (one matinee and one evening) on a Saturday. Since the *SF Guidelines* only provide trip generation rates for the weekday p.m. peak hour, weekday evening and weekday late evening travel demand will be estimated based on temporal distribution patterns contained within Pushkarev and Zupan's *Urban Space for Pedestrians*, as well as other sources, as determined appropriate by the Planning Department. To determine Saturday evening travel demand appropriate adjustments will be made to obtain similar factors for the Saturday daily based on the Saturday to weekday daily ratio from *ITE Trip Generation Report, 9th Edition,* Pushkarev and Zupan's *Urban Space for Pedestrians*, as well as other sources, as determined appropriate by the Planning Department.

The transportation consultants will estimate the number of vehicle trips associated with the existing parking lots located at the project site using the methodology described in the *SF Guidelines* (i.e., actual traffic data collected as part of Task 3, rather than trip generation estimates). Vehicles currently utilizing the existing surface parking facilities will be redistributed to park at other nearby off-street facilities based on their existing parking availability data obtained in Task 3.

Documentation: The transportation consultants will prepare a technical memorandum describing the assumptions, methodology and results of the travel demand for the proposed project component listed in Table 1 (p. 3). The technical memorandum will summarize the data sources, methodologies and recommended rates and factors to be used in the trip generation, mode choice, vehicle occupancies and parking demand analyses. The technical memorandum will summarize the travel demand estimates for the proposed project by land use type, mode of travel and place of origin. A graphic showing vehicle-trip distributions and assignments will also be included. This technical memorandum will be submitted to Planning Department staff in paper and electronic format for their

review and approval prior to performing the transportation impact analyses (Task 6 – Transportation Impacts Analysis). It is anticipated that this document will also be reviewed by OCII and SFMTA staff, as appropriate.

Alternatives: Travel demand estimates for up to two alternatives to the proposed project will be developed based on the methodology presented above for the proposed project uses. The scenarios and time periods of analysis will be based on the types and quantities of the land uses included in the alternative (e.g., trip generation for Saturday daily and evening peak hour conditions will not be prepared for an alternative including primarily office uses). The travel demand for the alternatives will be documented in a separate technical memorandum, and will be reviewed by Planning Department, OCII and SFMTA staff. See Task 8 for alternatives analysis.

Task 6 – Transportation Impact Analysis

The transportation consultants will identify the transportation impacts associated with the proposed project listed in Table 1 (p. 3). This will include impacts on the study intersections, impacts on transit (capacity utilization and operation), pedestrian circulation, bicycle circulation, passenger and freight loading supply and demand conditions, construction related activities, and emergency vehicle access to the site. A parking supply and demand analysis will also be presented for informational purposes.

The transportation impact analysis will reflect planned improvements to the transportation network (e.g., relocation and realignment of Terry Francois Boulevard with the eastern edge of Blocks 30 and 32), any changes/features included as part of the proposed project (e.g., wider sidewalks, plazas, adjacent bicycle lanes), as well as the draft Transportation Management Plan for events at the proposed arena.

TASK 6.1 – TRAFFIC IMPACTS

The transportation consultants will calculate peak hour intersection and freeway ramp LOS using the HCM 2000 methodology for the study intersections identified in Table 2a for the following overall scenarios:

- Existing plus Project
- Future year 2040 Cumulative - no Event
- Future year 2040 Cumulative - with Event

Table 1 on page 3 details the number of Existing plus Project and cumulative scenarios and the time periods of analysis.

The traffic volumes at the study intersection and freeway ramps for the 2040 Cumulative conditions will be based on the estimates from the latest travel demand forecasting data available from the San Francisco County Transportation Authority (SFCTA). The future cumulative traffic conditions at the study intersections and ramps will account for the vehicle trips generated by the proposed project, as well as the general increase in activity in the area.

The proposed project's contribution to the traffic volumes at the study intersections and freeway ramps will be shown in an Existing plus Project traffic volume figure for each analysis period/scenario, which will also identify the critical movement at each location. Based on this information and the estimated growth in traffic volumes between existing and year 2040 conditions, the transportation consultants will calculate the proposed project contribution to future cumulative conditions at those intersections operating at LOS E or LOS F under 2040 Cumulative conditions, as specified in Table 1 (p. 3). A series of 2040 Cumulative volume figures will then be prepared, identifying the critical movements at each intersection for the various cumulative scenarios.

A vehicle queuing analysis will be conducted at the entrance(s) to the on-site parking facilities, or other nearby off-street parking locations for Existing plus Project scenarios.

Freeway on-ramp junctions will be quantitatively evaluated based on the HCM 2000 merge/diverge methodology. Vehicle queuing at freeway off-ramps will also be quantitatively assessed based on field observations and intersection HCM 2000 LOS results at the freeway off-ramp intersections listed in Table 2b. The analysis will discuss the potential for project to exacerbate existing queuing; project's contributions to traffic on- and off-ramps will be summarized. Because these on-ramps are frequently operating over-capacity during the peak hours, the transportation team will work with the Planning Department to identify a methodology for describing the project's contribution to these conditions.

TASK 6.2 – TRANSIT IMPACTS

The transportation consultants will calculate transit capacity utilization for Muni and the regional transit providers for the following overall scenarios:

- Existing plus Project
- Future year 2040 Cumulative - no Event
- Future year 2040 Cumulative – with Event

Table 1 on page 3 details the number of Existing plus Project and cumulative scenarios and the time periods of analysis.

A transit impact analysis will be conducted for:

- Muni and regional screenlines – weekday p.m. commute peak hour
- Muni and regional routes serving the transportation study area, by individual route/line and by corridor – weekday p.m., weekday evening, weekday late evening and Saturday evening

The transit ridership and capacity for the 2040 Cumulative conditions will be based on the estimates from the latest travel demand forecasting data available from the San Francisco County Transportation Authority (SFCTA), as obtained from the Planning Department and SFMTA. The future cumulative transit conditions will account for the transit ridership generated by the proposed project, as well as the general increase in activity in the area.

The proposed project's contribution to the transit capacity utilization will be estimated, and contributions where 2040 Cumulative conditions exceed the transit operator capacity utilization standard will be identified.

A qualitative assessment of Existing plus Project conditions at the Muni Metro platform on Third Street at South Street will be conducted before and after weekday basketball and non-basketball events, subject to discussion with SFMTA.

TASK 6.3 – PEDESTRIAN IMPACTS

The transportation consultants will perform peak hour pedestrian LOS analyses of Existing plus Project conditions listed in Table 1 (p. 3) at the study locations identified in Table 3 using the HCM 2000 Methodology based on the number of new pedestrians that will be added to the network. Potential pedestrian safety issues will be identified, including vehicular-pedestrian conflicts, interruption of pedestrian circulation and potential safety issues. A qualitative discussion of the project's compliance with the Mission Bay South Area Plan will also be included. Future year 2040 Cumulative pedestrian conditions will be assessed qualitatively.

TASK 6.4 – BICYCLE IMPACTS

The transportation consultants will qualitatively evaluate bicycle conditions for the Existing plus Project scenarios listed in Table 1 (p. 3) at the study locations identified in Table 4. Potential bicycle circulation safety issues will be identified, including bicyclist-vehicular conflicts, interruption of bicycle flow and potential safety issues at the project site, as well as the effect on existing and proposed nearby bicycle routes. In addition, the Mission Bay South Area Design for Development (D4D)[1] requirements for bicycle parking and related facilities will be identified and compared to the proposed supply. Future year 2040 Cumulative bicycle conditions will be assessed qualitatively.

TASK 6.5 – LOADING IMPACTS

The transportation consultants will prepare a loading supply/demand analysis for the proposed project. The proposed on-site loading supply will be compared to the Mission Bay South Area D4D in terms of their location, number of spaces and minimum dimensions, as applicable. The loading supply will also be compared to the estimated demand generated by the proposed project. Additionally, the transportation consultant will assess the proposed loading facilities in terms of their operational characteristics, including truck movement (including truck turning pathways into the loading area), location of trash compactor, storage and removal of garbage.

Passenger loading/unloading, including taxis, charter buses, limousines, and private autos, before and after events at the proposed arena passenger loading/unloading facilities will be assessed.

TASK 6.6 – EMERGENCY ACCESS IMPACTS

The transportation consultants will assess any potential impacts to the emergency access that could result from the proposed project.

TASK 6.7 – CONSTRUCTION IMPACTS

The transportation consultants will qualitatively assess any potential temporary construction-related transportation impacts that would be generated by the proposed project. Construction impact

[1] In combination with the Development Plan, the Mission Bay South Area Design for Development (D4D) document supersedes the San Francisco *Planning Code* for the Mission Bay South Area Development Plan.

evaluation will address displacement of existing parking, the staging and duration of construction activity, truck routings, estimated daily truck volumes, street and/or sidewalk closures, impacts on Muni operations, and construction worker parking.

TASK 6.8 – PARKING IMPACTS

The transportation consultants will prepare a parking supply/code/demand analysis for the proposed project. Handicapped-accessible, bicycle and carshare spaces supplied by the proposed project will be identified. The proposed parking supply will be compared to the requirements of the Mission Bay South Area D4D. Any exceptions to the Mission Bay South Area D4D will be noted.

Any deficit or surplus of parking spaces will be quantified, and discussed in relation to the effect on the parking supply in the area surrounding the project sites. The design of the access to the proposed project's parking facilities will be assessed in terms of operational characteristics.

As described in Task 6.1, a vehicle queuing analysis will be conducted at the project entrance(s) to any proposed parking facility on site other nearby off-street parking locations.

Task 7 – Develop Mitigation/Improvement Measures

Mitigation measures will be proposed to improve operations if significant project-related impacts have been identified, and improvement measures may be proposed where no significant impacts have been identified. In accordance with City guidelines, the report will clearly distinguish between mitigation measures required under CEQA, and transportation improvement measures not related to CEQA significant impacts, such as pedestrian improvement measures, parking access operations, traffic, parking and pedestrian enforcement etc. Responsibility for implementation of identified measures will be identified, where possible.

Task 8 – Alternative Analysis

The No Project Alternative (approved Mission Bay Plan uses on the project site) and a Lesser Intensity Alternative will be assessed qualitatively for various transportation scenarios. Depending on definition of the alternatives and the outcome of the travel demand memo, the Planning Department may require at a later time limited quantitative analysis. The scenarios and time periods of analysis will be based on the types and quantities of the land uses included in the alternative (e.g., trip generation for Saturday daily and evening peak hour conditions will not be prepared for an alternative including primarily office uses). The scenarios will be developed in conjunction with development of the alternatives in consultation with the Planning Department and OCII. The analysis will cover all transportation topics. Travel demand estimates will be prepared for each alternative based on the travel demand methodology presented in Task 5.

Task 9 – Transportation Section of the EIR

The transportation consultants will prepare the transportation setting and impact analysis sections for inclusion in the EIR document. The transportation discussion will follow the format specified by Planning Department staff, and will include setting, methodology, impact assessment, and mitigation and improvement measures. A discussion of the underlying environmental review document (e.g., 1998 SEIR) will also be provided, as needed. An Administrative Draft 1 of the transportation chapter will be submitted to the Planning Department for review by Planning, SFMTA and OCII staff.

All stand-alone submittals of the transportation section of the Draft EIR will be in paper copies (five copies), along with an electronic version. Transportation section versions included as part of the overall Administrative Draft EIR will follow the distribution format determined for the EIR.

As part of the transportation section submittal, the transportation consultants will prepare a comprehensive technical appendix that will include, but not be limited to, the following:

- Proposed project access and internal/external circulation plans;
- Lane geometries at the study intersections;
- Traffic summaries showing turning movement volumes at the study intersections for all periods and scenarios listed in Table 1;
- Intersection and freeway ramp LOS analysis for the periods and scenarios listed in Table 1;
- Transit capacity utilization calculations for Muni and regional transit providers for all the periods and scenarios listed in Table 1;
- Travel demand calculations for the proposed project and alternatives to the project;
- Travel demand analysis Technical Memorandum;
- Pedestrian counts and LOS, and bicycle counts at all study locations;
- Existing and Existing plus Project parking supply and utilization; and
- Draft Transportation Management Plan (to be developed by project sponsor).

Two paper copies and an electronic copy of the draft technical appendix will be submitted to the Planning Department for review by Planning, SFMTA and OCII staff for Preliminary Draft 1 and Preliminary Draft 2 submittals.

Task 10 – Prepare Data for Air Quality and Noise Analysis

The transportation consultants will summarize and package the Existing, Existing plus Project, and 2040 Cumulative traffic volumes developed in the previous tasks for submittal to the noise and air quality analysts for their studies.

Task 11 – Attendance at Meetings

The transportation consultants will meet with the Planning Department, OCII, and other city agencies, as appropriate, to work out details related to transportation scope of work, impact assumptions, methodology, and development of improvement and/or mitigation measures.

Task 12 – Draft EIR Response to Comments

The transportation consultant will prepare responses to comments made by public agencies and members of the public at large related to the transportation section of the Draft EIR.

TR-2

TRAVEL DEMAND ANALYSIS

PROPOSED PROJECT TRAVEL DEMAND MEMORANDUM

LCW Consulting

Adavant Consulting

Memorandum

To: Brett Bollinger/Chris Kern/Viktoriya Wise/Kansai Uchida – SF Planning Department

Catherine Reilly – SF Office of Community Investment and Infrastructure

From: José I. Farrán – Adavant Consulting; Luba C. Wyznyckyj – LCW Consulting

Date: May 22, 2015 Final Memorandum (2nd update)

Re: Travel, Parking, and Loading Demand Estimates for the Proposed Event Center & Mixed-Use Development at Mission Bay Blocks 29-32 – Case No. 2014.1441E

This technical memorandum describes the methodology and assumptions used to determine the travel demand for the proposed event center and mixed-use development at Mission Bay Blocks 29-32, and presents the estimate of project-generated person and vehicle trips that would travel to and from the proposed project. Parking and commercial/service loading demand estimates for the proposed uses are also presented. Detailed travel demand calculation and supporting data are included in the attached Appendix.

Introduction and Background

GSW Arena LLC (GSW), an affiliate of Golden State Warriors, LLC, which owns and operates the Golden State Warriors National Basketball Association (NBA) team, proposes to develop an approximately 12-acre project located in San Francisco on land referred to as Blocks 29-32 in the Mission Bay South Plan Area. The proposed project consists of a new approximately 18,000-seat multi-purpose event center and ancillary development including multiple office buildings, retail, restaurants, structured parking, plaza areas, and other amenities. The event center would host the Golden State Warriors basketball team during the NBA season, as well as provide a year-round venue for a variety of other uses, including concerts, family shows, other sporting events, cultural events, conferences and conventions. The rectangular site is bound by Third Street to the west, South Street to the north, Terry François Boulevard to the east, and 16th Street to the south, as shown in an aerial map of the project site in Figure 1. It should be noted that as part of the buildout of Mission Bay, Terry François Boulevard will be relocated to align with the eastern edge of Blocks 30 and 32[1].

[1] Relocation of Terry François Boulevard will be implemented as part of the Mission Bay Area South Infrastructure Plan by FOCIL-Mission Bay, the entity serving as master developer of the remaining development rights within the Mission Bay South Plan project area.

Figure 1
Proposed Project Site Location
Source: ESA, Google – 2014

PROPOSED PROJECT LAND USES

The proposed project includes a multi-purpose event center, office,[2] retail, and restaurant uses (including both quick service and more formal sit-down restaurants) on Blocks 29-32.[3] The event center building would include a variety of supporting uses, including office space, practice facilities, event hall, and other event-related uses. Table 1 provides a summary overview of the key characteristics of the project development.

Table 1
Summary of Proposed Project for Travel Demand Analysis [a]

Project Component	Characteristics	
	Gross Square Feet (GSF) / Attendance for Travel Demand Analysis	Event Center Employment Characteristics
Event Center	750,000 GSF	
- No Event		105 employees
- GS Warriors Game	18,064 attendees (maximum)	1,000 employees
- Convention	9,000 attendees (average)	675 employees
GSW Office (Administration & Mgmt.)	25,000 GSF	[c]
Office	580,000 GSF	[c]
Retail [b]	62,500 GSF	[c]
Quick Service Restaurant	11,000 GSF	[c]
Sit-down Restaurant	51,500 GSF	[c]

Notes:
[a] This table presents the characteristics of the proposed project uses as they are defined for travel demand analysis purposes.
[b] The Retail use encompasses general and specialty retail, as well as food-related retail.
[c] Employment information is not required for travel demand analysis purposes; travel demand for these uses is calculated based on the amount of square footage provided, in accordance with the *SF Guidelines*.

Source: Golden State Warriors and Strada Investment Group – November 2014

[2] The Mission Bay South Redevelopment Plan allows for general office as well as research and development uses at the project site. According to the 1998 Mission Bay SEIR, the daily travel demand per 1000 gsf for an office use is approximately 2.3 times the daily demand for R&D (Table V.E.6, p. V.E.58), thus the travel demand analysis conservatively assumes office use at the site.

[3] Quick service restaurants consist of full-service eating establishments with typical duration of stay of approximately one hour, while more formal sit-down restaurants have a typical duration of stay of at least one hour and generally do not serve breakfast (Source: *Trip Generation Manual – 9th Edition*, Institute of Transportation Engineers, Washington DC, 2012).

EVENT CENTER ATTENDANCE

An event center is a special trip generator for which travel demand characteristics (i.e., trip generation rates, peak hour factors, etc.) are not available from standard sources used for development projects in San Francisco, such as the *Transportation Impact Analysis Guidelines for Environmental Review* (*SF Guidelines*)[4] or the Institute of Transportation Engineers' *Trip Generation Manual*.[5] As such, the transportation planning characteristics of the proposed event center were evaluated taking into account the expected attendance for various events at the proposed event center.

Average and maximum attendance estimates by type of event for the proposed event center were prepared by the project sponsor and are summarized in Table 2; Appendix A (pp. A-7 through A-11) provides additional information about the survey data.[6] The expected attendance would vary depending on the type of event held (e.g., basketball game, concert, non-sports event), but will be expected to be similar on weekdays and on weekends (both weekday and weekend scenarios are included in this analysis). In the case of sporting events, the expected attendance would also depend on the interest in competing teams, and, in the case of concerts, on the popularity of the performing artists.

Average visitor attendance for the proposed event center is projected to range between 5,000 attendees for a family show event, to between 17,000 and 18,000 attendees for a regular season or post season basketball home game; concert average attendance is estimated to range between 3,000 attendees for arena theater concerts to 12,500 attendees for the typical end-stage full arena configuration, and average convention attendance is estimated at 9,000 attendees.[7] As shown in Table 2, there would be up to 225 event days in any given year. Table 2 also provides a summary of event center employment according to the type of event.

Transportation planning analyses of special generators such as event centers typically use the 85th percentile, and sometimes the 90th percentile, of the daily attendance throughout a period of one or more years, to define the attendance for the analysis.

[4] *Transportation Impact Analysis Guidelines for Environmental Review,* San Francisco Planning Department, October 2002.

[5] *Trip Generation Manual – 9th Edition*, Institute of Transportation Engineers, 2012.

[6] Event types and characteristics provided by the project sponsor were based on the current event mix at the Oracle Arena in Oakland and SAP Center in San Jose, as well as information from the Barclays Center in Brooklyn, New York. The project sponsor considers the Barclays Center to be a relevant comparable, as it is the most recently completed entertainment venue hosting an NBA team, is a single-tenant arena, and is in an urban setting. Attendance estimates for conferences, corporate events, and other rentals were validated through discussion with San Francisco Travel.

[7] Event Center and Mixed-Use Development at Mission Bay Blocks 29-32, Initial Study, November 19, 2014.

Table 2
Event Characteristics at Proposed Event Center

Event Type	Annual Number of Event Days at the Event Center	Event Attendance [a] Average	Event Attendance [a] Maximum	Event Center Day-of-Game/Event Employment Characteristics [a]	Season	Event Temporal Characteristics
Golden State Warriors Basketball Home Games	2 to 3 preseason home games	11,000	*18,064*	*1,000* [b]	two weeks mid-October	Regular season game time: 7:30 to ~9:40 p.m. [d] Preseason/Postseason game time variable. Monthly Distribution: ~7 homes games per month Weekly Distribution: 50%/50% weekdays/weekends Monday-Thursday: 2 to 6 home games/month Friday: 1 to 3 home games/month Saturday: 1 to 3 home games/month Sunday: 0 to 1 home games/month
	41 regular season home games	17,000	*18,064*	*1,000* [b]	late October to mid-April	
	0 to 16 post season home games	18,000	*18,064*	*1,000* [b]	mid-April to mid-June	
Concerts	Approximately 30 Full Arena Concerts	12,500	14,000 to 18,500 [e]	775 [c]	major concert season is Fall, Winter and early Spring; Summer is the slow season	Concert time: typically 7:30 p.m. to 10:30 p.m. Weekly distribution: primarily Friday and Saturday evenings
	Approximately 15 Arena Theater Concerts	3,000	4,000	675 [c]		
Family Shows [f]	Approximately 55	5,000	8,200	675 [c]	distributed throughout the year	Family Show characteristics: typically 10 shows over 5 days (Wednesday to Sunday): Wednesday: 1 show, 7:30 p.m. to 9:00 p.m. Thursday: 1 show, 7:30 p.m. to 9:00 p.m. Friday: 2 shows, 10:30 a.m. to 12:00 p.m.; and 7:30 p.m. to 9:00 p.m. Saturday: 3 shows, 11:00 a.m. to 12:30 p.m.; 3:00 p.m. to 4:30 p.m.; and 7:00 p.m. to 8:30 p.m. Sunday: 3 shows, 11:00 a.m. to 12:30 p.m.; 3:00 p.m. to 4:30 p.m.; and 7:00 p.m. to 8:30 p.m.
Other Sporting Events [g]	Approximately 30	7,000	18,064	675 [c]	distributed throughout the year; times variable	
Conventions/ Corporate Events [h]	Approximately 31	*9,000*	18,500 [i]	*675* [c]	distributed throughout the year; times variable	

Notes:

[a] The event center attendance and employment estimates used for travel demand calculations and analysis are shown in ***bold and italics***.

[b] This estimate includes approximately 900 event center day-of-game non-GS Warriors employees, and approximately 100 GS Warriors employees that would work at the Warriors games. The estimate does not include GS Warriors employees that would occupy the team management offices in the event center during the day and non-GS Warriors employees of the retail and office buildings at Mission Bay Blocks 29-32; all of these employees are accounted for under the GS Warriors administration and management office space, general office, retail, and restaurant land use categories shown in Table 1 (p. 3) of this technical memorandum. This estimate does not include the visiting team/event performers and their support staff at the event center during a game, but they are considered “de minimis” for travel demand analysis purposes.

[c] These event employee estimates refer to non-GS Warriors employees. These estimates do not include the 105 Event Center GSW employees, including electricians or facilities staff, who would also be present on No Event days.

[d] The large majority of GS Warriors regular season home games would start at 7:30 p.m. For example, over the course of the most recent full three NBA regular seasons (2010-11, 2012-13, and 2013-14; the 2011-12 NBA season was shortened due to delays in signing of a collective bargaining agreement between NBA owners and players and consequently is not included), 90 percent of GS Warriors home games started at 7:30 p.m., 6 percent of homes games started at 6:00 p.m., and the balance (accounting for one home game or less per season) started at either 1:00 p.m. (on Martin Luther King holiday), 5:00 p.m., or 7:00 p.m.

[e] Nearly 90 percent of annual arena concerts at the event center would be with maximum end-stage concert configuration attendance of 14,000, and 10 percent (no more than four arena concerts annually) would be with a 360-degree configuration which would allow for a maximum attendance of about 18,500.

[f] Examples of family shows include Disney on Ice, Disney Live, Harlem Globetrotters, and Sesame Street Live.

[g] Examples of non-GS Warriors Sporting Events include college basketball, hockey, boxing, figure skating, arena football, gymnastics, lacrosse, tennis, and mixed martial arts. These could be professional, collegiate, amateur, high school/youth, local, regional, or international competition.

[h] Examples of Conventions/Corporate Events include conventions, conferences, cultural events, and corporate events. It is anticipated that the event center would only act as a satellite venue for conventions/conferences held primarily at the Moscone Center when an event or speaker cannot be accommodated at that location.

[i] The maximum attendance of 18,500 represents the maximum number of conference attendees that could be accommodated at the event center in a configuration similar to a center stage concert (see footnote [e] above). However, the event center is expected to typically serve as a satellite venue for conventions/conferences held primarily at the Moscone Center, with an attendance of 9,000 people.

Sources: Golden State Warriors, Strada Investment Group based on current event mix at the Oracle Arena in Oakland and the SAP Center in San Jose, as well as information provided for the recently completed Barclays Center in Brooklyn, New York – 2014

For the analysis of the proposed event center, the use of the maximum attendance presented in Table 2 for basketball games was analyzed, as it the most conservative approach that assumes that the event center would be filled to capacity (i.e., 18,064 attendees).[8]

In addition to a sell-out basketball game event, the transportation analysis also includes a convention/corporate event at the event center. For convention/corporate events, a 9,000-attendee event was analyzed, as this attendance level represents the average attendance (i.e., the average attendance for events would be 9,000) for about 50 percent of the events that would occur at the proposed event center (i.e., the convention events, family shows, and other sporting events).[9]

The travel demand for concerts, family shows and other sporting events was not estimated quantitatively because as shown in Table 2 these types of events are expected to attract a lower attendance and require fewer employees than a basketball game. In addition, arrival and departure travel patterns for these types of events would also be expected to be similar to those of basketball game. As such, the transportation infrastructure (roadways, transit vehicles, stations, sidewalks, etc.) would be expected to operate similar to or better before and after concerts than before or after a sold-out basketball game.

TRAVEL DEMAND

Travel demand refers to the new vehicle, transit, pedestrian and bicycle trips generated by the proposed project. The methods commonly used for forecasting travel demand for development projects in San Francisco are based on person-trip generation rates, trip distribution information, and mode splits data described in the *SF Guidelines*, and which are based on a number of detailed travel behavior surveys conducted within San Francisco. The data in the *SF Guidelines* are generally accepted as more appropriate for use in transportation impact analyses for San Francisco development projects than conventional transportation planning data because of the unique mix of uses, density, availability of transit, and cost of parking in San Francisco.

However, as noted above, the *SF Guidelines* do not include travel demand estimates for the specialized uses (e.g., sports events, conventions, and other events) that would take place at the proposed event center. Similarly, standard trip generation resources, such as the *Trip Generation Manual – 9th Edition*, 2012, Institute of Transportation Engineers (ITE), do not include sufficiently detailed trip generation data for such specialized uses. Therefore, the travel demand for the event center component of the proposed project was based on the estimated attendance described in the previous section.[10]

[8] 2013-14 was the ninth GS Warriors season averaging more than 18,000 attendees per game with a sellout season-ending average attendance (GS Warriors press release, April 14, 2014); the maximum capacity for a basketball game at the Oracle Arena is approximately 19,600 seats (Event Center and Mixed-Use Development at Mission Bay Blocks 29-32, Initial Study, November 19, 2014).

[9] The event center is expected to typically serve as a satellite venue for conventions/conferences held primarily at the Moscone Center, with an attendance of 9,000 people. The maximum attendance of 18,500 shown in Table 2 represents the maximum number of conference attendees that could be accommodated in a 360-degree center stage configuration, which would be infrequent.

[10] Survey and other relevant data supplied by the project sponsor are included in Appendix A (pp. A-7 to A-11).

In addition, the trips generation rates presented in the *SF Guidelines* and ITE's *Trip Generation Manual* cannot be directly applied to some development projects, such as the proposed project, because of its large scale, unique location and mixed-use character (restaurant and retail uses supporting an event center as an anchor use). Thus, appropriate adjustments have been made to account for these factors, as described later in this memorandum.

The weekday daily PM peak hour travel demand for standard project land uses, such as office, retail, and restaurant uses were developed in accordance with the *SF Guidelines*, which provides PM peak hour trip generation rates and modal split, trip distribution and average vehicle occupancy data specific to the southeast quadrant of San Francisco (Superdistrict 3) where the project site is located. The modal split and trip distribution assumptions presented in the *SF Guidelines* for work trips into and out of Superdistrict 3 were further refined using more recent travel pattern data of actual Mission Bay employees collected by the Mission Bay Transportation Management Association (MB TMA) in 2012, 2013 and 2014.

Travel demand was also determined, as described in the following section, for weekday evening and late evening and for Saturday daily and evening conditions based on adjusted trip generation rates developed for the office, retail, and restaurant uses using information obtained from ITE's *Trip Generation Manual*, the Urban Land Institute's *Shared Parking* (2nd Edition), and Pushkarev and Zupan's, *Urban Space for Pedestrians*. Appendix A (pp. A-14 through A-16, and A-23 through A-62) contains the travel demand calculations and assumptions. For the office, retail, and restaurant uses, a weekday-to-Saturday ratio was obtained from the trip generation rates presented in ITE's *Trip Generation Manual* for the proposed project uses, which was then applied to the weekday daily trip generation rates presented in the *SF Guidelines* in order to obtain the weekend daily rates. For the office, retail, and restaurant uses, data from the Pushkarev and Zupan and ULI studies was used to estimate the percentage of daily trips that would occur during the weekday evening, weekday late evening and Saturday evening peak hours.

PROJECT SCENARIOS AND TIME PERIODS OF ANALYSIS

Travel demand for the proposed event center and mixed-use development on Blocks 29-32 presented in this document evaluates three different event scenarios:

- No event at the event center;
- Basketball game at the event center; and,[11]
- Convention event at the event center.

[11] The game day analysis for weekday PM (4 to 6 PM), evening (6 to 8 PM), late evening (9 to 11 PM), and Saturday evening (7 to 9 PM) will also include the evaluation of transportation conditions when a SF Giants home game occurs concurrently with a basketball game, although because there is a lack of overlap of the basketball and baseball seasons such that concurrent events would be uncommon, limited primarily to post-season play situations.

The expected start and end times of these project events and other characteristics are presented in Table 2 (p. 5). The travel demand for the three scenarios has been estimated for the following six time periods:

- Weekday all day;
- Weekday PM peak period (highest 60-minute period between 4 and 6 PM);
- Weekday evening peak period (highest 60-minute period between 6 and 8 PM);
- Weekday late evening period (highest 60-minute period between 9 and 11 PM);
- Saturday all day; and
- Saturday evening period (highest 60-minute period between 7 and 9 PM).

Each event scenario was evaluated for the particular time periods during which the specific event would occur. For example, convention events are not anticipated to occur in the weekday evening and late evening peak hours or on weekends, and therefore, analysis of convention events during these time periods was not conducted.

- The weekday PM peak period (from 4 to 6 PM) was selected because it represents the period during which weekday background traffic in the area is highest. Approximately 5 percent of attendees are projected to arrive at the event center between 5 and 6 PM.
- The weekday evening peak period (from 6 to 8 PM) was selected because basketball games typically start at 7:30 PM and therefore, a higher percentage of inbound event attendees would travel to the event center during the 6 to 8 PM period than during the 4 to 6 PM commute peak period; see Table 3. Approximately 65 percent of attendees are projected to arrive at the event center during the 7 to 8 PM peak hour.
- The weekday late evening period (from 9 to 11 PM) was selected because it represents the period during which the highest outbound event trips would occur after a basketball game or concert event. Approximately 70 percent of attendees are projected to depart the event center during the 9 to 10 PM peak hour.
- The Saturday evening period (from 7 to 9 PM) was selected because it represents the period during which the highest inbound event trips would occur. Approximately 65 percent of attendees are projected to arrive at the event center during the 7 to 8 PM peak hour.

Table 3
Estimated Basketball Game Attendee Arrival and Departure Patterns [a]
For 7:30 PM Start Time and 9:40 PM End Time

Time Period	by Hour	Cumulative
Arrivals		
5:00 to 5:30 PM	1.0%	1.0%
5:30 to 6:00 PM	4.0%	5.0%
6:00 to 6:30 PM	10.5%	15.5%
6:30 to 7:00 PM	19.5%	35%
7:00 to 7:30 PM	32.5%	67.5%
7:30 to 8:00 PM	32.5%	100%
Departures		
9:00 to 9:30 PM	30%	30%
9:30 to 10:00 PM	40%	70%
10:00 to 10:30 PM	30%	100%

Note:
[a] Based on basketball game arrival and departure information provided by the Golden State Warriors for Oracle Arena, as well as recent arrival/departure data for other NBA facilities to account for the increased availability of retail and restaurant uses at the proposed project site compared to Oracle Arena in Oakland. Arrival patterns were adjusted to account for availability of retail/restaurant uses at the proposed project site. A summary of this data is provided in Appendix A.

Source: Golden State Warriors, Adavant Consulting – January 2015

The "No Event" conditions reflect travel demand associated with the office uses at the event center, plus the travel demand associated with the office, retail, and restaurant (both quick service and sit-down) uses for the weekday PM commute peak hour of analysis and the Saturday evening peak hour. Table 4 provides a cross-tabulation of proposed scenarios and time periods for which the project travel demand was estimated.

Table 4
Proposed Project Scenarios and Time Periods for Travel Demand Estimation

Project Scenario	Time Period [a]					
	Weekday				Saturday	
	Daily	PM Peak Hour (4 to 6 PM)	Evening Peak Hour (6 to 8 PM)	Late Evening Peak Hour (9 to 11 PM)	Daily	Evening Peak Hour (7 to 9 PM)
No Event	√	√			√	√
Basketball Game	√	√ [b]	√ [b]	√ [b]	√	√ [b]
Convention Event	√	√				

Notes:
[a] The time periods presented in this table are those for which the project travel demand is being estimated because that is the time period during which trip volumes would be highest; they do not represent the only time periods during which an event could take place at the proposed event center.
[b] The basketball game day analysis also includes the evaluation of peak hour transportation conditions when a SF Giants home game occurs concurrently with a basketball game.

Source: Adavant Consulting/LCW Consulting – August 2014

Overall, the travel demand was calculated for seven combinations of project scenarios and peak hour time periods, five peak hour scenarios on a weekday and two peak hour scenarios on a Saturday. In addition, the transportation impact analysis of basketball game conditions was performed for three peak hour scenarios (weekday PM, weekday evening, and Saturday evening) that also includes the evaluation of transportation conditions with the travel demand generated by a concurrent SF Giants baseball game at AT&T Park, however, this does not affect the calculation of the proposed project travel demand estimates presented in this document.

TRIP GENERATION

The person-trip generation for the proposed project includes trips made by event attendees, employees, and other visitors to the project site and are based on the appropriate rates as described in a previous section and summarized in Table 5. Detailed calculations for the development of these rates are provided in Appendix A (pp. A-5 through A-22). The rates shown in Table 5 were then applied, as appropriate, to the number of expected event attendees, 1,000 GSF of office, retail and restaurant uses in order to obtain the number of person trips generated by each land use.

Table 5
Proposed Project Person Trip Generation Rates by Land Use and Time Period [a]

Land Use Type	Weekday							Saturday			
	Daily Rate	PM Peak Hour of the 4 to 6 PM period [b]		Evening Peak Hour of the 6 to 8 PM period [b]		Late Evening Peak Hour of the 9 to 11 PM period [c]		Daily		Evening Peak Hour of the 7 to 9 PM period [b]	
		% of Daily	Rate	% of Daily	Rate	% of Daily	Rate	% of Weekday	Rate	% of Daily	Rate
Event Center (per attendee)											
Basketball Game	2.1	4.8%	0.10	30.9%	0.65	33.8%	0.71	100%	2.1	30.9%	0.65
Convention Event [d]	3.2	10.9%	0.35	N.A. [e]		N.A. [e]		N.A. [e]		N.A. [e]	
Office (per 1,000 GSF)	18.1	8.5%	1.54	1.7%	0.31	0.4%	0.08	22%	4.0	1.1%	0.04
Retail (per 1,000 GSF)	150.0	9.0%	13.5	6.8%	10.13	3.2%	4.73	117%	175.5	4.0%	7.02
Restaurant (per 1,000 GSF)											
Quick Service Rest. (no event) [f]	600.0	13.5%	81.0	20.3%	121.5	20.3%	121.5	125%	747.3	24.0%	179.3
Quick Service Rest. (event) [f]	600.0	13.5%	81.0	20.3%	121.5	20.3%	121.5	125%	747.3	24.0%	179.3
Sit-down Restaurant	200.0	13.5%	27.0	20.3%	40.5	20.3%	40.5	125%	249.1	24.0%	59. 8

Notes:
[a] See Appendix B (pp. A-23 through A-62) for detailed trip generation rate calculations.
[b] Pre-event analysis period.
[c] Post-event analysis period.
[d] The average person trip rate per attendee depends in part on the number of employees working at the event; a convention event has the lowest attendee-to-employee ratio (13) compared to a basketball game (18); in addition, it is assumed that 25 percent of the employees and 50 percent of the attendees during a convention would leave the project site during the day for lunch, shopping, errands, etc., resulting in a higher average daily person trip rate than a basketball game.
[e] Not applicable; not part of the travel demand analysis because other scenarios would capture the potential transportation impacts during this period.
[f] The project sponsor anticipates that the quick service restaurants would be open similar hours for event and no-event days alike.

Source: SF Guidelines, Institute of Transportation Engineers, Urban Land Institute, Pushkarev and Zupan, Adavant Consulting – January 2015.

It should be noted that the rates presented in Table 5 represent the number of person trips that would be generated by each project component as a standalone use. Some of the visitor trips entering/exiting the project retail and restaurant uses would be made by individuals destined to either nearby uses or to other components of the proposed project (referred to as visitor linked trips), such as the event center or the nearby residential, research and development, office or UCSF uses.

Thus, to account for the linked visitor trips, based on studies of non-work (visitor) trips conducted along the San Francisco waterfront and the type of retail and restaurant uses accessory to the event center,[12] a daily 67 percent linked trips reduction was applied to non-work (visitor) trips for retail and restaurant uses during an event day (i.e., 33 percent of the visitor trips are considered new trips to the area unrelated to other nearby uses). On the other hand, because it is likely that more people would come to the area to specifically visit the project retail and restaurant uses on a no event day, the daily linked trip factor was reduced to 33 percent for the sit-down restaurant and retail uses when no events are planned to take place at the site (i.e., 67 percent of the visitor trips are new trips to the site and to the area on non-event days). These assumptions are consistent with and more conservative (i.e., generates more trips) than the data obtained from a survey of shoppers conducted in the vicinity of the San Francisco Center at Powell and Market streets,[13] which found a linked trip factor of 67 percent for retail uses.

Higher visitor linked trip ratios were assumed for the evening and late evening periods during an event, as shown in Table 6, when the percent of visitors unrelated to nearby project uses would be expected to be lower. It was assumed that the visitor linked trip factor would generally be constant throughout the day during no event days. For event days, on the other hand, it was assumed that the linked trip factor would progressively increase as the event start time approaches, changing from the average daily value of 67 percent before 6 PM, to 95 percent immediately before, during and after the event. No linked trip factors were assumed under any scenario for visitors to the office and movie uses.

[12] San Francisco Boudin Bakery and Café at Fisherman's Wharf Transportation Study, prepared by Wilbur Smith Associates for the San Francisco Planning Department, Case Number 2003.0186, September 19, 2003.

[13] City Place Cross Shopping Survey Results, Technical memorandum prepared by AECOM for the SF Planning Department, October 18, 2007 (a copy of this document is included in Appendix E, p. A-75.).

Table 6
Proposed Linked Visitor Trip Reduction Factors [a]
by Type of Land Use

Land Use [b]	Time Period					
	Daily		Before 6 PM		After 6 PM	
	Event	No Event	Event	No Event	Event	No Event
Retail	67%	33%	67%	33%	95%	33%
Quick Service Restaurant	67%	67%	67%	67%	95%	67%
Sit-down Restaurant	67%	33%	67%	33%	95%	33%

Notes:

[a] As an example, a 67 percent linked trip reduction factor means that 33 percent of the visitor trips are considered new trips to the area unrelated to other project or nearby uses. No linked trip reduction factors were applied to employee work trips for any of the proposed land uses as the trip credit is already being taken on the non-work (visitor/customer) end of the retail or restaurant trip.

[b] No linked trip factors were assumed under any scenario for visitors/customers to the office uses.

Source: Adavant Consulting – November 2014

Table 7 on the next page presents the resulting number of person trips generated by the proposed project uses for the weekday and Saturday daily and peak hour analysis periods, once the trip rates presented in Table 5 and the linked trip factors shown in Table 6 were applied to the proposed project land uses and event attendances presented in Tables 1 and 2, respectively; the calculations and adjustments for each individual land use are shown in Appendix B (pp. A-50 through A-62).

No Event

As shown in Table 7, the overall daily person trip generation would be lower on a Saturday than on a weekday, due to the higher trip generation associated with the office use on a weekday.

- On a weekday without an event, the proposed project would generate 26,998 daily person trips (inbound plus outbound), and 2,796 person trips during the weekday PM peak hour.

- On a Saturday without an event the proposed project would generate 21,883 daily person trips and 3,130 person trips during the Saturday evening peak hour.

Table 7
Proposed Project Person Trip Generation by Land Use and Time Period [a]

Land Use Type	Weekday				Saturday	
	Daily	PM Peak Hour of the 4 to 6 PM period	Evening Peak Hour of the 6 to 8 PM period	Late Evening Peak Hour of the 9 to 11 PM period	Daily	Evening Peak Hour of the 7 to 9 PM period
No Event						
Event Center [b]	263	22			263	0
Office	10,951	931			2,442	27
Retail	6,405	576			7,496	300
Quick Service Restaurant [d]	2,376	321			2,959	710
Sit-down Restaurant [d]	7,004	946			8,724	2,093
Total person trips w/out event	**26,998**	**2,796**	N.A. [c]	N.A. [c]	**21,883**	**3,130**
With Event						
Basketball Game	38,128	1,803	11,742	12,845	38,128	11,742
Convention Event	28,688	3,113	N.A. [c]	N.A. [c]	N.A. [c]	N.A. [c]
Office	10,951	931	186	47	2,442	27
Retail [d]	3,375	304	56	26	3,950	39
Quick Service Restaurant [d]	2,376	321	118	118	2,959	174
Sit-down Restaurant [d]	3,708	501	184	184	4,618	271
Total person trips w/ event						
Basketball Game	58,538	3,859	12,285	13,218	52,098	12,252
Convention Event	49,097	5,169	N.A. [c]	N.A. [c]	N.A. [c]	N.A. [c]

Notes:
[a] Numbers may not sum to total due to rounding to the nearest person-trip. See Appendix B (pp. A-50 through A-62) for detailed trip generation calculations for each individual land use.
[b] 105 employees would work at the event center on no-event days.
[c] Not applicable; not part of the travel demand analysis.
[d] Includes linked trip reductions as appropriate.
Source: Adavant Consulting – January 2015.

With Event

The total number of daily person trips generated on a weekday event day with a basketball game would be 58,538 trips. Of these, 3,859 person trips would be during the PM peak hour, 12,285 person trips during the evening peak hour, and 13,218 person trips during the weekday late evening peak hour. The total number of daily person trips generated on a Saturday with a basketball game would be 52,098 for a basketball game, of which 12,252 person trips would occur during the evening peak hour.

Convention events would generate fewer daily person trips than a basketball game (38,128 person trips for a basketball game versus 28,688 person trips for a convention event), however, the proportion of convention event trips during the weekday PM peak hour would be greater than during a basketball game. This is because it is anticipated that many people would leave the convention during the weekday PM peak hour while the majority of basketball fans arrive after the end of the PM peak hour (6 PM). The total number of daily person trips generated on a weekday event day with a convention event would be 49,097 trips, of which 5,169 person trips would occur during the PM peak hour.

TRIP DISTRIBUTION

The directional distribution is based on the origins and destinations of trips for each specific land use, which are then assigned to the four quadrants of San Francisco (Superdistricts 1 through 4), East Bay, North Bay, South Bay and Out of Region (a map of the San Francisco Superdistricts is included in Appendix A, p. A-21).

The directional distribution of visitor trips for the proposed office, restaurant, and retail uses was obtained from the *SF Guidelines* for Superdistrict 3[14] (SD3), in which the project is located. The distribution of convention/corporate events attendees was based on data provided by the Moscone Center Operator and documented in the Moscone Center Expansion EIR,[15] The distribution of basketball game attendees was derived from information provided by Golden State Warriors (based on a market study assessment conducted by the project sponsor for the previously-proposed project location at Piers 30-32 in San Francisco; see Appendix A, p. A-7) for basketball events.

The directional distribution of employee trips for all proposed project uses was obtained from information provided by the Mission Bay TMA derived from transportation surveys of residents and employees in Mission Bay conducted in 2012, 2013, and 2014.[16] The trip distribution percentages are summarized in Table 8.

[14] Superdistricts are travel analysis zones established by the Metropolitan Transportation Commission (MTC). These Superdistricts provide geographic subareas for planning purposes in San Francisco; a map with the Superdistrict boundaries is included in Appendix A (p. A-25).

[15] *Moscone Center Expansion Project – Estimation of Travel Demand*, Adavant Consulting, January 9, 2014. Appendix C of Moscone Center Expansion Project EIR, April 2014. A copy of this document is available for review at the SF Planning Department, 1650 Mission Street, Suite 400, as part of Case File No. 2013.0154E.

[16] Annual surveys conducted by the MB TMA in 2012, 2013, and 2014. Online surveys were sent in September-October to residential and commercial property managers in the Mission Bay area for distribution to their tenants or employees; the online survey remained open for 10 to 15 days. Typical rates of response were 4 to 8 percent based on the total employment and residential population at Mission Bay (Wendy Silvani, consultant for Mission Bay TMA, October 14, 2014). More than 1,000 survey responses were used in the travel demand analysis, which are summarized in Appendix A, page 17.

Table 8
Proposed Project Trip Distribution Patterns by Land Use [a]

Place of Trip Origin/Destination	Basketball Event			Convention Event		Retail		Office/Restaurant	
	Workers [b]	Visitors: Weekday Inbound [c]	Visitors: All Other [d]	Workers [b]	Visitors [e]	Workers [b]	Visitors [f]	Workers [b]	Visitors [g]
San Francisco									
Superdistrict 1	7.7%	14.8%	11.1%	7.7%	55.0%	7.7%	6.0%	7.7%	13.0%
Superdistrict 2	9.9%	4.6%	3.4%	9.9%	5.0%	9.9%	9.0%	9.9%	14.0%
Superdistrict 3	22.3%	5.5%	4.2%	22.3%	5.0%	22.3%	61.0%	22.3%	44.0%
Superdistrict 4	7.4%	4.4%	3.3%	7.4%	5.0%	7.4%	5.0%	7.4%	7.0%
East Bay	27.7%	31.1%	33.0%	27.7%	7.5%	27.7%	3.0%	27.7%	9.0%
North Bay	3.5%	8.9%	13.0%	3.5%	2.5%	3.5%	2.0%	3.5%	1.0%
South Bay	19.0%	26.7%	28.0%	19.0%	10.0%	19.0%	9.0%	19.0%	9.0%
Out of Region	2.5%	4.0%	4.0%	2.5%	10.0%	2.5%	5.0%	2.5%	3.0%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Notes:

[a] Percentages may not sum to 100 due to rounding.
[b] Based on Mission Bay TMA Transportation surveys of residents and employees in Mission Bay conducted in 2012, 2013, and 2014 (see Appendix A, p. 17).
[c] Adjusted for trips starting at the place of employment rather than at home for a weekday evening event based on Golden State Warriors survey data (see Appendix A, p. A-7).
[d] All Other includes the distribution pattern for weekday outbound trips, and Saturday inbound and outbound trips, and reflects trips starting and ending at the place of residence, rather than the place of employment (see footnote C regarding distribution of weekday inbound trips). Based on Golden State Warriors survey data for a San Francisco arena (see Appendix A, p. A-9).
[e] Based on Moscone Center Expansion Project EIR data.
[f] SF Guidelines, Appendix E - Table E-14 Visitor Trips to SD3 (Retail).
[g] SF Guidelines, Appendix E - Table E-15 Visitor Trips to SD3 (All Other).

Sources: SF Guidelines, GS Warriors, MB TMA, Moscone Center, Adavant Consulting – November 2014.

For worker trips to all land uses, the majority would be to/from San Francisco (47.3 percent), with the greatest proportion within SD3 (22.3 percent), followed by East Bay (27.7 percent), and then South Bay (19.0 percent) origins/destinations. For visitor trips to a basketball game, the majority of trips would be to/from East Bay origins/destinations (31.1 to 33.0 percent), followed by the South Bay (26.7 to 28.0 percent), and then San Francisco (22.0 to 29.3 percent) origins/destinations.

The origin/destination distribution range for a weekday basketball game reflects an adjustment for event attendees who would travel to the event center directly from work rather than from their place of residence. The adjustment was based on a survey of Golden State Warriors season ticket holders, which is provided in Appendix A (p. A-7). As shown in Table 8 and in the appendix, the number of trips starting in San Francisco on a weekday would increase by approximately 7.5 percentage points, with the corresponding reductions in trips arriving from the East Bay (2 percentage points), North Bay (4 percentage points), and South Bay (1.5 percentage points) areas.

The majority of visitor trips to a convention event, retail, office, and restaurant uses would be from within San Francisco (70 to 81 percent), followed by South Bay (9 to 10 percent), and then East Bay (3 to 9 percent) origins/destinations.

MODE OF TRAVEL

The estimated daily, PM peak hour, evening peak hour, and late evening peak hour person trips were allocated to travel modes in order to determine the number of auto, transit, taxi, TNC vehicles, motor coaches, bicycle, walk, and other trips. For event center basketball games, the "other" category includes motorcycles and non-conventional travel modes such as pedicabs, while for the no-event related uses of the proposed project (office, retail, and restaurant) "other" includes bicycles, motorcycles, and taxis. The bicycle trips generated by a basketball game were calculated as a separate mode of travel (see Appendix A, pp. A-35 through A-46), but have been aggregated with those under the "other" category in the summary tables presented in this technical memorandum.

Travel mode splits of visitor trips for the non-event related uses were estimated from information in the *SF Guidelines* to the southeastern waterfront (SD3), where the project site is located. Travel mode splits of all employee trips (including event employees at basketball games and conventions) were estimated from information provided by the Mission Bay TMA based on transportation surveys conducted in 2012, 2013, and 2014.

Mode split assumptions for convention/corporate events attendees were based on data provided by the Moscone Center Operator and documented in the Moscone Center Expansion EIR,[17] with some adjustments to account for the SD3 location of the proposed project. Specifically, it was assumed that the overall auto usage would be twice the Moscone Center (20

[17] *Moscone Center Expansion Project – Estimation of Travel Demand*, Adavant Consulting, January 9, 2014. Appendix C of Moscone Center Expansion Project EIR, April 2014. A copy of this document is available for review at the San Francisco Planning Department, 1650 Mission Street, Suite 400, as part of Case File No. 2013.0154E. A summary table is included in Appendix A (p. A-19).

percent at the proposed project site versus 10 percent at the Moscone Center), with minimal walk trips (2 percent at the proposed project site versus 30 percent at the Moscone Center). Taxi and shuttle bus trips would continue to represent about half of all the trips, while transit trips would increase to 23 percent. The modal split allocation for each major origin/destination was estimated by using the *SF Guidelines* data for visitor trips to SD3 as a guide (Appendix E, Table E-15 of the *SF Guidelines*) and proportionally shifting walk trips from SD1, SD2 and SD4 to transit trips and shifting walk trips starting or ending outside of San Francisco to auto trips; no adjustments were made for walk trips within SD3.

Mode splits for basketball event attendee trips were based on weekday and Saturday game attendance data at AT&T Park collected by the San Francisco Giants in the fall 2012, which are presented in more detail in Appendix A (p. A-14). For basketball event attendees, the mode split obtained from the San Francisco Giants survey data was adjusted in consultation with the SFMTA to better represent a more limited transit access and longer walking distances from downtown to the project site, as compared to AT&T Park, which is located about 0.6 miles closer to the Market Street corridor. In addition, the area surrounding the proposed project would be expected to have more prominent and easier to find parking, with more availability than the parking facilities near AT&T Park. As a result, a portion of trips currently taking transit or walking to AT&T Park were shifted to auto trips.

In consultation with SFMTA and taking into account Muni's expanded transit capacity planned for large events, it was assumed that the overall auto usage for a basketball game at the proposed project site would be between 54 percent (weekdays) and 60 percent (weekends), compared to 38 and 52 percent, respectively, at AT&T Park, but 3 to 10 percentage points lower than a similar average for the proposed project location (i.e., 64 percent for retail and 57 percent for other uses for projects in SD3) per information within the *SF Guidelines*. Similarly, the overall transit usage to and from an event would be about 35 percent, compared to 45 percent (weekdays) and 36 percent (weekends) at AT&T Park, and 19 percent (retail uses) to 22 percent (other uses) for projects within SD3. The modal split allocation within each major origin/ destination was estimated by using the *SF Guidelines* data for visitor trips to SD3 as a guide (Appendix E, Table E-14 of the *SF Guidelines*) and adjusting it proportionally; in addition, walk trips outside of San Francisco were shifted to transit trips.

The mode split for basketball event attendee trips assumes that the project would include a special event transit service plan for additional Muni service to and from the event center, as well as TDM strategies that would be implemented as part of the proposed project during basketball game events.

Table 9 summarizes the trip generation by mode of travel for the proposed project land uses for the standard weekday PM peak hour, as well for the weekday evening and late evening peak hours, and for the Saturday evening peak hour.

Table 9
Trip Generation by Mode, Land Use and Time Period [a]

Project Land Use	Weekday												Saturday			
	PM Peak Hour of the 4 to 6 PM period				Evening Peak Hour of the 6 to 8 PM period				Late Evening Peak Hour of the 9 to 11 PM period				Evening Peak Hour of the 7 to 9 PM period			
	Auto	Transit	Walk/ Other[b]	Total	Auto	Transit	Walk/ Other[b]	Total	Auto	Transit	Walk/ Other[b]	Total	Auto	Transit	Walk/ Other[b]	Total
No Event																
Event Center	6	14	3	22									0	0	0	0
Office	298	506	127	931									7	17	3	27
Retail [e]	357	84	135	576									185	44	70	300
Quick Service Restaurant [e]	170	75	76	321									376	167	168	710
Sit-down Restaurant [e]	514	201	230	946									1,139	446	509	2,093
Total person trips w/out event	1,344 48%	881 32%	570 20%	2,796 100%	N.A. [c]				N.A. [c]				1,707 55%	673 22%	750 24%	3,130 100%
With Event																
Basketball Game	731	872	200	1,803	6,340	4,121	1,280	11,742	7,126	4,527	1,191	12,845	7,045	4,110	567	11,742
Convention Event [e]	633	772	1,708	3,113	N.A. [c]				N.A. [c]				N.A. [c]			
Office	298	506	127	931	50	115	21	186	13	29	5	47	7	17	3	27
Retail [e]	182	52	69	304	26	19	10	56	12	9	5	26	18	13	7	39
Quick Service Restaurant [e]	170	75	76	321	50	45	22	118	50	45	22	118	74	66	33	174
Sit-down Restaurant [e]	265	118	118	501	79	70	35	184	79	70	35	184	116	104	51	271
Total person trips w/ event																
Basketball Game	1,645 43%	1,625 42%	590 15%	3,859 100%	6,546 53%	4,371 36%	1,368 11%	12,285 100%	7,280 55%	4,680 35%	1,258 10%	13,218 100%	7,261 59%	4,310 35%	681 6%	12,252 100%
Convention Event	1,547 30%	1,524 29%	2,098 41%	5,169 100%	N.A. [c]				N.A. [c]				N.A. [c]			

Notes:

[a] Numbers may not sum to total due to rounding; see Appendix B (pp. A-50 to A-62) for detailed trip generation calculations.
[b] "Other" includes walk, bicycle, motorcycle, taxis, limousines, etc.
[c] Not applicable; not part of the travel demand analysis.
[d] Transit mode includes trips made by convention event shuttle.
[e] Includes linked trip reductions.

Source: Adavant Consulting – January 2015.

No Event

On a weekday with no event, the proposed project would generate 1,344 person trips by automobile (48 percent), 881 person trips by transit (32 percent), and 570 person trips by other modes (20 percent) during the PM peak hour. On a Saturday with no event, the proposed project would generate 1,707 person trips by automobile (55 percent), 673 person trips by transit (22 percent), and 750 person trips by other modes (24 percent) during the evening peak hour.

With Event

The person trips by mode generated by the proposed project on a weekday with a basketball game would be as follows:

- The overall project would generate 1,645 person trips by automobile (43 percent), 1,625 person trips by transit (42 percent), and 590 person trips by other modes (15 percent) during the weekday PM peak hour.
- The overall project would generate 6,546 person trips by automobile (53 percent), 4,371 person trips by transit (36 percent), and 1,368 person trips by other modes (11 percent) during the weekday evening peak hour.
- The overall project would generate 7,280 person trips by automobile (55 percent), 4,680 person trips by transit (35 percent), and 1,258 person trips by other modes (10 percent) during the weekday late evening peak hour.

On a Saturday with a basketball game, the proposed project would generate 7,261 person trips by automobile (59 percent), 4,310 person trips by transit (35 percent), and 681 person trips by other modes (6 percent). On a Saturday event day during the evening peak hour, the project would generate a higher percentage of auto trips than on a weekday event day (59 percent on a Saturday, as compared to 43 percent on a weekday), as a result of the typically lower transit service available, combined with a greater number of attendees arriving from outside San Francisco.

On a weekday with a convention event, during the PM peak hour the proposed project would generate a relatively low percentage of weekday auto trips (30 percent for a convention event compared to 41 percent for a basketball game), since about 80 percent of the convention trips would be expected to arrive by transit, taxi or convention shuttle bus service. Approximately 2 percent of the convention attendees are expected to walk to the site.

VEHICLE OCCUPANCIES AND VEHICLE TRIPS BY PLACE OF ORIGIN

To determine the number of vehicle trips generated by the proposed project under various scenarios, an average vehicle occupancy rate was applied to the number of person trips by automobile mode. Average vehicle occupancies for a convention event as well as for standard project land uses, such as office, retail, and restaurant uses were estimated in accordance with the methodologies in the *SF Guidelines*.

Average Vehicle Occupancy: Vehicle occupancy data for the basketball games at the event center was developed based on information from surveys conducted by the SF Giants in 2007; data from 2007 was used because the 2012 SF Giants survey used to derive the modal split ratios did not include information about vehicle occupancy. More detailed information from the 2007 SF Giants survey is included in Appendix A (p. A-12). The average vehicle occupancy for attendees for a weekday and Saturday evening event derived from the SF Giants survey (2.7 passengers per vehicle) is comparable to data obtained from other similar transportation planning studies for arenas in urban settings, which estimated average vehicle occupancies between 2.35 and 2.8 passengers per vehicle, with the higher values being observed on weekends.[18]

Table 10 summarizes the average vehicle occupancy rates and number of vehicles for project trips by place of origin/destination and time period. When combined with employee trips and trips to/from other on-site uses the overall average vehicle occupancy during a convention event and a basketball would range between 1.5 and 3.6 passengers per vehicle, depending on the type, day of the event, and peak hour.

During the weekday PM peak hour without and with a basketball game, the average vehicle occupancy would be about 1.9 passengers per vehicle, which generally reflects the overall peak period commute average vehicle occupancies of the other project land uses (i.e., the proportion of basketball game attendees who travel to the event center during the PM peak hour would be low – about 5 percent of arrivals, as presented in Table 3). During the weekday evening and late evening peak hours, the average vehicle occupancy would increase to 2.5 and 2.6 persons per vehicle, as the majority of trips would be event-related. During the Saturday evening peak hour for no event conditions, the average vehicle occupancy would be higher than on weekdays, at 2.2 persons per vehicle, reflecting the generally higher average vehicle occupancy for entertainment uses (i.e., the sit-down restaurant), while with a basketball game the average vehicle occupancy would increase to 2.6 persons per vehicle reflecting the greater number of attendees that would travel to the event center by auto mode on a Saturday as compared to a weekday game.

The average vehicle occupancy during a convention event during the weekday PM peak hour (3.3 persons per vehicle overall, 8.1 persons per vehicle for SD1) includes trips by convention shuttle bus with an average occupancy of 25 passengers per vehicle.

[18] Table 2, p. 5; *Transportation Planning Assumptions for the Atlantic Yards Arena and Redevelopment*, Technical Memorandum, Philip Habib and Associates, May 4, 2006, and Table 10, p. 6, *Madison Square Garden Relocation and Expansion Transportation Planning Assumptions*, Technical Memorandum from PB Team to New York City Department of City Planning, November 11, 2003; copies of these two documents are included in Appendix E, starting on pages A-79 and A-97, respectively.

Table 10
Project Average Vehicle Occupancies and Vehicle Trips by Place of Origin and Time Period [a, b, c]

Place of Trip Origin/ Destination	Weekday										Saturday			
	PM Peak Hour of the 4 to 6 PM period						Evening Peak Hour of the 6 to 8 PM period		Late Evening Peak Hour of the 9 to 11 PM period		Evening Peak Hour of the 7 to 9 PM period			
	No Event		Basketball Game		Convention Event [d]		Basketball Game		Basketball Game		No Event		Basketball Game	
	Avg. Veh. Occup.	Veh. Trips	Avg. Veh. Occup.	Veh. Trips	Avg. Veh. Occup.	Veh. Trips	Avg. Veh. Occup.	Veh. Trips	Avg. Veh. Occup.	Veh. Trips	Avg. Veh. Occup.	Veh. Trips	Avg. Veh. Occup.	Veh. Trips
San Francisco														
Superdistrict 1	1.9	46	1.9	58	8.1 [d]	161	2.2	266	2.2	217	2.0	66	2.5	191
Superdistrict 2	1.8	101	1.7	93	3.0	87	2.3	128	2.3	106	1.9	141	2.5	103
Superdistrict 3	2.1	236	1.9	193	2.4	165	2.4	162	2.4	136	2.3	266	2.5	143
Superdistrict 4	2.0	52	2.0	63	3.8	54	2.4	161	2.5	133	2.4	59	2.6	120
East Bay	2.1	70	2.2	146	2.2	93	2.6	787	2.6	898	2.4	74	2.6	831
North Bay	2.0	19	2.2	46	2.0	51	2.7	286	2.7	446	3.5	10	2.7	422
South Bay	1.6	148	1.7	261	1.9	245	2.6	907	2.5	1,024	2.1	129	2.6	938
Out of Region	1.7	30	2.0	27	1.7	62	3.7	55	3.6	59	1.7	40	3.0	66
Total Vehicles	**1.9**	**702**	**1.9**	**886**	**3.3**	**919**	**2.5**	**2,752**	**2.6**	**3,018**	**2.2**	**785**	**2.6**	**2,815**
Inbound		255		524		256		2,553		134		367		2,687
		36%		59%		28%		93%		4%		47%		95%
Outbound		447		362		663		198		2,883		418		128
		64%		41%		72%		7%		96%		53%		5%

Notes:

[a] Numbers may not sum due to rounding.

[b] Average vehicle occupancy rates vary depending on the time of day (i.e., analysis periods) as the proportion of trips generated by the various land uses components of the project, each one with a different average vehicle occupancy rate, is different depending on the time of the day. See Appendix B (pp. A-50 through A-62) for detailed vehicle occupancy and vehicle trip demand calculations for each individual land use.

[c] For all analysis scenarios, the average vehicle occupancies and vehicle trips include the proposed office, retail, and restaurant uses, as well as an event or no event at the event center, depending on the analysis scenario (i.e., No Event, Basketball Game, Convention Event, etc.).

[d] The average vehicle occupancy rate for a convention event includes trips by shuttle bus service with an average occupancy of 25 passengers per vehicle, per the Moscone Center Expansion Project EIR.

Source: Adavant Consulting – January 2015.

Vehicle Trips: The overall number of vehicle trips generated by the proposed project by origin and destination is also presented in Table 10.

No Event

During the weekday PM peak hour without an event, the proposed project land uses would generate 702 vehicle trips. On Saturdays without an event, the number of vehicle trips during the Saturday evening peak hour (785 vehicle trips) would higher but comparable to those occurring during the weekday PM peak hour (702 vehicle trips). The number of vehicle trips would be higher because trip generation associated with the office uses would be minimal on a Saturday, and the reduction in office trip generation (with a higher transit than auto mode split) would be offset by a greater trip generation for the retail and restaurant uses (with a higher auto than transit mode split) on a Saturday than on a weekday.

With Event

On weekdays with a basketball game, the proposed project would generate 886 vehicle trips during the PM peak hour, and the number of vehicle trips would increase to 2,752 vehicle trips during the evening peak hour (mostly arrivals to the event center), and to 3,018 vehicle trips during the late evening peak hour (mostly departures from the event center). More vehicle trips would be generated by a basketball game during the weekday late evening peak hour than during the PM peak hour because arrivals (inbound trips) tend to be spread out over a longer period of time as sport fans shop, buy food or meet on their way to their seats, whereas departures (outbound trips) are typically concentrated within the one hour immediately following the conclusion of an event.

On Saturdays with a basketball game, the proposed project would generate 2,815 vehicle trips during the evening peak hour. As indicated in Table 10, there would be a somewhat greater vehicle trip generation for a Saturday basketball game (2,815 vehicle trips) than for a weekday basketball game (2,752 vehicle trips) as more people tend to drive on weekends because of the typically lighter traffic, more parking availability, and less transit service (e.g., fewer routes and/or longer headways between buses on Saturdays than on weekdays). In addition, retail, and restaurant uses would generate more vehicle trips on a Saturday than on a weekday.

On weekdays with a convention event, the proposed project would generate 919 vehicle trips during the PM peak hour. A convention event would generate fewer weekday PM peak hour vehicles trips than a basketball game, as convention events would have both a lower event attendance (9,000 attendees for a convention event as compared to 18,064 attendees for a basketball game) and a higher non-automobile event-only mode share (70 percent transit/other mode for a convention event during the PM peak hour, as compared to 59 percent transit/other mode share for a basketball game during the PM peak hour; see Table 9, p. 20).

TRANSIT TRIPS BY PLACE OF ORIGIN

Table 11 summarizes the transit trips generated by the proposed project for the various scenarios and time periods.

Table 11
Project Transit (Muni and Regional) Trips by Place of Origin and Time Period [a, b]

Place of Trip Origin/Destination	Weekday: PM Peak Hour of the 4 to 6 PM period – No Event	Weekday: PM Peak Hour of the 4 to 6 PM period – Basketball Game	Weekday: PM Peak Hour of the 4 to 6 PM period – Convention Event	Weekday: Evening Peak Hour of the 6 to 8 PM period – Basketball Game	Weekday: Late Evening Peak Hour of the 9 to 11 PM period – Basketball Game	Saturday: Evening Peak Hour of the 7 to 9 PM period – No Event	Saturday: Evening Peak Hour of the 7 to 9 PM period – Basketball Game
San Francisco							
Superdistrict 1	88	177	467	834	681	82	698
Superdistrict 2	93	149	99	184	157	72	151
Superdistrict 3	261	311	228	188	167	290	163
Superdistrict 4	61	104	81	125	107	43	94
East Bay	237	535	387	1,663	1,898	124	1,698
North Bay	18	55	19	295	460	5	399
South Bay	94	236	139	855	967	34	854
Out of Region	30	57	104	227	244	23	253
Total Transit Trips	**881**	**1,625**	**1,524**	**4,371**	**4,680**	**673**	**4,310**
Inbound	157	944	212	4,138	0	261	4,134
	18%	58%	14%	95%	0%	39%	96%
Outbound	724	681	1,312	232	4,680	413	176
	82%	42%	86%	5%	100%	61%	4%

Note:
[a] Numbers may not sum due to rounding.
[b] For all analysis scenarios, the transit trips include the proposed office, retail, and restaurant uses, as well as an event or no event at the event center, depending on the analysis scenario (i.e., No Event, Basketball Game, Convention Event).
Source: Adavant Consulting – January 2015.

No Event

During the weekday PM peak hour without an event, the proposed project land uses would generate 881 transit trips. On Saturdays without an event, the number of transit trips during the Saturday evening peak hour (673 transit trips) would be less than during the weekday PM peak hour (881 transit trips) due to the higher trip generation and greater transit mode share of the office use on a weekday.

With Event

On weekdays with a basketball game, the proposed project would generate 1,625 transit trips during the PM peak hour, and the number of transit trips would increase to 4,371 transit trips during the evening peak hour (mostly arrivals to the event center), and to 4,680 transit trips during the late evening peak hour (primarily departures from the event center). On Saturdays with a basketball game, the proposed project would generate 4,310 transit trips during the evening peak hour.

On weekdays with a convention event, the proposed project would generate 1,524 transit trips during the PM peak hour.

WALK/OTHER TRIPS BY PLACE OF ORIGIN

Table 12 summarizes the walk/other trips (i.e., walk, bicycle, motorcycle, taxi, and other modes) generated by the proposed project.

No Event

During the weekday PM peak hour without an event, the proposed project land uses would generate 570 walk/other trips. On Saturdays without an event, the number of walk/other trips during the Saturday evening peak hour (750 walk/other trips) would be more than during the weekday PM peak hour (570 walk/other trips) due to the higher trip generation of the restaurant uses on a Saturday at the later hour.

With Event

On weekdays with a basketball game, the proposed project would generate 590 walk/other trips during the PM peak hour, and the number of walk/other trips would increase to 1,368 walk/other trips during the evening peak hour (mostly arrivals to the event center), and to 1,258 walk/other trips during the late evening peak hour (primarily departures from the event center). On Saturdays with a basketball game, the proposed project would generate 681 walk/other trips during the evening peak hour.

On weekdays with a convention event, the proposed project would generate 2,098 walk/other trips during the PM peak hour.

Table 12
Project Walk/Other Trips by Place of Origin and Time Period [a, b, c]

Place of Trip Origin/Destination	Weekday					Saturday	
	PM Peak Hour of the 4 to 6 PM period			Evening Peak Hour of the 6 to 8 PM period	Late Evening Peak Hour of the 9 to 11 PM period	Evening Peak Hour of the 7 to 9 PM period	
	No Event	Basketball Game	Convention Event	Basketball Game	Basketball Game	No Event	Basketball Game
San Francisco							
Superdistrict 1	104	124	1,250	464	379	161	211
Superdistrict 2	55	62	167	149	123	71	69
Superdistrict 3	365	321	385	257	218	467	146
Superdistrict 4	20	22	127	66	54	31	27
East Bay	9	26	8	174	199	7	98
North Bay	1	3	2	1	1	0	0
South Bay	6	16	4	139	157	6	69
Out of Region	10	16	155	119	127	8	60
Total Walk/Other Trips	**570**	**590**	**2,098**	**1,368**	**1,258**	**750**	**681**
Inbound	233	339	322	1,304	0	361	620
	41%	58%	15%	95%	0%	48%	91%
Outbound	337	251	1,777	64	1,258	389	61
	59%	42%	85%	5%	100%	52%	9%

Notes:
[a] Other trips include walk, bicycle, motorcycle, taxi and other modes.
[b] Numbers may not sum due to rounding.
[c] For all analysis scenarios, the walk/other trips include the proposed office, retail, and restaurant uses, as well as an event or no event at the event center, depending on the analysis scenario (i.e., No Event, Basketball Game, Convention Event).
Source: Adavant Consulting – January 2015.

PARKING DEMAND

Weekday and Saturday parking demand for the proposed project was determined based on methodologies presented in the *SF Guidelines*, supplemented with data obtained from the Urban Land Institute[19] and the project sponsor on the characteristics of the event center, described above. Parking demand consists of both long-term demand (typically employees) and short-term demand (typically visitors).

Peak parking demand was estimated for the midday period (1 to 3 PM) when parking occupancy is typically greatest for office and retail uses, and for the late evening (7 to 9 PM) period when parking demand is greater for the basketball game and restaurant uses.

Long-term parking demand for the office, retail, and restaurant uses was estimated by applying the average mode split and vehicle occupancy from the trip generation estimation to the number of employees for each of the proposed land uses. Short-term parking for these uses was estimated based on the total daily vehicle visitor trips and an average daily parking turnover rate of 5.5 vehicles per space per day for the office, retail, and restaurant uses.[20]

Parking demand for attendees at a basketball game and convention event were estimated based on the total number of attendee vehicle trips expected at each event (i.e., the maximum number of vehicles arriving for the event, not just during the analysis hours) and an average daily parking turnover rate (1 vehicle per space per day for all basketball games on weekdays and Saturdays, and 1.5 vehicles per space per day for convention events).[21] Event employee parking demand was estimated by applying the average mode split and vehicle occupancy from the trip generation estimation described in the previous sections to the number of employees expected at each event.

Table 13 summarizes the estimated weekday and Saturday parking demand for the proposed project during the midday and late evening periods. Detailed parking demand calculations are presented in Appendix C (p. A-63).

[19] Table 2-5 and Table 2-6 (pp. 16 and 17); Shared Parking, Urban Land Institute, Second Edition, 2005.

[20] Based on the *SF Guidelines*, Appendix G, page G-1. A turnover of 5.5 means that each parking is utilized by an average of 5.5 vehicles during the day.

[21] See Appendix C, p. A-63.

Table 13
Project Parking Demand by Land Use and Time Period [a]

Land Use Type	Weekday						Saturday					
	Midday Period (1 to 3 PM)			Late Evening Period (7 to 9 PM)			Midday Period (1 to 3 PM)			Late Evening Period (7 to 9 PM)		
	Short-term spaces	Long-term spaces	Total spaces	Short-term spaces	Long-term spaces	Total spaces	Short-term spaces	Long-term spaces	Total spaces	Short-term spaces	Long-term spaces	Total spaces
No Event												
Event Center	0	22	22	0	2	2	0	22	22	0	2	2
Office	156	457	613	8	46	54	0	82	82	0	0	0
Retail	185	37	222	176	35	211	217	37	254	163	30	193
Quick Service Restaurant	47	7	54	38	6	44	59	7	66	47	6	53
Sit-down Restaurant	110	28	138	147	31	178	137	28	165	183	31	214
Total spaces w/out event	**498**	**551**	**1,049**	**369**	**120**	**489**	**413**	**176**	**589**	**393**	**69**	**462**
With Event												
Basketball Game	74	63	137	3,677	208	3,885	80	63	143	4,014	208	4,222
Convention Event	830	141	971	249	35	284		N.A. [c]			N.A. [c]	
Office	156	457	613	8	46	54	0	82	82	0	0	0
Retail	127	37	164	120	35	155	148	37	185	111	30	141
Quick Service Restaurant	47	7	54	38	6	44	59	7	66	47	6	53
Sit-down Restaurant	76	28	104	101	31	132	94	28	122	126	31	157
Total spaces with event												
Basketball Game	480	592	1,072	3,944	326	4,270	381	217	598	4,298	275	4,573
Convention Event	1,236	670	1,906	516	153	669		N.A. [c]			N.A. [c]	

Notes:
[a] See Appendix C (p. A-63) for detailed project parking demand calculations; numbers may not sum due to rounding.
[b] Not applicable; not part of the travel demand analysis.
Source: Adavant Consulting – November 2014.

No Event

On weekdays without an event, the proposed project would generate a maximum parking demand for 1,049 spaces during weekday midday period and 489 spaces during the late evening period. The parking demand on Saturday (589 spaces during the midday and 462 spaces during the late evening period) would be lower because the parking demand associated with the office use would be substantially less on a Saturday than on a weekday**,** particularly at midday, and the reduction in the office parking demand would not be offset by the higher Saturday parking demand associated with the retail and restaurant uses.

With Event

On weekdays with an event, the proposed project would generate a maximum parking demand for 1,906 spaces during weekday midday period during a convention event, and 4,270 spaces during the late evening period with a basketball game.

On a Saturday with a basketball game, the midday parking demand would be similar to conditions with no event because basketball games start at 7:30 PM and game attendees would not have had arrived during the midday period. Thus, on Saturdays with a basketball game the midday parking demand associated with the event center would be somewhat greater, but similar to conditions without an event (i.e., 598 spaces with an event, as compared to the parking demand for 589 spaces without an event). The late evening parking demand on Saturday with a basketball game (4,573 spaces) would be greater than on weekdays (4,270 spaces) due to the higher auto mode share for basketball game attendees on Saturdays than on weekdays.

LOADING DEMAND

The *SF Guidelines* methodology for estimating commercial vehicle and freight loading demand was used to calculate the daily truck/service vehicle trips and the average hour and peak hour loading space demand for the office, retail, and restaurant uses. Daily truck trips generated per 1,000 square feet were calculated based on the rates contained within the *SF Guidelines*, then converted to hourly demand based on a 9-hour day and a 25-minute average stay. Average hour loading space demand was converted to a peak hour demand by applying a peaking factor, as specified in the *SF Guidelines*. For the event center, information from the project sponsor on the loading activity for the Golden State Warriors at the Oracle Arena in Oakland, and event loading activity at the Toyota Center in Houston, Texas and at the Barclays's Center in Brooklyn, New York was used to estimate the event center loading demand.

Table 14 presents the number of trucks generated on a daily basis, and the demand for loading dock spaces during the average hour and peak hour of loading activity. Loading demand calculations are included in Appendix D (p. A-69). The office, retail, and restaurant uses would generate about 360 delivery and service vehicle trips per day, which corresponds to a demand for 17 loading spaces during the average hour of loading activity and 21 loading spaces during the peak hour of loading activity.

Table 14
Project Delivery/Service Vehicle Trips and Loading Space Demand

Land Use	GSF	Daily Trucks/ Service Vehicle Trip Generation	Loading Space Demand	
			Average Hour Loading Spaces	Peak Hour Loading Spaces
Event Center [a]	750,000	30	7	7
Office	605,000	127	6	7
Retail	62,500	14	1	1
Restaurant	62,500	225	10	13
Total		**396**	**24**	**28**

Note:
[a] Represents maximum loading demand associated with non-GS Warriors events.
Source: *SF Guidelines*, GS Warriors, LCW Consulting – November 2014

In addition, as indicated in Table 14, the event center would generate a demand of up to 30 delivery and service vehicle trips on the day prior to an event. Non-GS Warriors events would generate a greater number of delivery and service vehicle trips associated with show components (e.g., stage, sound equipment and controls, video equipment and controls, and props), as well as food and beverage trucks, than basketball games. As indicated in Table 14, the event center would generate a loading space demand for seven loading spaces during the average and peak hour of loading activity. The loading space demand for seven loading spaces takes into consideration that the loading demand would occur over a shorter period (i.e., over a period of about four hours, rather than 9-hour period for the office, retail, and restaurant uses), and some loading spaces would be occupied for one or more days (e.g., TV crew trucks).

APPENDIX A

TRAVEL DEMAND ASSUMPTIONS

ORIGIN/DESTINATION DATA FROM GS WARRIORS

(Used to estimate event attendee O/D trip distribution)

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

Estimated Origin-Destination for GS Warriors and non-basketball Events at a San Francisco facility

PLACE OF RESIDENCE BY ZIP CODE

Zip Code	Location	Super District	Percentage
94102	Hayes Valley/Tenderloin/North of Market	SD1	2.1%
94103	South of Market	SD1	4.0%
94104	Downtown	SD1	4.4%
94105	Downtown	SD1	8.4%
94107	South of Market	SD1	5.9%
94108	Chinatown	SD1	3.8%
94109	Polk/Russian Hill	SD1	4.2%
94111	Downtown/South of Market	SD1	11.1%
94119	Rincon Center	SD1	2.1%
94133	North Beach/Chinatown	SD1	4.2%
94141	South of Market	SD1	0.2%
		TOTAL SD1	**50.4%**
94115	Western Addition/Japantown	SD2	1.9%
94117	Haight-Ashbury	SD2	1.7%
94118	Inner Richmond	SD2	3.2%
94121	Outer Richmond	SD2	3.8%
94123	Marina	SD2	4.4%
94129	Presidio	SD2	0.6%
		TOTAL SD2	**15.6%**
94110	Inner Mission/Bernal Heights	SD3	3.1%
94112	Ingleside-Excelsior/Crocker Amazon	SD3	4.6%
94114	Castro/Noe Valley	SD3	2.3%
94124	Bayview-Hunters Point	SD3	2.3%
94128	SFO	SD3	0.2%
94131	Twin Peaks/Glen Park	SD3	2.5%
94134	Visitacion Valley/Sunnydale	SD3	1.9%
94158	Mission Bay	SD3	1.7%
94188	India Basin	SD3	0.4%
		TOTAL SD3	**18.9%**
94116	Parkside/Forest Hill	SD4	2.9%
94122	Sunset	SD4	5.5%
94127	St Francis Wood/Miraloma/West Portal	SD4	4.2%
94132	Lake Merced	SD4	2.5%
		TOTAL SD4	**15.1%**
		TOTAL SAN FRANCISCO	**100.0%**

Source: Market study for SF location, GS Warriors, 2013

PLACE OF RESIDENCE SUMMARY

County	Geographical Area	Percentage
San Francisco	SD1	11.1%
	SD2	3.4%
	SD3	4.2%
	SD4	3.3%
	Total San Francisco	**22.0%**
Alameda	East Bay	20.0%
Contra Costa	East Bay	12.0%
San Joaquin	East Bay	1.0%
	Total East Bay	**33.0%**
Marin	North Bay	4.2%
Solano	North Bay	4.0%
Sonoma	North Bay	3.8%
Napa	North Bay	1.0%
	Total North Bay	**13.0%**
Santa Clara	South Bay	14.0%
San Mateo	South Bay	13.0%
Santa Cruz	South Bay	1.0%
	Total South Bay	**28.0%**
Other	Outside Bay Area	4.0%
	TOTAL ALL AREAS	**100.0%**

Source: GS Warriors, 2013

GS WARRIORS SEASON TICKET HOLDERS

Place of Residence	Place of Employment: S Francisco	East Bay	North Bay	South Bay	Out of Region	Total
San Francisco	21	3	0	4	0	28
East Bay	15	91	0	8	3	117
North Bay	5	1	10	0	0	16
South Bay	8	2	0	40	0	50
Outside Bay Area	0	1	0	1	7	9
Total All Areas	**49**	**98**	**10**	**53**	**10**	**220**

LOCATION	Place of residence for GS Warriors season ticket holders who work in San Francisco		
San Francisco	21	75.0%	of SF residents
East Bay	15	12.8%	of East Bay residents
North Bay	5	31.3%	of North Bay residents
South Bay	8	16.0%	of South Bay residents
Outside Bay Area	0	0.0%	of Outside Bay Area residents
Total All Areas	**49**	**22.3%**	**of all residents**

LOCATION	Place of employment for GS Warriors season ticket holders who live in San Francisco		
San Francisco	21	75.0%	of SF residents
East Bay	3	10.7%	of SF residents
North Bay	0	0.0%	of SF residents
South Bay	4	14.3%	of SF residents
Outside Bay Area	0	0.0%	of SF residents
Total All Areas	**28**	**100.0%**	**of SF residents**

	Weekday Trip Origin Adjustment for Live/Work Locations					
LOCATION	Original Unadjusted	SF Resid. work else.	Interim Factor	Others who work in SF	Final Adjusted	Change
SD1	11.1%	-2.8%	8.3%	6.4%	14.8%	3.7%
SD2	3.4%	-0.9%	2.6%	2.0%	4.6%	1.1%
SD3	4.2%	-1.0%	3.1%	2.4%	5.5%	1.4%
SD4	3.3%	-0.8%	2.5%	1.9%	4.4%	1.1%
East Bay	33.0%	2.4%	35.4%	-4.2%	31.1%	-1.9%
North Bay	13.0%	0.0%	13.0%	-4.1%	8.9%	-4.1%
South Bay	28.0%	3.1%	31.1%	-4.5%	26.7%	-1.3%
Outside Bay Area	4.0%	0.0%	4.0%	0.0%	4.0%	0.0%
Total All Areas	**100.0%**	**0.0%**	**100.0%**	**0.0%**	**100.0%**	**0.0%**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

TEMPORAL DISTRIBUTION OF EVENT ATTENDEE ARRIVALS

Time Period	GSW (Oracle)	Icon Venue Group	Houston 2015	Phoenix Jan 2015	Sacramento 2012	Brooklyn 2013-14	Brooklyn 2014-15	GSW @ SF MB
Within 2½ hours and 2 hours prior to start								1.0%
Within 2 hours and 1½ hours prior to start	1.0%	incl. below	incl. below	incl. below	incl. below	2.0%	4.1%	4.0%
Within 1½ hours and 1 hour prior to start	11.0%	9.2%	12.0%	9.6%	14.0%	12.6%	11.3%	10.5%
Within 1 hour and ½ hour prior to start	20.0%	21.5%	18.0%	21.9%	22.7%	20.5%	22.4%	19.5%
Within ½ hour prior to start	34.0%	32.3%	32.0%	35.2%	44.7%	32.3%	33.6%	32.5%
Within ½ hour after start	34.0%	37.0%	30.0%	25.6%	18.6%	24.8%	22.5%	32.5%
Within ½ hour and 1 hour after start			5.0%	6.5%		5.8%	4.6%	
Within 1 hour and 1½ hours after start			3.0%	1.1%		2.0%	1.6%	
TOTAL	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.1%**	**100.0%**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

ARENA ATTENDEES	WEEKDAY			SATURDAY			WEEKDAY	
	Vehicles	% of Daily		Vehicles	% of Daily		Person trips	% of
Basketball Game	Estimated by model	Estimated by model	from GSW Attendee Data	Estimated by model	Estimated by model	from GSW Attendee Data	Estimated by model	Estimated by model
Total daily vehicle trips (in+out)	8,183			8,581			38,128	
Inbound daily vehicle trips	4,092			4,291			19,064	
Estimated Inbound peak hour of 4 to 6 PM period	379	9.3%	5.0%				1,803	9.5%
Estimated Inbound peak hour of 6 to 8 PM period	2,489	60.8%	65.0%				11,742	61.6%
Estimated Inbound peak hour of 7 to 9 PM period				2,653	61.8%	65.0%		
Estimated Outbound peak hour of 9 to 11 PM period	2,797	68.4%	70.0%				12,845	67.4%

GS WARRIORS DATA

Arrivals Time Period		Start time: 7:30 PM	
5:00 PM	5:30 PM	1%	1%
5:30 PM	6:00 PM	4%	5%
6:00 PM	6:30 PM	11%	16%
6:30 PM	7:00 PM	20%	35%
7:00 PM	7:30 PM	33%	68%
7:30 PM	8:00 PM	33%	100%
	TOTAL	**100%**	

Departures Time Period		End time: 9:40 PM	
9:00 PM	9:30 PM	30%	30%
9:30 PM	10:00 PM	40%	70%
10:00 PM	10:30 PM	30%	100%

SAN FRANCISCO GIANTS SPECTATOR TRAVEL SURVEYS
(Used to estimate event travel mode & vehicle occupancy)

SF GIANTS BALLPARK TRANSPORTATION SUMMARY

	2000 SURVEY				2007 SURVEY					2012 SURVEY				
	WEEKDAY		WEEKEND	ALL DAYS	WEEKDAY		WEEKEND		ALL DAYS	WEEKDAY		WEEKEND		ALL DAYS
	Afternoon	Evening	Afternoon	COMBINED	Afternoon	Evening	Afternoon	Evening	COMBINED	Afternoon	Evening	Afternoon	Evening	COMBINED
ORIGIN OF TRIP														
Home	68.0%	72.0%	97.0%	79.0%	76.5%	76.0%	96.5%	77.0%	81.5%	84.2%	71.7%	91.0%	91.1%	84.5%
Work	32.0%	28.0%	3.0%	21.0%	19.0%	20.0%	0.0%	19.0%	14.5%	6.5%	7.1%	6.9%	6.0%	6.6%
Other	included in home		included in home		4.5%	4.0%	3.5%	4.0%	4.0%	9.3%	21.2%	2.2%	2.8%	8.9%
All Origins	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
San Francisco										26.7%	40.4%	24.8%	27.0%	29.7%
East Bay										29.0%	20.5%	27.6%	26.6%	25.9%
North Bay										19.4%	10.8%	17.6%	14.8%	15.6%
South Bay										24.9%	28.3%	30.0%	31.7%	28.7%
All Origins										**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
MODE OF TRAVEL														
Auto					49.8%	54.0%	59.0%	53.0%	53.9%	40.9%	33.0%	51.8%	51.3%	44.2%
Charter bus					included above		included above			0.7%	0.0%	0.4%	0.0%	0.3%
Muni					10.9%	11.6%	11.0%	9.8%	10.8%	11.0%	19.2%	7.7%	9.7%	11.9%
BART					12.8%	10.3%	11.9%	14.4%	12.3%	20.3%	15.3%	13.4%	13.1%	15.5%
Caltrain					12.2%	11.6%	9.5%	9.4%	10.7%	9.6%	12.8%	12.7%	12.4%	11.9%
Ferry					5.5%	3.0%	4.1%	6.2%	4.7%	7.6%	6.9%	8.1%	3.7%	6.6%
Taxi					0.8%	1.5%	0.9%	1.2%	1.1%	2.0%	2.0%	0.4%	2.3%	1.7%
Walk					6.0%	5.0%	2.0%	6.0%	4.8%	3.3%	6.4%	2.1%	2.7%	3.6%
Bike					included above		included above			2.0%	1.0%	1.4%	1.7%	1.5%
Other					2.0%	3.0%	1.5%	0.0%	1.6%	2.7%	3.4%	2.1%	3.0%	2.8%
All Modes					**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Auto	48.0%	50.0%	57.5%	51.8%	49.8%	54.0%	59.0%	53.0%	53.9%	40.9%	33.0%	51.8%	51.3%	44.2%
Transit	41.0%	37.0%	33.5%	37.2%	41.4%	36.5%	36.6%	39.8%	38.6%	49.2%	54.2%	42.3%	38.9%	46.1%
Taxi	included in other		included in other		0.8%	1.5%	0.9%	1.2%	1.1%	2.0%	2.0%	0.4%	2.3%	1.7%
Walk	8.0%	7.0%	5.0%	6.7%	6.0%	5.0%	2.0%	6.0%	4.8%	3.3%	6.4%	2.1%	2.7%	3.6%
Other	3.0%	6.0%	4.0%	4.3%	2.0%	3.0%	1.5%	0.0%	1.6%	4.7%	4.4%	3.5%	4.7%	4.3%
All Modes	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
PARKING LOCATION														
SF Giants facilities	76.0%	60.0%	61.0%	65.7%	40.0%	33.0%	33.4%	38.0%	36.1%	45.6%	31.5%	35.9%	24.8%	34.5%
On-street					21.0%	36.0%	29.3%	38.0%	31.1%	12.8%	30.1%	20.5%	26.1%	22.4%
Other off-street facilities					39.0%	31.0%	37.4%	24.0%	32.8%	41.6%	38.4%	43.6%	49.1%	43.2%
All parking locations					**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Avg. number of people in car				2.80	2.48	2.67	2.48	2.67	2.57					
Avg. time of arrival before start					36 min	35 min	42 min	37 min	37 min					

Sources:
San Francisco's New Downtown Ballpark: A home run for public transit; G. Robbins, A. Felder, W. Hurrell; 2001 Institute of Transportation Engineers Annual Meeting.
San Francisco Giants Transportation Survey; SF Giants; August 2007.
San Francisco Giants Transportation Survey; SF Giants; October 2012.

Temporal Distribution of Project Land Uses

(Used to estimate non-event land use arrival patterns)

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION

TABLE 1 CALCULATION OF TRIP GENERATION RATES FOR WEEKDAY & SATURDAY CONDITIONS LAND USES	WEEKDAY PM Peak Hour of 4-6 PM Period SF Guidelines Rates	WEEKDAY Proposed Late PM Peak Hour Rates	SATURDAY ITE Weekday-to-Saturday Trip Gen Factor (from Table 2)	SATURDAY Proposed Daily and Late PM Peak Hour Rates
OFFICE				
Daily trips per 1000 gsf	18.1		0.22	4.0
Peak Hour of 4-6 PM period as a % of Daily	8.5%			11.0%
Peak Hour of 4-6 PM period trips per 1000 gsf	1.54		0.29	0.44
Peak Hour of 6-8 PM period as a % of PM peak hour (Table 3a)		0.20		
Peak Hour of 6-8 PM period as a % of daily (calculated)		1.7%		
Peak Hour of 6-8 PM period trips per 1000 gsf		0.31		
Peak Hour of 7-9 PM period as a % of PM peak hour (Table 3a)				0.10
Peak Hour of 7-9 PM period as a % of daily				1.1%
Peak Hour of 7-9 PM period trips per 1000 gsf				0.04
Peak Hour of 9-11 PM period as a % of PM peak hour (Table 3a)		0.05		
Peak Hour of 9-11 PM period as a % of daily		0.4%		
Peak Hour of 9-11 PM period trips per 1000 gsf		0.08		
RETAIL				
Daily trips per 1000 gsf	150.0		1.17	175.5
Peak Hour of 4-6 PM period as a % of Daily	9.0%			10.0%
Peak Hour of 4-6 PM period trips per 1000 gsf	13.5		1.30	17.5
Peak Hour of 6-8 PM period as a % of PM peak hour (Table 3a)		0.75		
Peak Hour of 6-8 PM period as a % of daily (calculated)		6.8%		
Peak Hour of 6-8 PM period trips per 1000 gsf		10.13		
Peak Hour of 7-9 PM period as a % of PM peak hour (Table 3a)				0.40
Peak Hour of 7-9 PM period as a % of daily				4.0%
Peak Hour of 7-9 PM period trips per 1000 gsf				7.02
Peak Hour of 9-11 PM period as a % of PM peak hour (Table 3a)		0.35		
Peak Hour of 9-11 PM period as a % of daily		3.2%		
Peak Hour of 9-11 PM period trips per 1000 gsf		4.73		
SIT-DOWN RESTAURANT				
Daily trips per 1000 gsf	200.0		1.25	249.1
Peak Hour of 4-6 PM period as a % of Daily	13.5%			15.5%
Peak Hour of 4-6 PM period trips per 1000 gsf	27.0		1.43	38.6
Peak Hour of 6-8 PM period as a % of PM peak hour (Table 3a)		1.50		
Peak Hour of 6-8 PM period as a % of daily (calculated)		20.3%		
Peak Hour of 6-8 PM period trips per 1000 gsf		40.50		
Peak Hour of 7-9 PM period as a % of PM peak hour (Table 3a)				1.55
Peak Hour of 7-9 PM period as a % of daily				24.0%
Peak Hour of 7-9 PM period trips per 1000 gsf				59.78
Peak Hour of 9-11 PM period as a % of PM peak hour (Table 3a)		1.50		
Peak Hour of 9-11 PM period as a % of daily		20.3%		
Peak Hour of 9-11 PM period trips per 1000 gsf		40.50		
QUICK SERVICE RESTAURANT				
Daily trips per 1000 gsf (Composite rate)	600.0		1.25	747.3
Peak Hour of 4-6 PM period as a % of Daily	13.5%			15.5%
Peak Hour of 4-6 PM period trips per 1000 gsf	81.0		1.43	115.7
Peak Hour of 6-8 PM period as a % of PM peak hour (closed except during events)		1.50		
Peak Hour of 6-8 PM period as a % of daily (calculated)		20.3%		
Peak Hour of 6-8 PM period trips per 1000 gsf		121.50		
Peak Hour of 7-9 PM period as a % of PM peak hour (closed except during events)				1.55
Peak Hour of 7-9 PM period as a % of daily				24.0%
Peak Hour of 7-9 PM period trips per 1000 gsf				179.34
Peak Hour of 9-11 PM period as a % of PM peak hour (closed except during events)		1.50		
Peak Hour of 9-11 PM period as a % of daily		20.3%		
Peak Hour of 9-11 PM period trips per 1000 gsf		121.50		

(Used to estimate work travel modes and origins/destinations)

TABLE 2

ITE OFFICE LAND USE 710 General Office Building	Vehicle-trips per 1000 gsf Weekday	 Saturday	Weekday-to- Sat. factor
Daily	11.03	2.46	0.22
Peak Hour of 4-6 PM period	1.49	0.43	0.29
Peak Hour of 4-6 PM period as a % of Daily	13.5%	17.5%	1.29

ITE RETAIL LAND USE 820 Shopping Center	Vehicle-trips per 1000 gsf Weekday	 Saturday	Weekday-to- Sat. factor
Daily	42.70	49.97	1.17
Peak Hour of 4-6 PM period	3.71	4.82	1.30
Peak Hour of 4-6 PM period as a % of Daily	8.7%	9.6%	1.11

ITE RESTAURANT LAND USE 932 High-Turnover Sit-Down	Vehicle-trips per 1000 gsf Weekday	 Saturday	Weekday-to- Sat. factor
Daily	127.15	158.37	1.25
Peak Hour of 4-6 PM period	9.85	14.07	1.43
Peak Hour of 4-6 PM period as a % of Daily	7.7%	8.9%	1.15

Source: Institute of Transportation Engineers, Trip Generation Report, 9th Edition, 2012

TABLE 3 (Summary of Table 3a)
Source: Pushkarev and Zupan, Urban Space for Pedestrians

	Start Time							PM to Late Evening Adjustment Ratios for 6-8 period over 4-6 period		7-9 period over 4-6 period		9-11 period over 4-6 period	
LAND USE	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	Calculated	Selected	Calculated	Selected	Calculated	Selected
Office (flat peak)	15.2%	8.5%	2.9%	0.4%	1.5%	0.8%	0.0%	0.19	0.20	0.10	0.10	0.05	0.05
Office (sharp peak)	8.3%	13.4%	2.6%	0.5%	1.3%	0.9%	0.0%	0.20		0.09		0.07	
Retail	6.2%	8.9%	6.4%	2.7%	3.6%	3.0%	1.4%	0.72	0.75	0.41	0.40	0.34	0.35
Restaurant	4.1%	6.3%	9.2%	8.9%	9.6%	9.3%	6.6%	1.47	1.50	1.53	1.55	1.48	1.50

TABLE 3a
Percent of weekday 24-hour in and out trips during each hour by type of land use
Source: Pushkarev and Zupan, Urban Space for Pedestrians

Weekday Time Period		Office (flat peak) In	Out	Two-way	Office (sharp peak) In	Out	Two-way	Retail Two-way	Restaurant Two-way
12:00 AM	1:00 AM								
1:00 AM	2:00 AM								
2:00 AM	3:00 AM								
3:00 AM	4:00 AM								
4:00 AM	5:00 AM								
5:00 AM	6:00 AM								
6:00 AM	7:00 AM								
7:00 AM	8:00 AM	3.9	0.6	2.2	1.9	0.2	1.1	0.0	0.0
8:00 AM	9:00 AM	25.6	2.3	13.9	22.5	0.9	11.5	0.0	0.0
9:00 AM	10:00 AM	10.9	3.5	7.2	20.5	2.2	11.3	0.9	0.0
10:00 AM	11:00 AM	5.8	4.0	4.9	4.4	3.2	3.7	3.8	2.1
11:00 AM	12:00 PM	5.3	7.8	6.5	3.5	9.3	6.4	6.7	4.4
12:00 PM	1:00 PM	12.6	16.6	14.7	8.0	20.0	14.2	20.1	14.0
1:00 PM	2:00 PM	10.7	7.8	9.2	20.8	8.2	14.4	19.9	15.1
2:00 PM	3:00 PM	8.4	5.3	6.8	9.5	4.5	7.0	9.9	7.6
3:00 PM	4:00 PM	4.2	6.3	5.3	3.4	3.6	3.4	6.3	2.9
4:00 PM	5:00 PM	5.3	24.9	15.2	2.3	14.1	8.3	6.2	4.1
5:00 PM	6:00 PM	3.6	13.2	8.5	1.3	25.3	13.4	8.9	6.3
6:00 PM	7:00 PM	2.0	3.9	2.9	0.9	4.3	2.6	6.4	9.2
7:00 PM	8:00 PM	0.1	0.8	0.4	0.2	0.8	0.5	2.7	8.9
8:00 PM	9:00 PM	1.0	1.8	1.5	0.5	2.1	1.3	3.6	9.6
9:00 PM	10:00 PM	0.4	1.3	0.8	0.3	1.4	0.9	3.0	9.3
10:00 PM	11:00 PM	0.0	0.0	0.0	0.0	0.0	0.0	1.4	6.6
11:00 PM	12:00 AM								
TOTAL		**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Place of Origin & Mode of Travel for the Moscone Convention Center

(Used to estimate convention trip distribution and mode of travel)

MISSION BAY AREA
TRANSPORTATION SURVEY OF MISSION BAY EMPLOYEES
Source: Mission Bay TMA 2012, 2013 & 2014

	PLACE OF RESIDENCE							MISSION BAY	
Mode of travel most frequently used	**Mission Bay**	**SF, not MB**	**East Bay**	**North Bay**	**South Bay**	**40+ miles**	**Total**	**MB Residents**	**Reside elsewhere**
Drive alone	22	82	41	12	106	5	268	22	246
Carpool or Get Dropped Off	6	13	30	8	15	2	74	6	68
Walk or Bike	55	66	4	1	0	0	126	55	71
BART plus Mission Bay Shuttle	5	10	222	1	3	6	247	5	242
Caltrain plus Mission Bay Shuttle	11	0	2	0	61	4	78	11	67
MUNI plus Mission Bay Shuttle	34	51	1	0	0	0	86	34	52
Other Transit plus Mission Bay Shuttle	4	3	5	1	0	1	14	4	10
Caltrain plus Walk	16	0	0	1	51	7	75	16	59
MUNI plus Walk	24	41	13	4	0	1	83	24	59
Walk plus MB shuttle	34	19	0	0	0	0	53	34	19
UCSF or China Basin or GAP Shuttle	29	59	0	0	1	1	90	29	61
Motorcycle	2	8	3	1	2	2	18	2	16
Other transit plus walk or bike	1	0	33	16	2	3	55	1	54
MB Shuttle only	2	1	0	0	1	0	4	2	2
Corporate shuttles (2013 and 2014)	3	0	0	0	0	0	3	3	0
Uber/Lyft/Taxi (2014)	0	3	0	0	0	0	3	0	3
Total	**248**	**356**	**354**	**45**	**242**	**32**	**1,277**	**248**	**1,029**
Drive alone	22	82	41	12	106	5	268	22	246
Carpool or Get Dropped Off	6	16	30	8	15	2	77	6	71
Transit plus MB shuttle	54	64	230	2	64	11	425	54	371
Transit plus Walk	41	41	46	21	53	11	213	41	172
MB Shuttle only	36	20	0	0	1	0	57	36	21
Other shuttle	32	59	0	0	1	1	93	32	61
Motorcycle	2	8	3	1	2	2	18	2	16
Walk or Bike	55	66	4	1	0	0	126	55	71
Total	**248**	**356**	**354**	**45**	**242**	**32**	**1,277**	**248**	**1,029**
Drive alone	8.9%	23.0%	11.6%	26.7%	43.8%	15.6%	21.0%	8.9%	23.9%
Carpool or Get Dropped Off	2.4%	4.5%	8.5%	17.8%	6.2%	6.3%	6.0%	2.4%	6.9%
Transit plus MB shuttle	21.8%	18.0%	65.0%	4.4%	26.4%	34.4%	33.3%	21.8%	36.1%
Transit plus Walk	16.5%	11.5%	13.0%	46.7%	21.9%	34.4%	16.7%	16.5%	16.7%
MB Shuttle only	14.5%	5.6%	0.0%	0.0%	0.4%	0.0%	4.5%	14.5%	2.0%
Other shuttle	12.9%	16.6%	0.0%	0.0%	0.4%	3.1%	7.3%	12.9%	5.9%
Motorcycle	0.8%	2.2%	0.8%	2.2%	0.8%	6.3%	1.4%	0.8%	1.6%
Walk or Bike	22.2%	18.5%	1.1%	2.2%	0.0%	0.0%	9.9%	22.2%	6.9%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
Auto	28	98	71	20	121	7	345	28	317
Transit	163	184	276	23	119	23	788	163	625
Walk/Bike/Other	57	74	7	2	2	2	144	57	87
Total	**248**	**356**	**354**	**45**	**242**	**32**	**1,277**	**248**	**1,029**
Auto	11.3%	27.5%	20.1%	44.4%	50.0%	21.9%	27.0%	11.3%	30.8%
Transit	65.7%	51.7%	78.0%	51.1%	49.2%	71.9%	61.7%	65.7%	60.7%
Walk/Bike/Other	23.0%	20.8%	2.0%	4.4%	0.8%	6.3%	11.3%	23.0%	8.5%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PLACE OF ORIGIN AND MODE OF TRAVEL PATTERNS FOR THE MOSCONE CONVENTION CENTER

Place of Origin	Attendees	Employees
San Francisco	70% [1]	50%
Other Bay Area	20%	50%
Out of Region	10%	0%
TOTAL	**100%**	**100%**

[1] Approximately 656,000 convention attendees or 72% of the total annual attendance at Moscone Center (907,990) stayed at SF hotels in 2011; Source: Moscone Expansion Project - Fiscal Responsibility & Feasibility Report, Table II, p. 6, San Francisco Office of Economic and Workforce Development, January 2013.

Source: Table 18, p. 89, Moscone Center Expansion Project Transportation Impact Study Final Report, April 24, 2014, Case No. 2013.0154E

Mode of Travel	Attendees	Employees
Auto	10%	30%
Public Transit	5%	60%
Event Shuttle Bus	50%	N.A. [2]
Walk	30%	8%
Other [1]	5%	2%
TOTAL	**100%**	**100%**

[1] Other includes bicycle, motorcycle, and additional modes such as taxis or limousines
[2] N.A. = Not Applicable

Source: Table 19, p. 89, Moscone Center Expansion Project Transportation Impact Study Final Report, April 24, 2014, Case No. 2013.0154E

SAN FRANCISCO SUPERDISTRICT BOUNDARIES MAP

Adavant
Consulting

San Francisco Superdistrict Boundaries

The boundaries of the four San Francisco Superdistricts are based on the travel analysis zones established by the Metropolitan Transportation Commission (MTC). The four Superdistricts shown in this figure are aggregations of the MTC's 1454 Regional Travel Analysis Zones (May 2002) that encompasses the nine-county San Francisco Bay Area. MTC's 1454-zone system fits within the year 2000 U.S. Census tracts.

PROPOSED PROJECT LAND USE SUMMARY

Event Center & Mixed-Use Development at Mission Bay Blocks 29-3

PROJECT SUMMARY
September 11, 2014

	Total Project						
Event Center	710,486	gsf					
- no event	100	employees					
- basketball game	18,064	attendees	(maximum attendance)				
	925	employees					
- convention event	9,000	attendees	(typical large attendance)				
	675	employees					
Commercial Uses							
- Retail	55,500	gsf					
- Quick Service Restaurant	18,500	gsf					
- Sit-down Restaurant	37,000	gsf					
Total commercial	111,000	gsf					
Live Theater							
	-	seats		-	gsf	-	employees
Movie Theater							
	420	seats		39,000	gsf		
Office							
- GSW Admin. & Mngmnt.	20,000	gsf					
- General Office	509,210	gsf					
Total office	529,210	gsf					
Vehicle parking							
- non-residential standard	TBD	spaces					
- non-residential attendant	TBD	spaces					
- residential	TBD	spaces					
- car share	TBD	spaces					
Total vehicle parking	-	spaces					
Bicycle parking							
- non-residential Class 1	TBD	spaces					
- non-residential Class 2	TBD	spaces					
- residential Class 1	TBD	spaces					
- residential Class 2	TBD	spaces					
Total bicycle parking	-	spaces					

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRAVEL DEMAND SUMMARY BY SCENARIO

	No Event		Basketball Game				Convention Event		No Event		Basketball Game	
	Total All Day	Peak Hour of the 4 to 6 PM Period	Total All Day	Peak Hour of the 4 to 6 PM Period	Peak Hour of the 6 to 8 PM Period	Peak Hour of the 9 to 11 PM Period	Total All Day	Peak Hour of the 4 to 6 PM Period	Total All Day	Peak Hour of the 7 to 9 PM Period	Total All Day	Peak Hour of the 7 to 9 PM Period
Auto person-trips	14,100	1,344	30,636	1,645	6,546	7,280	16,100	1,547	11,681	1,707	29,252	7,261
Transit person-trips	6,896	881	19,627	1,625	4,371	4,680	13,014	1,524	5,318	673	17,851	4,310
Taxi/Coach person trips (event)	-	-	1,277	33	434	426	13,491	1,484	-	-	434	141
Bike/Walk/Other person-trips	6,002	570	6,997	556	933	832	6,493	614	4,884	750	4,562	540
Total Person-trips	26,998	2,796	58,538	3,859	12,285	13,218	49,097	5,169	21,883	3,130	52,098	12,252
Auto person-trips	52%	48%	52%	43%	53%	55%	33%	30%	53%	55%	56%	59%
Transit person-trips	26%	32%	34%	42%	36%	35%	27%	29%	24%	22%	34%	35%
Taxi/Coach (event)	0%	0%	2%	1%	4%	3%	27%	29%	0%	0%	1%	1%
Bike/Walk/Other person-trips	22%	20%	12%	14%	8%	6%	13%	12%	22%	24%	9%	4%
Vehicle trips	6,990	702	13,691	886	2,752	3,018	9,023	919	5,876	785	12,331	2,815
- Inbound	3,495	255	6,846	524	2,553	134	4,511	256	2,938	367	6,165	2,687
- Outbound	3,495	447	6,846	362	198	2,883	4,511	663	2,938	418	6,165	128
Average vehicle occupancy	2.02	1.91	2.33	1.89	2.54	2.55	3.28	3.30	1.99	2.17	2.41	2.63

NO EVENT SUMMARY

WEEKDAY: 4 PM TO 6 PM PERIOD PEAK HOUR

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION - WEEKDAY DAILY AND PM PEAK HOUR BETWEEN 4 AND 6 PM
SUMMARY OF TRIPS WITH NO EVENT

Land Use	Intensity
Arena	0 attendees
	105 employees
Retail	62,500 gsf
Quick Service Rest.	11,000 gsf
Sit-down Restaurant	51,500 gsf
XXX	0 xxx
XXX	0 xxx
Office	605,000 gsf

Daily Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	71	3,965	1,256	3,810	0	0	4,997	14,100	52%
Transit	162	936	559	1,491	0	0	3,748	6,896	26%
Taxi/Coach (Event)								0	0%
Bike (Event)								0	0%
Walk	21	1,380	373	1,130	0	0	1,477	4,381	16%
Other	9	124	188	572	0	0	728	1,621	6%
Total	**263**	**6,405**	**2,376**	**7,004**	**0**	**0**	**10,951**	**26,998**	**100%**
	1%	**24%**	**9%**	**26%**	**0%**	**0%**	**41%**	**100%**	
Vehicle Trips	55	2,116	573	1,704	0	0	2,542	6,990	
	1%	30%	8%	24%	0%	0%	36%	100%	
Avg. veh. occupancy	*1.30*	*1.87*	*2.19*	*2.24*	*0.00*	*0.00*	*1.97*	*2.02*	

PM Peak Hour Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	6	357	170	514	0	0	298	1,344	48%
Transit	14	84	75	201	0	0	506	881	32%
Taxi/Coach (Event)								0	0%
Bike (Event)								0	0%
Walk	2	124	50	153	0	0	87	416	15%
Other	1	11	25	77	0	0	40	154	6%
Total	**22**	**576**	**321**	**946**	**0**	**0**	**931**	**2,796**	**100%**
	1%	**21%**	**11%**	**34%**	**0%**	**0%**	**33%**	**100%**	
Vehicle Trips	5	190	77	230	0	0	200	702	
	1%	27%	11%	33%	0%	0%	28%	100%	
Avg. veh. occupancy	*1.30*	*1.87*	*2.19*	*2.24*	*0.00*	*0.00*	*1.49*	*1.91*	

Percent of Daily during PM Peak Hour

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Auto	8.5%	9.0%	13.5%	13.5%	0.0%	0.0%	6.0%	9.5%
Transit	8.5%	9.0%	13.5%	13.5%	0.0%	0.0%	13.5%	12.8%
Taxi/Coach (Event)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bike (Event)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Walk	8.5%	9.0%	13.5%	13.5%	0.0%	0.0%	5.9%	9.5%
Other	8.5%	9.0%	13.5%	13.5%	0.0%	0.0%	5.5%	9.5%
Total	**8.5%**	**9.0%**	**13.5%**	**13.5%**	**0.0%**	**0.0%**	**8.5%**	**10.4%**
Vehicle Trips	8.5%	9.0%	13.5%	13.5%	0.0%	0.0%	7.9%	10.0%

PM Peak Hour Person-Trips

Weekday Distribution	Total Daily Person-trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	2,811	2	35	40	120	0	0	80	277
Superdistrict 2	3,262	2	52	43	130	0	0	99	326
Superdistrict 3	11,764	5	339	133	404	0	0	242	1,123
Superdistrict 4	1,789	2	30	23	66	0	0	68	188
East Bay	3,052	6	26	36	96	0	0	228	391
North Bay	463	1	12	4	11	0	0	29	57
South Bay	2,953	4	55	32	91	0	0	161	343
Out of Region	905	1	28	9	28	0	0	24	90
Total	**26,998**	**22**	**576**	**321**	**946**	**0**	**0**	**931**	**2,796**

PM Peak Hour Transit-Trips

Weekday Distribution	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	1	11	9	25	0	0	42	88
Superdistrict 2	1	10	8	22	0	0	53	93
Superdistrict 3	2	35	31	90	0	0	101	261
Superdistrict 4	1	4	5	13	0	0	38	61
East Bay	5	9	15	36	0	0	171	237
North Bay	0	2	1	1	0	0	14	18
South Bay	2	8	4	8	0	0	73	94
Out of Region	0	5	2	7	0	0	15	30
Total	**14**	**84**	**75**	**201**	**0**	**0**	**506**	**881**

PM Peak Hour Vehicle-Trips

Weekday Distribution	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total		Avg. Veh. Occ.
Superdistrict 1	0	9	7	21	0	0	9	46	7%	1.87
Superdistrict 2	0	20	15	44	0	0	21	101	14%	1.77
Superdistrict 3	1	99	24	72	0	0	40	236	34%	2.10
Superdistrict 4	0	13	6	18	0	0	15	52	7%	2.05
East Bay	1	8	8	23	0	0	30	70	10%	2.07
North Bay	0	7	1	2	0	0	9	19	3%	2.01
South Bay	2	24	14	38	0	0	71	148	21%	1.64
Out of Region	0	10	4	12	0	0	5	30	4%	1.67
Total	**5**	**190**	**77**	**230**	**0**	**0**	**200**	**702**	**100%**	**1.91**

Assumptions for PM Peak Hour bet. 4 PM & 6 PM	Arena		Retail		Q.S. Rest.		Sit-down Rest.		XXX		XXX		Office	
	Empl.	Attend.	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work
Inbound	0%	50%	0%	50%	0%	50%	0%	50%	100%	100%	100%	55%	0%	50%
Outbound	100%	50%	100%	50%	100%	50%	100%	50%	0%	0%	0%	45%	100%	50%

Inbound

PM Peak Hour bet. 4 PM & 6 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	0	271	143	445	0	0	79	938
	0%	47%	44%	47%	0%	0%	9%	34%
Transit Trips	0	32	27	84	0	0	15	157
	0%	38%	35%	41%	0%	0%	3%	18%
Vehicle Trips	0	92	35	109	0	0	19	255
	0%	48%	45%	47%	0%	0%	10%	36%

Outbound

PM Peak Hour bet. 4 PM & 6 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	22	305	178	501	0	0	852	1,858
	100%	53%	56%	53%	0%	0%	92%	66%
Transit Trips	14	53	49	118	0	0	492	724
	100%	62%	65%	59%	0%	0%	97%	82%
Vehicle Trips	5	99	42	121	0	0	180	447
	100%	52%	55%	53%	0%	0%	90%	64%

Total

PM Peak Hour bet. 4 PM & 6 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	22	576	321	946	0	0	931	2,796
Transit Trips	14	84	75	201	0	0	506	881
Vehicle Trips	5	190	77	230	0	0	200	702

Inbound

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	7	7	21	0	0	4	39
Superdistrict 2	0	15	14	43	0	0	8	79
Superdistrict 3	0	100	27	86	0	0	15	228
Superdistrict 4	0	11	7	21	0	0	4	43
East Bay	0	6	9	27	0	0	5	47
North Bay	0	5	1	4	0	0	1	11
South Bay	0	21	12	38	0	0	7	78
Out of Region	0	8	3	10	0	0	2	23
Total	**0**	**174**	**80**	**250**	**0**	**0**	**44**	**548**

Outbound

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	8	7	21	0	0	11	47
Superdistrict 2	0	16	14	44	0	0	24	99
Superdistrict 3	1	101	29	88	0	0	50	269
Superdistrict 4	1	12	8	22	0	0	21	64
East Bay	1	8	11	30	0	0	48	98
North Bay	0	5	2	5	0	0	13	26
South Bay	2	24	16	43	0	0	80	165
Out of Region	0	8	3	10	0	0	6	28
Total	**6**	**183**	**90**	**265**	**0**	**0**	**253**	**796**

Total

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	15	14	42	0	0	15	86
Superdistrict 2	0	31	28	87	0	0	32	178
Superdistrict 3	1	201	56	174	0	0	65	497
Superdistrict 4	1	24	14	43	0	0	25	107
East Bay	1	14	20	58	0	0	53	145
North Bay	0	10	3	10	0	0	14	37
South Bay	2	45	28	81	0	0	87	243
Out of Region	0	16	6	20	0	0	8	51
Total	**6**	**357**	**170**	**514**	**0**	**0**	**298**	**1,344**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION - WEEKDAY DAILY AND PM PEAK HOUR BETWEEN 4 AND 6 PM
SUMMARY OF TRIPS WITH NO EVENT

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Transit Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	5	4	11	0	0	2	21	1	6	5	14	0	0	40	66	1	11	9	25	0	0	42	88
Superdistrict 2	0	4	3	9	0	0	2	17	1	6	5	13	0	0	51	76	1	10	8	22	0	0	53	93
Superdistrict 3	0	16	13	42	0	0	7	79	2	20	17	48	0	0	94	182	2	35	31	90	0	0	101	261
Superdistrict 4	0	1	2	5	0	0	1	9	1	3	3	8	0	0	37	52	1	4	5	13	0	0	38	61
East Bay	0	1	4	12	0	0	2	19	5	8	12	24	0	0	169	218	5	9	15	36	0	0	171	237
North Bay	0	1	0	0	0	0	0	1	0	1	1	1	0	0	14	17	0	2	1	1	0	0	14	18
South Bay	0	2	0	1	0	0	0	4	2	5	4	7	0	0	72	90	2	8	4	8	0	0	73	94
Out of Region	0	2	1	3	0	0	1	7	0	3	2	4	0	0	14	23	0	5	2	7	0	0	15	30
Total	**0**	**32**	**27**	**84**	**0**	**0**	**15**	**157**	**14**	**53**	**49**	**118**	**0**	**0**	**492**	**724**	**14**	**84**	**75**	**201**	**0**	**0**	**506**	**881**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Bike (Event)	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1								0								0	0	0	0	0	0	0	0	0
Superdistrict 2								0								0	0	0	0	0	0	0	0	0
Superdistrict 3								0								0	0	0	0	0	0	0	0	0
Superdistrict 4								0								0	0	0	0	0	0	0	0	0
East Bay								0								0	0	0	0	0	0	0	0	0
North Bay								0								0	0	0	0	0	0	0	0	0
South Bay								0								0	0	0	0	0	0	0	0	0
Out of Region								0								0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Taxi/Walk/Other	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	4	8	26	0	0	5	43	0	5	9	27	0	0	19	61	0	9	17	53	0	0	24	104
Superdistrict 2	0	6	3	11	0	0	2	21	0	6	4	11	0	0	12	34	0	12	7	22	0	0	14	55
Superdistrict 3	0	50	22	68	0	0	12	152	1	52	24	72	0	0	63	213	1	102	46	140	0	0	76	365
Superdistrict 4	0	1	2	5	0	0	1	8	0	1	2	5	0	0	4	12	0	2	3	10	0	0	5	20
East Bay	0	1	0	1	0	0	0	2	0	1	0	1	0	0	4	7	0	2	1	2	0	0	4	9
North Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1
South Bay	0	1	0	1	0	0	0	2	0	1	0	1	0	0	1	4	0	2	1	2	0	0	1	6
Out of Region	0	3	0	1	0	0	0	4	0	3	0	1	0	0	1	6	0	7	1	2	0	0	1	10
Total	**0**	**66**	**36**	**112**	**0**	**0**	**20**	**233**	**3**	**70**	**40**	**118**	**0**	**0**	**107**	**337**	**3**	**135**	**76**	**230**	**0**	**0**	**127**	**570**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Total Person Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	16	19	58	0	0	10	103	2	19	21	62	0	0	70	174	2	35	40	120	0	0	80	277
Superdistrict 2	0	24	20	62	0	0	11	118	2	28	23	68	0	0	87	209	2	52	43	130	0	0	99	326
Superdistrict 3	0	166	63	196	0	0	35	459	5	173	71	208	0	0	207	664	5	339	133	404	0	0	242	1,123
Superdistrict 4	0	14	10	31	0	0	6	60	2	16	13	35	0	0	62	128	2	30	23	66	0	0	68	188
East Bay	0	8	13	40	0	0	7	68	6	17	23	55	0	0	221	323	6	26	36	96	0	0	228	391
North Bay	0	5	1	4	0	0	1	12	1	7	3	6	0	0	28	45	1	12	4	11	0	0	29	57
South Bay	0	24	13	40	0	0	7	84	4	31	20	51	0	0	154	259	4	55	32	91	0	0	161	343
Out of Region	0	14	4	13	0	0	2	34	1	14	5	15	0	0	22	57	1	28	9	28	0	0	24	90
Total	**0**	**271**	**143**	**445**	**0**	**0**	**79**	**938**	**22**	**305**	**178**	**501**	**0**	**0**	**852**	**1,858**	**22**	**576**	**321**	**946**	**0**	**0**	**931**	**2,796**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Vehicle-Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	4	3	10	0	0	2	20	0	4	4	11	0	0	8	26	0	9	7	21	0	0	9	46
Superdistrict 2	0	10	7	22	0	0	4	42	0	11	8	23	0	0	17	58	0	20	15	44	0	0	21	101
Superdistrict 3	0	49	11	35	0	0	6	102	1	50	13	37	0	0	34	135	1	99	24	72	0	0	40	236
Superdistrict 4	0	6	3	8	0	0	1	19	0	7	3	9	0	0	13	33	0	13	6	18	0	0	15	52
East Bay	0	3	3	11	0	0	2	19	1	5	5	12	0	0	29	51	1	8	8	23	0	0	30	70
North Bay	0	3	0	1	0	0	0	4	0	4	1	1	0	0	9	14	0	7	1	2	0	0	9	19
South Bay	0	11	5	17	0	0	3	36	2	13	8	21	0	0	68	113	2	24	14	38	0	0	71	148
Out of Region	0	5	2	6	0	0	1	14	0	5	2	6	0	0	4	17	0	10	4	12	0	0	5	30
Total	**0**	**92**	**35**	**109**	**0**	**0**	**19**	**255**	**5**	**99**	**42**	**121**	**0**	**0**	**180**	**447**	**5**	**190**	**77**	**230**	**0**	**0**	**200**	**702**

NO EVENT SUMMARY
SATURDAY: 7 PM TO 9 PM PERIOD PEAK HOUR

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION - SATURDAY DAILY AND EVENING PEAK HOUR BETWEEN 7 AND 9 PM
SUMMARY OF TRIPS WITH NO EVENT

Land Use	Intensity
Arena	0 attendees
	105 employees
Retail	62,500 gsf
Quick Service Rest.	11,000 gsf
Sit-down Restaurant	51,500 gsf
XXX	0 xxx
XXX	0 xxx
Office	605,000 gsf

Person-trips	Daily Trips									Evening Peak Hour Trips									Percent of Daily during Late PM Peak Hour							
by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total		Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total		Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Auto	71	4,640	1,565	4,745	0	0	660	11,681	53%	0	185	376	1,139	0	0	7	1,707	55%	0.0%	4.0%	24.0%	24.0%	0.0%	0.0%	1.1%	14.6%
Transit	162	1,095	697	1,857	0	0	1,507	5,318	24%	0	44	167	446	0	0	17	673	22%	0.0%	4.0%	24.0%	24.0%	0.0%	0.0%	1.1%	12.7%
Taxi/Coach (Event)								0	0%								0	0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bike (Event)								0	0%								0	0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Walk	21	1,615	464	1,408	0	0	192	3,700	17%	0	65	111	338	0	0	2	516	16%	0.0%	4.0%	24.0%	24.0%	0.0%	0.0%	1.1%	13.9%
Other	9	145	234	713	0	0	83	1,184	5%	0	6	56	171	0	0	1	234	7%	0.0%	4.0%	24.0%	24.0%	0.0%	0.0%	1.1%	19.8%
Total	**263**	**7,496**	**2,959**	**8,724**	**0**	**0**	**2,442**	**21,883**	**100%**	**0**	**300**	**710**	**2,093**	**0**	**0**	**27**	**3,130**	**100%**	**0.0%**	**4.0%**	**24.0%**	**24.0%**	**0.0%**	**0.0%**	**1.1%**	**14.3%**
	1%	**34%**	**14%**	**40%**	**0%**	**0%**	**11%**	**100%**		**0%**	**10%**	**23%**	**67%**	**0%**	**0%**	**1%**	**100%**									
Vehicle Trips	55	2,477	714	2,122	0	0	509	5,876		0	99	171	509	0	0	6	785		0.0%	4.0%	24.0%	24.0%	0.0%	0.0%	1.1%	13.4%
	1%	42%	12%	36%	0%	0%	9%	100%		0%	13%	22%	65%	0%	0%	1%	100%									
Avg. veh. occupancy	*1.30*	*1.87*	*2.19*	*2.24*	*0.00*	*0.00*	*1.30*	*1.99*		*0.00*	*1.87*	*2.19*	*2.24*	*0.00*	*0.00*	*1.30*	*2.17*									

Saturday	Total Daily	Evening Peak Hour Person-Trips								Evening Peak Hour Transit-Trips								Evening Peak Hour Vehicle-Trips									Avg.
Distribution	Person-trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total		Veh. Occ.
Superdistrict 1	2,141	0	18	88	266	0	0	2	374	0	6	20	55	0	0	1	82	0	4	15	46	0	0	0	66	8%	1.99
Superdistrict 2	2,547	0	27	96	288	0	0	3	414	0	5	18	48	0	0	2	72	0	11	32	98	0	0	0	141	18%	1.92
Superdistrict 3	9,963	0	176	295	894	0	0	6	1,372	0	18	69	200	0	0	3	290	0	52	53	160	0	0	1	266	34%	2.32
Superdistrict 4	1,405	0	15	50	147	0	0	2	214	0	2	11	28	0	0	1	43	0	7	13	39	0	0	0	59	8%	2.36
East Bay	2,292	0	13	79	211	0	0	7	311	0	5	34	79	0	0	6	124	0	4	18	51	0	0	1	74	9%	2.44
North Bay	390	0	6	9	24	0	0	1	40	0	1	1	2	0	0	0	5	0	4	2	4	0	0	0	10	1%	3.54
South Bay	2,366	0	29	72	201	0	0	5	306	0	4	9	18	0	0	3	34	0	13	30	84	0	0	2	129	16%	2.07
Out of Region	778	0	15	21	62	0	0	1	98	0	3	5	15	0	0	0	23	0	5	9	26	0	0	0	40	5%	1.68
Total	**21,883**	**0**	**300**	**710**	**2,093**	**0**	**0**	**27**	**3,130**	**0**	**44**	**167**	**446**	**0**	**0**	**17**	**673**	**0**	**99**	**171**	**509**	**0**	**0**	**6**	**785**	**100%**	**2.17**

Assumptions for Evening Peak Hour	Arena		Retail		Q.S. Rest.		Sit-down Rest.		XXX		XXX		Office	
bet. 7 PM & 9 PM	Empl.	Attend.	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work
Inbound	0%	50%	0%	50%	0%	50%	0%	50%	100%	100%	100%	50%	0%	50%
Outbound	100%	50%	100%	50%	100%	50%	100%	50%	0%	0%	0%	50%	100%	50%

Evening Peak Hour	Inbound								Outbound								Total							
bet. 7 PM & 9 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	0	141	316	985	0	0	0	1,442	0	159	395	1,108	0	0	27	1,688	0	300	710	2,093	0	0	27	3,130
	0%	47%	44%	47%	0%	0%	0%	46%	0%	53%	56%	53%	0%	0%	100%	54%								
Transit Trips	0	16	59	185	0	0	0	261	0	27	108	261	0	0	17	413	0	44	167	446	0	0	17	673
	0%	38%	35%	41%	0%	0%	0%	39%	0%	62%	65%	59%	0%	0%	100%	61%								
Vehicle Trips	0	48	77	242	0	0	0	367	0	51	94	267	0	0	6	418	0	99	171	509	0	0	6	785
	0%	48%	45%	47%	0%	0%	0%	47%	0%	52%	55%	53%	0%	0%	100%	53%								

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	4	15	46	0	0	0	65	0	4	16	47	0	0	0	67	0	8	30	93	0	0	0	132
Superdistrict 2	0	8	30	95	0	0	0	133	0	8	32	97	0	0	1	138	0	16	62	192	0	0	1	271
Superdistrict 3	0	52	61	189	0	0	0	302	0	53	64	195	0	0	1	313	0	105	125	384	0	0	1	615
Superdistrict 4	0	6	15	46	0	0	0	67	0	6	17	49	0	0	1	73	0	12	32	96	0	0	1	140
East Bay	0	3	19	61	0	0	0	83	0	4	24	67	0	0	1	97	0	7	43	128	0	0	1	180
North Bay	0	2	3	10	0	0	0	15	0	3	4	12	0	0	0	19	0	5	8	22	0	0	0	35
South Bay	0	11	27	84	0	0	0	122	0	13	34	96	0	0	3	145	0	24	61	179	0	0	3	267
Out of Region	0	4	7	22	0	0	0	33	0	4	7	22	0	0	0	34	0	8	14	44	0	0	0	67
Total	**0**	**90**	**177**	**553**	**0**	**0**	**0**	**820**	**0**	**95**	**198**	**586**	**0**	**0**	**7**	**887**	**0**	**185**	**376**	**1,139**	**0**	**0**	**7**	**1,707**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION - SATURDAY DAILY AND EVENING PEAK HOUR BETWEEN 7 AND 9 PM
SUMMARY OF TRIPS WITH NO EVENT

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Transit Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	2	8	25	0	0	0	35	0	3	12	31	0	0	1	47	0	6	20	55	0	0	1	82
Superdistrict 2	0	2	6	20	0	0	0	28	0	3	11	28	0	0	2	44	0	5	18	48	0	0	2	72
Superdistrict 3	0	8	30	93	0	0	0	131	0	10	39	107	0	0	3	159	0	18	69	200	0	0	3	290
Superdistrict 4	0	1	4	11	0	0	0	16	0	2	7	17	0	0	1	27	0	2	11	28	0	0	1	43
East Bay	0	1	8	26	0	0	0	35	0	4	26	53	0	0	6	89	0	5	34	79	0	0	6	124
North Bay	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	5	0	1	1	2	0	0	0	5
South Bay	0	1	1	3	0	0	0	5	0	3	8	15	0	0	3	28	0	4	9	18	0	0	3	34
Out of Region	0	1	2	6	0	0	0	9	0	2	3	8	0	0	0	14	0	3	5	15	0	0	0	23
Total	**0**	**16**	**59**	**185**	**0**	**0**	**0**	**261**	**0**	**27**	**108**	**261**	**0**	**0**	**17**	**413**	**0**	**44**	**167**	**446**	**0**	**0**	**17**	**673**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Bike (Event)	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1								0								0	0	0	0	0	0	0	0	0
Superdistrict 2								0								0	0	0	0	0	0	0	0	0
Superdistrict 3								0								0	0	0	0	0	0	0	0	0
Superdistrict 4								0								0	0	0	0	0	0	0	0	0
East Bay								0								0	0	0	0	0	0	0	0	0
North Bay								0								0	0	0	0	0	0	0	0	0
South Bay								0								0	0	0	0	0	0	0	0	0
Out of Region								0								0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Taxi/Walk/Other	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	2	18	57	0	0	0	78	0	3	20	60	0	0	1	83	0	5	38	117	0	0	1	161
Superdistrict 2	0	3	7	23	0	0	0	34	0	3	9	25	0	0	0	37	0	6	16	48	0	0	0	71
Superdistrict 3	0	26	48	151	0	0	0	225	0	27	54	159	0	0	2	241	0	53	102	310	0	0	2	467
Superdistrict 4	0	0	4	11	0	0	0	15	0	0	4	12	0	0	0	16	0	1	7	23	0	0	0	31
East Bay	0	1	1	2	0	0	0	3	0	1	1	2	0	0	0	4	0	1	1	4	0	0	0	7
North Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Bay	0	1	1	2	0	0	0	3	0	1	1	2	0	0	0	3	0	1	1	3	0	0	0	6
Out of Region	0	2	1	2	0	0	0	4	0	2	1	2	0	0	0	4	0	3	1	3	0	0	0	8
Total	**0**	**34**	**79**	**248**	**0**	**0**	**0**	**361**	**0**	**36**	**88**	**261**	**0**	**0**	**3**	**389**	**0**	**70**	**168**	**509**	**0**	**0**	**3**	**750**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Total Person Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	8	41	128	0	0	0	178	0	10	47	138	0	0	2	197	0	18	88	266	0	0	2	374
Superdistrict 2	0	13	44	138	0	0	0	195	0	14	52	150	0	0	3	219	0	27	96	288	0	0	3	414
Superdistrict 3	0	86	139	433	0	0	0	658	0	90	156	461	0	0	6	713	0	176	295	894	0	0	6	1,372
Superdistrict 4	0	7	22	69	0	0	0	98	0	8	28	78	0	0	2	116	0	15	50	147	0	0	2	214
East Bay	0	4	28	89	0	0	0	121	0	9	50	123	0	0	7	190	0	13	79	211	0	0	7	311
North Bay	0	3	3	10	0	0	0	16	0	3	6	14	0	0	1	25	0	6	9	24	0	0	1	40
South Bay	0	13	28	89	0	0	0	130	0	16	43	112	0	0	5	176	0	29	72	201	0	0	5	306
Out of Region	0	7	9	30	0	0	0	46	0	7	11	33	0	0	1	52	0	15	21	62	0	0	1	98
Total	**0**	**141**	**316**	**985**	**0**	**0**	**0**	**1,442**	**0**	**159**	**395**	**1,108**	**0**	**0**	**27**	**1,688**	**0**	**300**	**710**	**2,093**	**0**	**0**	**27**	**3,130**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Vehicle-Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	2	7	23	0	0	0	32	0	2	8	24	0	0	0	34	0	4	15	46	0	0	0	66
Superdistrict 2	0	5	15	48	0	0	0	69	0	5	17	50	0	0	0	73	0	11	32	98	0	0	0	141
Superdistrict 3	0	25	25	78	0	0	0	128	0	26	28	82	0	0	1	137	0	52	53	160	0	0	1	266
Superdistrict 4	0	3	6	19	0	0	0	28	0	4	7	20	0	0	0	32	0	7	13	39	0	0	0	59
East Bay	0	2	8	23	0	0	0	33	0	2	10	28	0	0	1	41	0	4	18	51	0	0	1	74
North Bay	0	2	0	1	0	0	0	4	0	2	1	3	0	0	0	6	0	4	2	4	0	0	0	10
South Bay	0	6	12	37	0	0	0	54	0	7	18	47	0	0	2	75	0	13	30	84	0	0	2	129
Out of Region	0	2	4	13	0	0	0	20	0	3	4	13	0	0	0	20	0	5	9	26	0	0	0	40
Total	**0**	**48**	**77**	**242**	**0**	**0**	**0**	**367**	**0**	**51**	**94**	**267**	**0**	**0**	**6**	**418**	**0**	**99**	**171**	**509**	**0**	**0**	**6**	**785**

Basketball Game Summary
Weekday: 4 PM to 6 PM Period Peak Hour

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION - WEEKDAY DAILY AND PM PEAK HOUR BETWEEN 4 AND 6 PM
SUMMARY OF TRIPS WITH BASKETBALL GAME

Land Use	Intensity	
Arena	18,064	attendees
	1,000	employees
Retail	62,500	gsf
Quick Service Rest.	11,000	gsf
Sit-down Restaurant	51,500	gsf
XXX	0	xxx
XXX	0	xxx
Office	605,000	gsf

Person-trips by Mode	Daily Trips Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	20,398	2,024	1,256	1,961	0	0	4,997	30,636	52%
Transit	13,865	582	559	873	0	0	3,748	19,627	34%
Taxi/Coach (Event)	1,277							1,277	2%
Bike (Event)	725							725	1%
Walk	1,613	701	373	581	0	0	1,477	4,745	8%
Other	249	68	188	293	0	0	728	1,526	3%
Total	**38,128**	**3,375**	**2,376**	**3,708**	**0**	**0**	**10,951**	**58,538**	**100%**
	65%	**6%**	**4%**	**6%**	**0%**	**0%**	**19%**	**100%**	
Vehicle Trips	8,589	1,092	573	895	0	0	2,542	13,691	
	63%	8%	4%	7%	0%	0%	19%	100%	
Avg. veh. occupancy	*2.52*	*1.85*	*2.19*	*2.19*	*0.00*	*0.00*	*1.97*	*2.33*	

Person-trips by Mode	PM Peak Hour Trips Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	731	182	170	265	0	0	298	1,645	43%
Transit	872	52	75	118	0	0	506	1,625	42%
Taxi/Coach (Event)	33							33	1%
Bike (Event)	19							19	0%
Walk	112	63	50	78	0	0	87	391	10%
Other	35	6	25	40	0	0	40	146	4%
Total	**1,803**	**304**	**321**	**501**	**0**	**0**	**931**	**3,859**	**100%**
	47%	**8%**	**8%**	**13%**	**0%**	**0%**	**24%**	**100%**	
Vehicle Trips	390	98	77	121	0	0	200	886	
	44%	11%	9%	14%	0%	0%	23%	100%	
Avg. veh. occupancy	*1.96*	*1.85*	*2.19*	*2.19*	*0.00*	*0.00*	*1.49*	*1.89*	

Person-trips by Mode	Percent of Daily during PM Peak Hour Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Auto	3.6%	9.0%	13.5%	13.5%	0.0%	0.0%	6.0%	5.4%
Transit	6.3%	9.0%	13.5%	13.5%	0.0%	0.0%	13.5%	8.3%
Taxi/Coach (Event)	2.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.6%
Bike (Event)	2.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.6%
Walk	7.0%	9.0%	13.5%	13.5%	0.0%	0.0%	5.9%	8.2%
Other	14.2%	9.0%	13.5%	13.5%	0.0%	0.0%	5.5%	9.6%
Total	**4.7%**	**9.0%**	**13.5%**	**13.5%**	**0.0%**	**0.0%**	**8.5%**	**6.6%**
Vehicle Trips	4.5%	9.0%	13.5%	13.5%	0.0%	0.0%	7.9%	6.5%

Weekday Distribution	Total Daily Person-trips	PM Peak Hour Person-Trips Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	7,006	203	19	40	62	0	0	80	404
Superdistrict 2	4,148	130	28	43	68	0	0	99	368
Superdistrict 3	10,602	251	172	133	208	0	0	242	1,006
Superdistrict 4	2,928	106	16	23	35	0	0	68	248
East Bay	14,730	531	17	36	55	0	0	228	867
North Bay	4,393	112	7	4	6	0	0	29	158
South Bay	12,587	411	31	32	51	0	0	161	686
Out of Region	2,143	59	14	9	15	0	0	24	121
Total	**58,538**	**1,803**	**304**	**321**	**501**	**0**	**0**	**931**	**3,859**

Weekday Distribution	PM Peak Hour Transit-Trips Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	106	6	9	14	0	0	42	177
Superdistrict 2	70	6	8	13	0	0	53	149
Superdistrict 3	111	19	31	48	0	0	101	311
Superdistrict 4	51	3	5	8	0	0	38	104
East Bay	316	8	15	24	0	0	171	535
North Bay	38	1	1	1	0	0	14	55
South Bay	147	5	4	7	0	0	73	236
Out of Region	33	3	2	4	0	0	15	57
Total	**872**	**52**	**75**	**118**	**0**	**0**	**506**	**1,625**

Weekday Distribution	PM Peak Hour Vehicle-Trips Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total		Avg. Veh. Occ.
Superdistrict 1	27	4	7	11	0	0	9	58	7%	1.92
Superdistrict 2	24	10	15	23	0	0	21	93	10%	1.73
Superdistrict 3	42	50	24	37	0	0	40	193	22%	1.95
Superdistrict 4	26	7	6	9	0	0	15	63	7%	1.98
East Bay	90	5	8	12	0	0	30	146	16%	2.15
North Bay	31	4	1	1	0	0	9	46	5%	2.19
South Bay	142	13	14	21	0	0	71	261	30%	1.69
Out of Region	7	5	4	6	0	0	5	27	3%	1.96
Total	**390**	**98**	**77**	**121**	**0**	**0**	**200**	**886**	**100%**	**1.89**

Assumptions for PM Peak Hour bet. 4 PM & 6 PM	Arena		Retail		Q.S. Rest.		Sit-down Rest.		XXX		XXX		Office	
	Empl.	Attend.	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work
Inbound	95%	100%	0%	50%	0%	50%	0%	50%	100%	100%	100%	55%	0%	50%
Outbound	5%	0%	100%	50%	100%	50%	100%	50%	0%	0%	0%	45%	100%	50%

PM Peak Hour bet. 4 PM & 6 PM	Inbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	1,758	135	143	222	0	0	79	2,337
	98%	44%	44%	44%	0%	0%	9%	61%
Transit Trips	845	16	27	42	0	0	15	944
	97%	30%	35%	35%	0%	0%	3%	58%
Vehicle Trips	370	46	35	55	0	0	19	524
	95%	46%	45%	45%	0%	0%	10%	59%

PM Peak Hour bet. 4 PM & 6 PM	Outbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	45	169	178	278	0	0	852	1,522
	2%	56%	56%	56%	0%	0%	92%	39%
Transit Trips	28	37	49	76	0	0	492	681
	3%	70%	65%	65%	0%	0%	97%	42%
Vehicle Trips	20	53	42	66	0	0	180	362
	5%	54%	55%	55%	0%	0%	90%	41%

PM Peak Hour bet. 4 PM & 6 PM	Total Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	1,803	304	321	501	0	0	931	3,859
Transit Trips	872	52	75	118	0	0	506	1,625
Vehicle Trips	390	98	77	121	0	0	200	886

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Inbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	45	4	7	10	0	0	4	69
Superdistrict 2	37	8	14	21	0	0	8	87
Superdistrict 3	62	50	27	43	0	0	15	198
Superdistrict 4	46	6	7	10	0	0	4	73
East Bay	194	3	9	14	0	0	5	224
North Bay	72	2	1	2	0	0	1	79
South Bay	248	10	12	19	0	0	7	296
Out of Region	15	4	3	5	0	0	2	29
Total	**719**	**87**	**80**	**125**	**0**	**0**	**44**	**1,054**

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Outbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	4	7	11	0	0	11	34
Superdistrict 2	1	8	14	23	0	0	24	70
Superdistrict 3	2	51	29	45	0	0	50	177
Superdistrict 4	1	6	8	12	0	0	21	48
East Bay	3	5	11	17	0	0	48	83
North Bay	1	3	2	3	0	0	13	22
South Bay	4	14	16	24	0	0	80	138
Out of Region	0	4	3	5	0	0	6	19
Total	**12**	**96**	**90**	**140**	**0**	**0**	**253**	**590**

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Total Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Taxi + Coach Arena
Superdistrict 1	45	8	14	21	0	0	15	103	9
Superdistrict 2	38	16	28	44	0	0	32	157	2
Superdistrict 3	64	101	56	88	0	0	65	375	2
Superdistrict 4	47	12	14	22	0	0	25	121	2
East Bay	196	8	20	30	0	0	53	307	7
North Bay	73	5	3	5	0	0	14	100	0
South Bay	252	24	28	43	0	0	87	434	7
Out of Region	15	8	6	10	0	0	8	48	5
Total	**731**	**182**	**170**	**265**	**0**	**0**	**298**	**1,645**	**33**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION - WEEKDAY DAILY AND PM PEAK HOUR BETWEEN 4 AND 6 PM

SUMMARY OF TRIPS WITH BASKETBALL GAME

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Transit Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	104	2	4	6	0	0	2	118	2	4	5	8	0	0	40	59	106	6	9	14	0	0	42	177
Superdistrict 2	67	2	3	5	0	0	2	78	3	4	5	8	0	0	51	71	70	6	8	13	0	0	53	149
Superdistrict 3	106	8	13	21	0	0	7	156	5	12	17	27	0	0	94	155	111	19	31	48	0	0	101	311
Superdistrict 4	49	1	2	3	0	0	1	54	2	2	3	5	0	0	37	50	51	3	5	8	0	0	38	104
East Bay	307	1	4	6	0	0	2	319	10	8	12	18	0	0	169	216	316	8	15	24	0	0	171	535
North Bay	38	0	0	0	0	0	0	38	1	1	1	1	0	0	14	17	38	1	1	1	0	0	14	55
South Bay	143	1	0	1	0	0	0	145	4	4	4	6	0	0	72	90	147	5	4	7	0	0	73	236
Out of Region	32	1	1	1	0	0	1	36	1	2	2	2	0	0	14	21	33	3	2	4	0	0	15	57
Total	**845**	**16**	**27**	**42**	**0**	**0**	**15**	**944**	**28**	**37**	**49**	**76**	**0**	**0**	**492**	**681**	**872**	**52**	**75**	**118**	**0**	**0**	**506**	**1,625**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Bike (Event)	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	5							5	0							0	5	0	0	0	0	0	0	5
Superdistrict 2	1							1	0							0	1	0	0	0	0	0	0	1
Superdistrict 3	1							1	0							0	1	0	0	0	0	0	0	1
Superdistrict 4	1							1	0							0	1	0	0	0	0	0	0	1
East Bay	6							6	0							0	6	0	0	0	0	0	0	6
North Bay	0							0	0							0	0	0	0	0	0	0	0	0
South Bay	4							4	0							0	4	0	0	0	0	0	0	4
Out of Region	0							0	0							0	0	0	0	0	0	0	0	0
Total	**19**	**0**	**0**	**0**	**0**	**0**	**0**	**19**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**19**	**0**	**0**	**0**	**0**	**0**	**0**	**19**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Taxi/Walk/Other	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	45	2	8	13	0	0	5	73	1	3	9	14	0	0	19	46	46	5	17	27	0	0	24	119
Superdistrict 2	21	3	3	5	0	0	2	34	1	3	4	6	0	0	12	26	21	6	7	11	0	0	14	60
Superdistrict 3	72	25	22	34	0	0	12	164	3	27	24	38	0	0	63	155	75	52	46	72	0	0	76	320
Superdistrict 4	7	0	2	3	0	0	1	12	0	1	2	3	0	0	4	9	7	1	3	5	0	0	5	21
East Bay	12	1	0	0	0	0	0	13	0	1	0	1	0	0	4	6	12	1	1	1	0	0	4	19
North Bay	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	1	3
South Bay	8	1	0	0	0	0	0	10	0	1	0	0	0	0	1	3	8	1	1	1	0	0	1	12
Out of Region	10	2	0	0	0	0	0	13	0	2	0	0	0	0	1	4	10	3	1	1	0	0	1	16
Total	**176**	**33**	**36**	**56**	**0**	**0**	**20**	**320**	**5**	**37**	**40**	**62**	**0**	**0**	**107**	**251**	**181**	**69**	**76**	**118**	**0**	**0**	**127**	**571**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Total Person Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	200	8	19	29	0	0	10	265	3	11	21	33	0	0	70	139	203	19	40	62	0	0	80	404
Superdistrict 2	126	12	20	31	0	0	11	200	4	15	23	37	0	0	87	168	130	28	43	68	0	0	99	368
Superdistrict 3	241	82	63	98	0	0	35	518	10	90	71	110	0	0	207	488	251	172	133	208	0	0	242	1,006
Superdistrict 4	103	7	10	16	0	0	6	141	3	9	13	20	0	0	62	107	106	16	23	35	0	0	68	248
East Bay	518	4	13	20	0	0	7	562	12	13	23	35	0	0	221	305	531	17	36	55	0	0	228	867
North Bay	111	3	1	2	0	0	1	118	2	4	3	4	0	0	28	40	112	7	4	6	0	0	29	158
South Bay	403	12	13	20	0	0	7	455	9	19	20	31	0	0	154	231	411	31	32	51	0	0	161	686
Out of Region	58	7	4	7	0	0	2	78	1	8	5	8	0	0	22	44	59	14	9	15	0	0	24	121
Total	**1,758**	**135**	**143**	**222**	**0**	**0**	**79**	**2,337**	**45**	**169**	**178**	**278**	**0**	**0**	**852**	**1,522**	**1,803**	**304**	**321**	**501**	**0**	**0**	**931**	**3,859**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Vehicle-Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	23	2	3	5	0	0	2	35	4	2	4	6	0	0	8	23	27	4	7	11	0	0	9	58
Superdistrict 2	22	5	7	11	0	0	4	49	2	6	8	12	0	0	17	44	24	10	15	23	0	0	21	93
Superdistrict 3	40	24	11	18	0	0	6	100	2	26	13	20	0	0	34	94	42	50	24	37	0	0	40	193
Superdistrict 4	24	3	3	4	0	0	1	36	2	4	3	5	0	0	13	27	26	7	6	9	0	0	15	63
East Bay	86	2	3	5	0	0	2	98	4	3	5	7	0	0	29	47	90	5	8	12	0	0	30	146
North Bay	31	2	0	0	0	0	0	33	0	2	1	1	0	0	9	13	31	4	1	1	0	0	9	46
South Bay	136	5	5	8	0	0	3	158	6	8	8	13	0	0	68	103	142	13	14	21	0	0	71	261
Out of Region	7	2	2	3	0	0	1	15	0	2	2	3	0	0	4	12	7	5	4	6	0	0	5	27
Total	**370**	**46**	**35**	**55**	**0**	**0**	**19**	**524**	**20**	**53**	**42**	**66**	**0**	**0**	**180**	**362**	**390**	**98**	**77**	**121**	**0**	**0**	**200**	**886**

BASKETBALL GAME SUMMARY
WEEKDAY: 6 PM TO 8 PM PERIOD PEAK HOUR

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION - WEEKDAY DAILY AND EVENING PEAK HOUR BETWEEN 6 AND 8 PM

SUMMARY OF TRIPS WITH BASKETBALL GAME

Land Use	Intensity
Arena	18,064 attendees
	1,000 employees
Retail	62,500 gsf
Quick Service Rest.	11,000 gsf
Sit-down Restaurant	51,500 gsf
XXX	0 xxx
XXX	0 xxx
Office	605,000 gsf

Person-trips	Daily Trips									Evening Peak Hour Trips									Percent of Daily during Evening Peak Hour							
by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total		Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total		Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Auto	20,398	2,024	1,256	1,961	0	0	4,997	30,636	52%	6,340	26	50	79	0	0	50	6,546	53%	31.1%	1.3%	4.0%	4.0%	0.0%	0.0%	1.0%	21.4%
Transit	13,865	582	559	873	0	0	3,748	19,627	34%	4,121	19	45	70	0	0	115	4,371	36%	29.7%	3.3%	8.1%	8.1%	0.0%	0.0%	3.1%	22.3%
Taxi/Coach (Event)	1,277							1,277	2%	434							434	4%	34.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	34.0%
Bike (Event)	725							725	1%	247							247	2%	34.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	34.0%
Walk	1,613	701	373	581	0	0	1,477	4,745	8%	540	9	15	23	0	0	15	602	5%	33.5%	1.3%	4.0%	4.0%	0.0%	0.0%	1.0%	12.7%
Other	249	68	188	293	0	0	728	1,526	3%	59	1	7	11	0	0	6	85	1%	23.6%	2.1%	3.9%	3.9%	0.0%	0.0%	0.9%	5.6%
Total	**38,128**	**3,375**	**2,376**	**3,708**	**0**	**0**	**10,951**	**58,538**	**100%**	**11,742**	**56**	**118**	**184**	**0**	**0**	**186**	**12,285**	**100%**	**30.8%**	**1.7%**	**5.0%**	**5.0%**	**0.0%**	**0.0%**	**1.7%**	**21.0%**
	65%	**6%**	**4%**	**6%**	**0%**	**0%**	**19%**	**100%**		**96%**	**0%**	**1%**	**1%**	**0%**	**0%**	**2%**	**100%**									
Vehicle Trips	8,589	1,092	573	895	0	0	2,542	13,691		2,628	16	27	42	0	0	39	2,752		30.6%	1.4%	4.7%	4.7%	0.0%	0.0%	1.5%	20.1%
	63%	8%	4%	7%	0%	0%	19%	100%		96%	1%	1%	2%	0%	0%	1%	100%									
Avg. veh. occupancy	*2.52*	*1.85*	*2.19*	*2.19*	*0.00*	*0.00*	*1.97*	*2.33*		*2.58*	*1.69*	*1.88*	*1.88*	*0.00*	*0.00*	*1.30*	*2.54*									

Weekday	Total Daily	Evening Peak Hour Person-Trips								Evening Peak Hour Transit-Trips								Evening Peak Hour Vehicle-Trips									Avg.
Distribution	Person-trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total		Veh. Occ.
Superdistrict 1	7,006	1,733	4	12	19	0	0	14	1,783	812	2	4	7	0	0	9	834	259	1	2	3	0	0	1	266	10%	2.17
Superdistrict 2	4,148	538	5	14	22	0	0	18	598	158	2	5	7	0	0	12	184	113	2	4	6	0	0	3	128	5%	2.28
Superdistrict 3	10,602	649	24	40	63	0	0	42	818	132	5	12	19	0	0	21	188	131	6	7	11	0	0	7	162	6%	2.40
Superdistrict 4	2,928	517	3	8	13	0	0	14	556	106	1	3	5	0	0	9	125	152	1	2	3	0	0	3	161	6%	2.42
East Bay	14,730	3,655	8	21	32	0	0	52	3,767	1,583	6	13	21	0	0	40	1,663	771	1	3	5	0	0	6	787	29%	2.58
North Bay	4,393	1,049	1	3	4	0	0	7	1,064	289	1	1	2	0	0	3	295	282	1	1	1	0	0	2	286	10%	2.69
South Bay	12,587	3,131	8	16	25	0	0	35	3,214	822	3	5	8	0	0	17	855	870	3	7	11	0	0	16	907	33%	2.56
Out of Region	2,143	470	2	3	5	0	0	5	485	219	1	1	2	0	0	3	227	51	1	1	2	0	0	1	55	2%	3.69
Total	**58,538**	**11,742**	**56**	**118**	**184**	**0**	**0**	**186**	**12,285**	**4,121**	**19**	**45**	**70**	**0**	**0**	**115**	**4,371**	**2,628**	**16**	**27**	**42**	**0**	**0**	**39**	**2,752**	**100%**	**2.53**

Assumptions for Evening Peak Hour	Arena		Retail		Q.S. Rest.		Sit-down Rest.		XXX		XXX		Office	
bet. 6 PM & 8 PM	Empl.	Attend.	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work
Inbound	100%	100%	0%	50%	0%	50%	0%	50%	100%	100%	100%	50%	0%	50%
Outbound	0%	0%	100%	50%	100%	50%	100%	50%	0%	0%	0%	50%	100%	50%

Evening Peak Hour	Inbound								Outbound								Total							
bet. 6 PM & 8 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	11,742	15	32	50	0	0	0	11,839	0	41	86	133	0	0	186	446	11,742	56	118	184	0	0	186	12,285
	100%	27%	27%	27%	0%	0%	0%	96%	0%	73%	73%	73%	0%	0%	100%	4%								
Transit Trips	4,121	2	6	9	0	0	0	4,138	0	17	39	61	0	0	115	232	4,121	19	45	70	0	0	115	4,371
	100%	9%	13%	13%	0%	0%	0%	95%	0%	91%	87%	87%	0%	0%	100%	5%								
Vehicle Trips	2,756	5	8	12	0	0	0	2,781	134	10	19	30	0	0	39	232	2,890	16	27	42	0	0	39	3,013
	95%	33%	29%	29%	0%	0%	0%	92%	5%	67%	71%	71%	0%	0%	100%	8%								

Evening Peak Hour bet. 6 PM & 8 PM	Inbound								Outbound								Total								Taxi + Coach
Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena
Superdistrict 1	474	0	2	2	0	0	0	478	0	1	2	3	0	0	2	8	474	1	4	5	0	0	2	486	91
Superdistrict 2	240	1	3	5	0	0	0	249	0	1	4	7	0	0	4	16	240	2	7	11	0	0	4	265	26
Superdistrict 3	315	6	6	10	0	0	0	336	0	7	9	13	0	0	8	37	315	12	15	23	0	0	8	373	16
Superdistrict 4	349	1	2	2	0	0	0	353	0	1	3	4	0	0	4	12	349	2	4	7	0	0	4	366	25
East Bay	1,900	0	2	3	0	0	0	1,905	0	2	5	8	0	0	10	25	1,900	2	7	11	0	0	10	1,930	103
North Bay	760	0	0	1	0	0	0	762	0	1	1	2	0	0	3	7	760	1	1	2	0	0	3	768	0
South Bay	2,171	1	3	4	0	0	0	2,179	0	4	8	12	0	0	18	41	2,171	5	11	16	0	0	18	2,220	102
Out of Region	133	0	1	1	0	0	0	135	0	1	1	2	0	0	1	4	133	1	2	3	0	0	1	140	63
Total	**6,340**	**10**	**18**	**28**	**0**	**0**	**0**	**6,396**	**0**	**17**	**32**	**51**	**0**	**0**	**50**	**150**	**6,340**	**26**	**50**	**79**	**0**	**0**	**50**	**6,546**	**426**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION - WEEKDAY DAILY AND EVENING PEAK HOUR BETWEEN 6 AND 8 PM

SUMMARY OF TRIPS WITH BASKETBALL GAME

Evening Peak Hour bet. 6 PM & 8 PM	Inbound								Outbound								Total							
Transit Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	812	0	1	1	0	0	0	815	0	1	3	5	0	0	9	19	812	2	4	7	0	0	9	834
Superdistrict 2	158	0	1	1	0	0	0	160	0	2	4	6	0	0	12	24	158	2	5	7	0	0	12	184
Superdistrict 3	132	1	3	5	0	0	0	140	0	4	9	14	0	0	21	48	132	5	12	19	0	0	21	188
Superdistrict 4	106	0	0	1	0	0	0	107	0	1	3	5	0	0	9	17	106	1	3	5	0	0	9	125
East Bay	1,583	0	1	1	0	0	0	1,586	0	6	12	19	0	0	40	78	1,583	6	13	21	0	0	40	1,663
North Bay	289	0	0	0	0	0	0	289	0	0	1	2	0	0	3	6	289	1	1	2	0	0	3	295
South Bay	822	0	0	0	0	0	0	822	0	2	5	8	0	0	17	33	822	3	5	8	0	0	17	855
Out of Region	219	0	0	0	0	0	0	220	0	1	1	2	0	0	3	7	219	1	1	2	0	0	3	227
Total	**4,121**	**2**	**6**	**9**	**0**	**0**	**0**	**4,138**	**0**	**17**	**39**	**61**	**0**	**0**	**115**	**232**	**4,121**	**19**	**45**	**70**	**0**	**0**	**115**	**4,371**

Evening Peak Hour bet. 6 PM & 8 PM	Inbound								Outbound								Total							
Bike (Event)	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	68							68	0							0	68	0	0	0	0	0	0	68
Superdistrict 2	19							19	0							0	19	0	0	0	0	0	0	19
Superdistrict 3	12							12	0							0	12	0	0	0	0	0	0	12
Superdistrict 4	18							18	0							0	18	0	0	0	0	0	0	18
East Bay	81							81	0							0	81	0	0	0	0	0	0	81
North Bay	0							0	0							0	0	0	0	0	0	0	0	0
South Bay	48							48	0							0	48	0	0	0	0	0	0	48
Out of Region	0							0	0							0	0	0	0	0	0	0	0	0
Total	**247**	**0**	**0**	**0**	**0**	**0**	**0**	**247**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**247**	**0**	**0**	**0**	**0**	**0**	**0**	**247**

Evening Peak Hour bet. 6 PM & 8 PM	Inbound								Outbound								Total							
Taxi/Walk/Other	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	379	0	2	3	0	0	0	384	0	1	3	5	0	0	4	12	379	1	5	7	0	0	4	396
Superdistrict 2	121	0	1	1	0	0	0	123	0	1	1	2	0	0	3	7	121	1	2	3	0	0	3	130
Superdistrict 3	191	3	5	8	0	0	0	207	0	4	8	13	0	0	12	39	191	7	13	21	0	0	12	245
Superdistrict 4	44	0	0	1	0	0	0	45	0	0	1	1	0	0	1	2	44	0	1	1	0	0	1	47
East Bay	90	0	0	0	0	0	0	91	0	0	0	1	0	0	1	2	90	0	0	1	0	0	1	93
North Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
South Bay	90	0	0	0	0	0	0	90	0	0	0	0	0	0	0	1	90	0	0	0	0	0	0	91
Out of Region	117	0	0	0	0	0	0	118	0	0	0	0	0	0	0	1	117	0	0	0	0	0	0	119
Total	**1,033**	**4**	**8**	**13**	**0**	**0**	**0**	**1,058**	**0**	**7**	**14**	**22**	**0**	**0**	**21**	**64**	**1,033**	**10**	**22**	**35**	**0**	**0**	**21**	**1,121**

Evening Peak Hour bet. 6 PM & 8 PM	Inbound								Outbound								Total							
Total Person Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	1,733	1	4	7	0	0	0	1,745	0	3	8	13	0	0	14	39	1,733	4	12	19	0	0	14	1,783
Superdistrict 2	538	1	4	7	0	0	0	550	0	4	10	15	0	0	18	47	538	5	14	22	0	0	18	598
Superdistrict 3	649	9	14	22	0	0	0	695	0	15	26	41	0	0	42	123	649	24	40	63	0	0	42	818
Superdistrict 4	517	1	2	4	0	0	0	524	0	3	6	10	0	0	14	32	517	3	8	13	0	0	14	556
East Bay	3,655	0	3	5	0	0	0	3,663	0	7	18	28	0	0	52	104	3,655	8	21	32	0	0	52	3,767
North Bay	1,049	0	0	1	0	0	0	1,051	0	1	2	3	0	0	7	13	1,049	1	3	4	0	0	7	1,064
South Bay	3,131	1	3	5	0	0	0	3,139	0	6	13	20	0	0	35	75	3,131	8	16	25	0	0	35	3,214
Out of Region	470	1	1	2	0	0	0	473	0	1	2	4	0	0	5	12	470	2	3	5	0	0	5	485
Total	**11,742**	**15**	**32**	**50**	**0**	**0**	**0**	**11,839**	**0**	**41**	**86**	**133**	**0**	**0**	**186**	**446**	**11,742**	**56**	**118**	**184**	**0**	**0**	**186**	**12,285**

Evening Peak Hour bet. 6 PM & 8 PM	Inbound								Outbound								Total							
Vehicle-Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	217	0	1	1	0	0	1	221	42	0	1	2	0	0	0	45	259	1	2	3	0	0	1	266
Superdistrict 2	101	1	2	2	0	0	3	108	12	1	2	4	0	0	0	19	113	2	4	6	0	0	3	128
Superdistrict 3	124	3	3	4	0	0	7	140	7	4	4	7	0	0	0	22	131	6	7	11	0	0	7	162
Superdistrict 4	141	0	1	1	0	0	3	145	11	1	1	2	0	0	0	16	152	1	2	3	0	0	3	161
East Bay	737	0	1	1	0	0	6	746	34	1	3	4	0	0	0	41	771	1	3	5	0	0	6	787
North Bay	282	0	0	0	0	0	2	284	0	0	1	1	0	0	0	2	282	1	1	1	0	0	2	286
South Bay	837	1	1	2	0	0	16	856	33	3	6	9	0	0	0	51	870	3	7	11	0	0	16	907
Out of Region	51	0	0	1	0	0	1	53	0	0	1	1	0	0	0	2	51	1	1	2	0	0	1	55
Total	**2,489**	**5**	**8**	**12**	**0**	**0**	**39**	**2,553**	**139**	**10**	**19**	**30**	**0**	**0**	**0**	**198**	**2,628**	**16**	**27**	**42**	**0**	**0**	**39**	**2,752**

Basketball Game Summary
Weekday: 9 PM to 11 PM Period Peak Hour

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION - WEEKDAY DAILY AND LATE PM PEAK HOUR BETWEEN 9 AND 11 PM
SUMMARY OF TRIPS WITH BASKETBALL GAME

Land Use	Intensity	
Arena	18,064	attendees
	1,000	employees
Retail	62,500	gsf
Quick Service Rest.	11,000	gsf
Sit-down Restaurant	51,500	gsf
XXX	0	xxx
XXX	0	xxx
Office	605,000	gsf

Person-trips by Mode – Daily Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	20,398	2,024	1,256	1,961	0	0	4,997	30,636	52%
Transit	13,865	582	559	873	0	0	3,748	19,627	34%
Taxi/Coach (Event)	1,277							1,277	2%
Bike (Event)	725							725	1%
Walk	1,613	701	373	581	0	0	1,477	4,745	8%
Other	249	68	188	293	0	0	728	1,526	3%
Total	**38,128**	**3,375**	**2,376**	**3,708**	**0**	**0**	**10,951**	**58,538**	**100%**
	65%	**6%**	**4%**	**6%**	**0%**	**0%**	**19%**	**100%**	
Vehicle Trips	8,589	1,092	573	895	0	0	2,542	13,691	
	63%	8%	4%	7%	0%	0%	19%	100%	
Avg. veh. occupancy	*2.52*	*1.85*	*2.19*	*2.19*	*0.00*	*0.00*	*1.97*	*2.33*	

Person-trips by Mode – Late PM Peak Hour Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	7,126	12	50	79	0	0	13	7,280	55%
Transit	4,527	9	45	70	0	0	29	4,680	35%
Taxi/Coach (Event)	426							426	3%
Bike (Event)	242							242	2%
Walk	453	4	15	23	0	0	4	499	4%
Other	70	1	7	11	0	0	2	91	1%
Total	**12,845**	**26**	**118**	**184**	**0**	**0**	**47**	**13,218**	**100%**
	97%	**0%**	**1%**	**1%**	**0%**	**0%**	**0%**	**100%**	
Vehicle Trips	2,932	7	27	42	0	0	10	3,018	
	97%	0%	1%	1%	0%	0%	0%	100%	
Avg. veh. occupancy	*2.58*	*1.69*	*1.88*	*1.88*	*0.00*	*0.00*	*1.30*	*2.55*	

Person-trips by Mode – Percent of Daily during Late PM Peak Hour

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Auto	34.9%	0.6%	4.0%	4.0%	0.0%	0.0%	0.3%	23.8%
Transit	32.6%	1.5%	8.1%	8.1%	0.0%	0.0%	0.8%	23.8%
Taxi/Coach (Event)	33.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	33.4%
Bike (Event)	33.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	33.4%
Walk	28.1%	0.6%	4.0%	4.0%	0.0%	0.0%	0.2%	10.5%
Other	28.1%	1.0%	3.9%	3.9%	0.0%	0.0%	0.2%	6.0%
Total	**33.7%**	**0.8%**	**5.0%**	**5.0%**	**0.0%**	**0.0%**	**0.4%**	**22.6%**
Vehicle Trips	34.1%	0.7%	4.7%	4.7%	0.0%	0.0%	0.4%	22.0%

Weekday Distribution – Late PM Peak Hour Person-Trips

Weekday Distribution	Total Daily Person-trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	7,006	1,418	2	12	19	0	0	4	1,455
Superdistrict 2	4,148	455	2	14	22	0	0	5	498
Superdistrict 3	10,602	570	11	40	63	0	0	10	695
Superdistrict 4	2,928	433	2	8	13	0	0	3	460
East Bay	14,730	4,228	4	21	32	0	0	13	4,298
North Bay	4,393	1,651	1	3	4	0	0	2	1,660
South Bay	12,587	3,578	4	16	25	0	0	9	3,632
Out of Region	2,143	511	1	3	5	0	0	1	521
Total	**58,538**	**12,845**	**26**	**118**	**184**	**0**	**0**	**47**	**13,218**

Weekday Distribution – Late PM Peak Hour Transit-Trips

Weekday Distribution	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	667	1	4	7	0	0	2	681
Superdistrict 2	141	1	5	7	0	0	3	157
Superdistrict 3	129	2	12	19	0	0	5	167
Superdistrict 4	95	1	3	5	0	0	2	107
East Bay	1,851	3	13	21	0	0	10	1,898
North Bay	456	0	1	2	0	0	1	460
South Bay	948	1	5	8	0	0	4	967
Out of Region	240	0	1	2	0	0	1	244
Total	**4,527**	**9**	**45**	**70**	**0**	**0**	**29**	**4,680**

Weekday Distribution – Late PM Peak Hour Vehicle-Trips

Weekday Distribution	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total		Avg. Veh. Occ.
Superdistrict 1	211	0	2	3	0	0	0	217	7%	2.25
Superdistrict 2	95	1	4	6	0	0	1	106	4%	2.30
Superdistrict 3	113	3	7	11	0	0	2	136	4%	2.39
Superdistrict 4	126	1	2	3	0	0	1	133	4%	2.45
East Bay	887	1	3	5	0	0	2	898	30%	2.57
North Bay	443	0	1	1	0	0	1	446	15%	2.69
South Bay	1,001	2	7	11	0	0	4	1,024	34%	2.55
Out of Region	56	0	1	2	0	0	0	59	2%	3.62
Total	**2,932**	**7**	**27**	**42**	**0**	**0**	**10**	**3,018**	**100%**	**2.55**

Assumptions for Late PM Peak Hour bet. 9 PM & 11 PM

Assumptions for Late PM Peak Hour bet. 9 PM & 11 PM	Arena		Retail		Q.S. Rest.		Sit-down Rest.		XXX		XXX		Office	
	Empl.	Attend.	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work
Inbound	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	45%	0%	0%
Outbound	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	55%	100%	100%

Late PM Peak Hour bet. 9 PM & 11 PM – Inbound

Late PM Peak Hour bet. 9 PM & 11 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	0	0	0	0	0	0	0	0
	0%	0%	0%	0%	0%	0%	0%	0%
Transit Trips	0	0	0	0	0	0	0	0
	0%	0%	0%	0%	0%	0%	0%	0%
Vehicle Trips	134	0	0	0	0	0	0	134
	5%	0%	0%	0%	0%	0%	0%	4%

Late PM Peak Hour bet. 9 PM & 11 PM – Outbound

Late PM Peak Hour bet. 9 PM & 11 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	12,845	26	118	184	0	0	47	13,218
	100%	100%	100%	100%	0%	0%	100%	100%
Transit Trips	4,527	9	45	70	0	0	29	4,680
	100%	100%	100%	100%	0%	0%	100%	100%
Vehicle Trips	2,797	7	27	42	0	0	10	2,883
	95%	100%	100%	100%	0%	0%	100%	96%

Late PM Peak Hour bet. 9 PM & 11 PM – Total

Late PM Peak Hour bet. 9 PM & 11 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	12,845	26	118	184	0	0	47	13,218
Transit Trips	4,527	9	45	70	0	0	29	4,680
Vehicle Trips	2,932	7	27	42	0	0	10	3,018

Late PM Peak Hour bet. 9 PM & 11 PM Auto Trips – Inbound

Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	0	0	0	0	0	0	0
Superdistrict 2	0	0	0	0	0	0	0	0
Superdistrict 3	0	0	0	0	0	0	0	0
Superdistrict 4	0	0	0	0	0	0	0	0
East Bay	0	0	0	0	0	0	0	0
North Bay	0	0	0	0	0	0	0	0
South Bay	0	0	0	0	0	0	0	0
Out of Region	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Late PM Peak Hour bet. 9 PM & 11 PM Auto Trips – Outbound

Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	385	0	4	5	0	0	0	395
Superdistrict 2	198	1	7	11	0	0	1	219
Superdistrict 3	263	6	15	23	0	0	2	309
Superdistrict 4	287	1	4	7	0	0	1	299
East Bay	2,180	1	7	11	0	0	3	2,201
North Bay	1,194	0	1	2	0	0	1	1,199
South Bay	2,474	2	11	16	0	0	4	2,507
Out of Region	145	0	2	3	0	0	0	150
Total	**7,126**	**12**	**50**	**79**	**0**	**0**	**13**	**7,280**

Late PM Peak Hour bet. 9 PM & 11 PM Auto Trips – Total

Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Taxi + Coach Arena
Superdistrict 1	385	0	4	5	0	0	0	395	91
Superdistrict 2	198	1	7	11	0	0	1	219	26
Superdistrict 3	263	6	15	23	0	0	2	309	16
Superdistrict 4	287	1	4	7	0	0	1	299	25
East Bay	2,180	1	7	11	0	0	3	2,201	103
North Bay	1,194	0	1	2	0	0	1	1,199	0
South Bay	2,474	2	11	16	0	0	4	2,507	102
Out of Region	145	0	2	3	0	0	0	150	63
Total	**7,126**	**12**	**50**	**79**	**0**	**0**	**13**	**7,280**	**426**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION - WEEKDAY DAILY AND LATE PM PEAK HOUR BETWEEN 9 AND 11 PM

SUMMARY OF TRIPS WITH BASKETBALL GAME

Late PM Peak Hour bet. 9 PM & 11 PM	Inbound								Outbound								Total							
Transit Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	0	0	0	0	0	0	0	667	1	4	7	0	0	2	681	667	1	4	7	0	0	2	681
Superdistrict 2	0	0	0	0	0	0	0	0	141	1	5	7	0	0	3	157	141	1	5	7	0	0	3	157
Superdistrict 3	0	0	0	0	0	0	0	0	129	2	12	19	0	0	5	167	129	2	12	19	0	0	5	167
Superdistrict 4	0	0	0	0	0	0	0	0	95	1	3	5	0	0	2	107	95	1	3	5	0	0	2	107
East Bay	0	0	0	0	0	0	0	0	1,851	3	13	21	0	0	10	1,898	1,851	3	13	21	0	0	10	1,898
North Bay	0	0	0	0	0	0	0	0	456	0	1	2	0	0	1	460	456	0	1	2	0	0	1	460
South Bay	0	0	0	0	0	0	0	0	948	1	5	8	0	0	4	967	948	1	5	8	0	0	4	967
Out of Region	0	0	0	0	0	0	0	0	240	0	1	2	0	0	1	244	240	0	1	2	0	0	1	244
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4,527**	**9**	**45**	**70**	**0**	**0**	**29**	**4,680**	**4,527**	**9**	**45**	**70**	**0**	**0**	**29**	**4,680**

Late PM Peak Hour bet. 9 PM & 11 PM	Inbound								Outbound								Total							
Bike (Event)	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0							0	55							55	55	0	0	0	0	0	0	55
Superdistrict 2	0							0	16							16	16	0	0	0	0	0	0	16
Superdistrict 3	0							0	9							9	9	0	0	0	0	0	0	9
Superdistrict 4	0							0	15							15	15	0	0	0	0	0	0	15
East Bay	0							0	93							93	93	0	0	0	0	0	0	93
North Bay	0							0	0							0	0	0	0	0	0	0	0	0
South Bay	0							0	55							55	55	0	0	0	0	0	0	55
Out of Region	0							0	0							0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**242**	**0**	**0**	**0**	**0**	**0**	**0**	**242**	**242**	**0**	**0**	**0**	**0**	**0**	**0**	**242**

Late PM Peak Hour bet. 9 PM & 11 PM	Inbound								Outbound								Total							
Taxi/Walk/Other	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	0	0	0	0	0	0	0	311	0	5	7	0	0	1	324	311	0	5	7	0	0	1	324
Superdistrict 2	0	0	0	0	0	0	0	0	100	0	2	3	0	0	1	107	100	0	2	3	0	0	1	107
Superdistrict 3	0	0	0	0	0	0	0	0	168	3	13	21	0	0	3	209	168	3	13	21	0	0	3	209
Superdistrict 4	0	0	0	0	0	0	0	0	36	0	1	1	0	0	0	39	36	0	1	1	0	0	0	39
East Bay	0	0	0	0	0	0	0	0	104	0	0	1	0	0	0	106	104	0	0	1	0	0	0	106
North Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
South Bay	0	0	0	0	0	0	0	0	102	0	0	0	0	0	0	102	102	0	0	0	0	0	0	102
Out of Region	0	0	0	0	0	0	0	0	127	0	0	0	0	0	0	127	127	0	0	0	0	0	0	127
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**949**	**5**	**22**	**35**	**0**	**0**	**5**	**1,016**	**949**	**5**	**22**	**35**	**0**	**0**	**5**	**1,016**

Late PM Peak Hour bet. 9 PM & 11 PM	Inbound								Outbound								Total							
Total Person Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	0	0	0	0	0	0	0	1,418	2	12	19	0	0	4	1,455	1,418	2	12	19	0	0	4	1,455
Superdistrict 2	0	0	0	0	0	0	0	0	455	2	14	22	0	0	5	498	455	2	14	22	0	0	5	498
Superdistrict 3	0	0	0	0	0	0	0	0	570	11	40	63	0	0	10	695	570	11	40	63	0	0	10	695
Superdistrict 4	0	0	0	0	0	0	0	0	433	2	8	13	0	0	3	460	433	2	8	13	0	0	3	460
East Bay	0	0	0	0	0	0	0	0	4,228	4	21	32	0	0	13	4,298	4,228	4	21	32	0	0	13	4,298
North Bay	0	0	0	0	0	0	0	0	1,651	1	3	4	0	0	2	1,660	1,651	1	3	4	0	0	2	1,660
South Bay	0	0	0	0	0	0	0	0	3,578	4	16	25	0	0	9	3,632	3,578	4	16	25	0	0	9	3,632
Out of Region	0	0	0	0	0	0	0	0	511	1	3	5	0	0	1	521	511	1	3	5	0	0	1	521
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**12,845**	**26**	**118**	**184**	**0**	**0**	**47**	**13,218**	**12,845**	**26**	**118**	**184**	**0**	**0**	**47**	**13,218**

Late PM Peak Hour bet. 9 PM & 11 PM	Inbound								Outbound								Total							
Vehicle-Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	34	0	0	0	0	0	0	34	177	0	2	3	0	0	0	183	211	0	2	3	0	0	0	217
Superdistrict 2	10	0	0	0	0	0	0	10	85	1	4	6	0	0	1	97	95	1	4	6	0	0	1	106
Superdistrict 3	6	0	0	0	0	0	0	6	107	3	7	11	0	0	2	130	113	3	7	11	0	0	2	136
Superdistrict 4	9	0	0	0	0	0	0	9	117	1	2	3	0	0	1	123	126	1	2	3	0	0	1	133
East Bay	38	0	0	0	0	0	0	38	848	1	3	5	0	0	2	859	887	1	3	5	0	0	2	898
North Bay	0	0	0	0	0	0	0	0	443	0	1	1	0	0	1	446	443	0	1	1	0	0	1	446
South Bay	38	0	0	0	0	0	0	38	964	2	7	11	0	0	4	987	1,001	2	7	11	0	0	4	1,024
Out of Region	0	0	0	0	0	0	0	0	56	0	1	2	0	0	0	59	56	0	1	2	0	0	0	59
Total	**134**	**0**	**0**	**0**	**0**	**0**	**0**	**134**	**2,797**	**7**	**27**	**42**	**0**	**0**	**10**	**2,883**	**2,932**	**7**	**27**	**42**	**0**	**0**	**10**	**3,018**

BASKETBALL GAME SUMMARY
SATURDAY: 7 PM TO 9 PM PERIOD PEAK HOUR

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION - SATURDAY DAILY AND EVENING PEAK HOUR BETWEEN 7 AND 9 PM

SUMMARY OF TRIPS WITH BASKETBALL GAME

Land Use	Intensity
Arena	18,064 attendees
	1,000 employees
Retail	62,500 gsf
Quick Service Rest.	11,000 gsf
Sit-down Restaurant	51,500 gsf
XXX	0 xxx
XXX	0 xxx
Office	605,000 gsf

Person-trips by Mode	Daily Trips: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	22,217	2,368	1,565	2,442	0	0	660	29,252	56%
Transit	13,879	681	697	1,087	0	0	1,507	17,851	34%
Taxi/Coach (Event)	434							434	1%
Bike (Event)	542							542	1%
Walk	880	821	464	724	0	0	192	3,081	6%
Other	177	80	234	365	0	0	83	939	2%
Total	**38,128**	**3,950**	**2,959**	**4,618**	**0**	**0**	**2,442**	**52,098**	**100%**
	73%	**8%**	**6%**	**9%**	**0%**	**0%**	**5%**	**100%**	
Vehicle Trips	8,715	1,278	714	1,114	0	0	509	12,331	
	71%	10%	6%	9%	0%	0%	4%	100%	
Avg. veh. occupancy	*2.60*	*1.85*	*2.19*	*2.19*	*0.00*	*0.00*	*1.30*	*2.41*	

Person-trips by Mode	Evening Peak Hour Trips: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	7,045	18	74	116	0	0	7	7,261	59%
Transit	4,110	13	66	104	0	0	17	4,310	35%
Taxi/Coach (Event)	141							141	1%
Bike (Event)	176							176	1%
Walk	235	6	22	34	0	0	2	299	2%
Other	35	1	11	17	0	0	1	65	1%
Total	**11,742**	**39**	**174**	**271**	**0**	**0**	**27**	**12,252**	**100%**
	96%	**0%**	**1%**	**2%**	**0%**	**0%**	**0%**	**100%**	
Vehicle Trips	2,697	11	40	62	0	0	6	2,815	
	96%	0%	1%	2%	0%	0%	0%	100%	
Avg. veh. occupancy	*2.66*	*1.69*	*1.88*	*1.88*	*0.00*	*0.00*	*1.30*	*2.63*	

Person-trips by Mode	Percent of Daily during Late PM Peak Hour: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Auto	31.7%	0.8%	4.8%	4.8%	0.0%	0.0%	1.1%	24.8%
Transit	29.6%	2.0%	9.5%	9.5%	0.0%	0.0%	1.1%	24.1%
Taxi/Coach (Event)	32.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	32.5%
Bike (Event)	32.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	32.5%
Walk	26.7%	0.7%	4.7%	4.7%	0.0%	0.0%	1.1%	9.7%
Other	19.9%	1.2%	4.6%	4.6%	0.0%	0.0%	1.1%	6.9%
Total	**30.8%**	**1.0%**	**5.9%**	**5.9%**	**0.0%**	**0.0%**	**1.1%**	**23.5%**
Vehicle Trips	30.9%	0.8%	5.6%	5.6%	0.0%	0.0%	1.1%	22.8%

Saturday Distribution	Total Daily Person-trips	Evening Peak Hour Person-Trips: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	5,537	1,302	3	18	29	0	0	2	1,354
Superdistrict 2	3,068	404	4	21	33	0	0	3	464
Superdistrict 3	7,883	488	17	59	92	0	0	6	662
Superdistrict 4	2,265	389	2	12	19	0	0	2	425
East Bay	14,220	3,875	5	30	47	0	0	7	3,966
North Bay	5,036	1,526	1	4	6	0	0	1	1,538
South Bay	12,123	3,288	5	23	37	0	0	5	3,358
Out of Region	1,966	470	1	5	8	0	0	1	484
Total	**52,098**	**11,742**	**39**	**174**	**271**	**0**	**0**	**27**	**12,252**

Saturday Distribution	Evening Peak Hour Transit-Trips: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	679	1	6	10	0	0	1	698
Superdistrict 2	130	1	7	11	0	0	2	151
Superdistrict 3	111	3	18	28	0	0	3	163
Superdistrict 4	80	1	5	7	0	0	1	94
East Bay	1,638	4	20	31	0	0	6	1,698
North Bay	395	0	1	2	0	0	0	399
South Bay	830	2	8	12	0	0	3	854
Out of Region	247	0	2	3	0	0	0	253
Total	**4,110**	**13**	**66**	**104**	**0**	**0**	**17**	**4,310**

Saturday Distribution	Evening Peak Hour Vehicle-Trips: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total		Avg. Veh. Occ.
Superdistrict 1	184	0	3	4	0	0	0	191	7%	2.50
Superdistrict 2	86	1	6	9	0	0	0	103	4%	2.46
Superdistrict 3	111	4	10	16	0	0	1	143	5%	2.52
Superdistrict 4	111	1	3	5	0	0	0	120	4%	2.58
East Bay	816	1	5	8	0	0	1	831	30%	2.65
North Bay	419	0	1	2	0	0	0	422	15%	2.69
South Bay	908	2	10	16	0	0	2	938	33%	2.63
Out of Region	61	0	2	2	0	0	0	66	2%	2.96
Total	**2,697**	**11**	**40**	**62**	**0**	**0**	**6**	**2,815**	**100%**	**2.63**

Assumptions for Evening Peak Hour bet. 7 PM & 9 PM	Arena		Retail		Q.S. Rest.		Sit-down Rest.		XXX		XXX		Office	
	Empl.	Attend.	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work
Inbound	95%	100%	0%	50%	0%	50%	0%	50%	100%	100%	100%	50%	0%	50%
Outbound	5%	0%	100%	50%	100%	50%	100%	50%	0%	0%	0%	50%	100%	50%

Evening Peak Hour bet. 7 PM & 9 PM	Inbound: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	11,742	11	47	74	0	0	0	11,873
	100%	27%	27%	27%	0%	0%	0%	97%
Transit Trips	4,110	1	9	14	0	0	0	4,134
	100%	9%	13%	13%	0%	0%	0%	96%
Vehicle Trips	2,653	4	12	18	0	0	0	2,687
	98%	33%	29%	29%	0%	0%	0%	95%

Evening Peak Hour bet. 7 PM & 9 PM	Outbound: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	0	28	126	197	0	0	27	378
	0%	73%	73%	73%	0%	0%	100%	3%
Transit Trips	0	12	58	90	0	0	17	176
	0%	91%	87%	87%	0%	0%	100%	4%
Vehicle Trips	43	7	28	44	0	0	6	128
	2%	67%	71%	71%	0%	0%	100%	5%

Evening Peak Hour bet. 7 PM & 9 PM	Total: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	11,742	39	174	271	0	0	27	12,252
Transit Trips	4,110	13	66	104	0	0	17	4,310
Vehicle Trips	2,697	11	40	62	0	0	6	2,815

Evening Peak Hour bet. 7 PM & 9 PM Auto Trips	Inbound: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	432	0	2	3	0	0	0	438
Superdistrict 2	215	1	5	7	0	0	0	227
Superdistrict 3	288	4	9	14	0	0	0	316
Superdistrict 4	285	0	2	3	0	0	0	291
East Bay	2,141	0	3	5	0	0	0	2,148
North Bay	1,132	0	0	1	0	0	0	1,133
South Bay	2,389	1	4	6	0	0	0	2,400
Out of Region	164	0	1	2	0	0	0	167
Total	**7,045**	**7**	**27**	**41**	**0**	**0**	**0**	**7,120**

Evening Peak Hour bet. 7 PM & 9 PM Auto Trips	Outbound: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	0	3	5	0	0	0	8
Superdistrict 2	0	1	6	10	0	0	1	18
Superdistrict 3	0	5	13	20	0	0	1	38
Superdistrict 4	0	1	4	6	0	0	1	12
East Bay	0	1	7	11	0	0	1	21
North Bay	0	0	2	3	0	0	0	5
South Bay	0	2	12	18	0	0	3	34
Out of Region	0	0	1	2	0	0	0	4
Total	**0**	**11**	**48**	**75**	**0**	**0**	**7**	**141**

Evening Peak Hour bet. 7 PM & 9 PM Auto Trips	Total: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Taxi + Coach Arena
Superdistrict 1	432	1	5	8	0	0	0	446	32
Superdistrict 2	215	2	11	17	0	0	1	245	9
Superdistrict 3	288	9	22	34	0	0	1	354	6
Superdistrict 4	285	1	6	10	0	0	1	303	8
East Bay	2,141	1	10	16	0	0	1	2,170	32
North Bay	1,132	1	2	3	0	0	0	1,138	0
South Bay	2,389	3	16	24	0	0	3	2,434	31
Out of Region	164	1	3	4	0	0	0	171	23
Total	**7,045**	**18**	**74**	**116**	**0**	**0**	**7**	**7,261**	**141**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION - SATURDAY DAILY AND EVENING PEAK HOUR BETWEEN 7 AND 9 PM
SUMMARY OF TRIPS WITH BASKETBALL GAME

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Transit Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	679	0	1	2	0	0	0	682	0	1	5	8	0	0	1	15	679	1	6	10	0	0	1	698
Superdistrict 2	130	0	1	1	0	0	0	133	0	1	6	9	0	0	2	18	130	1	7	11	0	0	2	151
Superdistrict 3	111	1	4	7	0	0	0	123	0	3	13	21	0	0	3	40	111	3	18	28	0	0	3	163
Superdistrict 4	80	0	1	1	0	0	0	81	0	1	4	7	0	0	1	13	80	1	5	7	0	0	1	94
East Bay	1,638	0	1	2	0	0	0	1,641	0	4	18	29	0	0	6	57	1,638	4	20	31	0	0	6	1,698
North Bay	395	0	0	0	0	0	0	395	0	0	1	2	0	0	0	4	395	0	1	2	0	0	0	399
South Bay	830	0	0	0	0	0	0	831	0	2	8	12	0	0	3	23	830	2	8	12	0	0	3	854
Out of Region	247	0	0	0	0	0	0	248	0	0	2	3	0	0	0	5	247	0	2	3	0	0	0	253
Total	**4,110**	**1**	**9**	**14**	**0**	**0**	**0**	**4,134**	**0**	**12**	**58**	**90**	**0**	**0**	**17**	**176**	**4,110**	**13**	**66**	**104**	**0**	**0**	**17**	**4,310**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Bike (Event)	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	43							43	0							0	43	0	0	0	0	0	0	43
Superdistrict 2	12							12	0							0	12	0	0	0	0	0	0	12
Superdistrict 3	8							8	0							0	8	0	0	0	0	0	0	8
Superdistrict 4	11							11	0							0	11	0	0	0	0	0	0	11
East Bay	65							65	0							0	65	0	0	0	0	0	0	65
North Bay	0							0	0							0	0	0	0	0	0	0	0	0
South Bay	38							38	0							0	38	0	0	0	0	0	0	38
Out of Region	0							0	0							0	0	0	0	0	0	0	0	0
Total	**176**	**0**	**0**	**0**	**0**	**0**	**0**	**176**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**176**	**0**	**0**	**0**	**0**	**0**	**0**	**176**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Taxi/Walk/Other	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	148	0	3	4	0	0	0	156	0	0	4	7	0	0	1	12	148	1	7	11	0	0	1	167
Superdistrict 2	47	0	1	2	0	0	0	50	0	0	2	3	0	0	0	6	47	1	3	5	0	0	0	56
Superdistrict 3	81	2	7	11	0	0	0	102	0	3	12	19	0	0	2	37	81	5	20	31	0	0	2	138
Superdistrict 4	13	0	1	1	0	0	0	15	0	0	1	1	0	0	0	2	13	0	1	2	0	0	0	17
East Bay	32	0	0	0	0	0	0	32	0	0	1	1	0	0	0	2	32	0	1	1	0	0	0	34
North Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Bay	31	0	0	0	0	0	0	31	0	0	0	0	0	0	0	1	31	0	0	0	0	0	0	32
Out of Region	59	0	0	0	0	0	0	59	0	0	0	0	0	0	0	1	59	0	0	0	0	0	0	60
Total	**411**	**3**	**12**	**19**	**0**	**0**	**0**	**444**	**0**	**5**	**21**	**32**	**0**	**0**	**3**	**61**	**411**	**7**	**33**	**51**	**0**	**0**	**3**	**505**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Total Person Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	1,302	1	6	10	0	0	0	1,319	0	2	12	19	0	0	2	35	1,302	3	18	29	0	0	2	1,354
Superdistrict 2	404	1	7	10	0	0	0	422	0	3	14	23	0	0	3	42	404	4	21	33	0	0	3	464
Superdistrict 3	488	6	21	33	0	0	0	548	0	10	38	60	0	0	6	115	488	17	59	92	0	0	6	662
Superdistrict 4	389	1	3	5	0	0	0	398	0	2	9	14	0	0	2	27	389	2	12	19	0	0	2	425
East Bay	3,875	0	4	7	0	0	0	3,886	0	5	26	41	0	0	7	80	3,875	5	30	47	0	0	7	3,966
North Bay	1,526	0	0	1	0	0	0	1,528	0	1	3	5	0	0	1	10	1,526	1	4	6	0	0	1	1,538
South Bay	3,288	1	4	7	0	0	0	3,300	0	4	19	30	0	0	5	59	3,288	5	23	37	0	0	5	3,358
Out of Region	470	1	1	2	0	0	0	474	0	1	3	5	0	0	1	10	470	1	5	8	0	0	1	484
Total	**11,742**	**11**	**47**	**74**	**0**	**0**	**0**	**11,873**	**0**	**28**	**126**	**197**	**0**	**0**	**27**	**378**	**11,742**	**39**	**174**	**271**	**0**	**0**	**27**	**12,252**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Vehicle-Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	172	0	1	2	0	0	0	175	12	0	2	3	0	0	0	17	184	0	3	4	0	0	0	191
Superdistrict 2	83	0	2	4	0	0	0	89	3	1	4	6	0	0	0	14	86	1	6	9	0	0	0	103
Superdistrict 3	109	2	4	6	0	0	0	120	2	3	7	10	0	0	1	22	111	4	10	16	0	0	1	143
Superdistrict 4	109	0	1	1	0	0	0	111	3	1	2	3	0	0	0	9	111	1	3	5	0	0	0	120
East Bay	805	0	1	2	0	0	0	808	12	1	4	6	0	0	1	23	816	1	5	8	0	0	1	831
North Bay	419	0	0	0	0	0	0	419	0	0	1	1	0	0	0	3	419	0	1	2	0	0	0	422
South Bay	896	0	2	3	0	0	0	901	11	2	8	13	0	0	2	37	908	2	10	16	0	0	2	938
Out of Region	61	0	1	1	0	0	0	63	0	0	1	1	0	0	0	3	61	0	2	2	0	0	0	66
Total	**2,653**	**4**	**12**	**18**	**0**	**0**	**0**	**2,687**	**43**	**7**	**28**	**44**	**0**	**0**	**6**	**128**	**2,697**	**11**	**40**	**62**	**0**	**0**	**6**	**2,815**

CONVENTION EVENT SUMMARY
WEEKDAY: 4 PM TO 6 PM PERIOD PEAK HOUR

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION - WEEKDAY DAILY AND PM PEAK HOUR BETWEEN 4 AND 6 PM
SUMMARY OF TRIPS WITH CONVENTION EVENT

Land Use	Intensity
Arena	9,000 attendees
	675 employees
Retail	62,500 gsf
Quick Service Rest.	11,000 gsf
Sit-down Restaurant	51,500 gsf
XXX	0 xxx
XXX	0 xxx
Office	605,000 gsf

Person-trips by Mode	Daily Trips Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	5,862	2,024	1,256	1,961	0	0	4,997	16,100	33%
Transit	7,252	582	559	873	0	0	3,748	13,014	27%
Taxi/Shuttle (Event)	13,491							13,491	27%
Walk	672	701	373	581	0	0	1,477	3,805	8%
Other	1,411	68	188	293	0	0	728	2,688	5%
Total	**28,688**	**3,375**	**2,376**	**3,708**	**0**	**0**	**10,951**	**49,097**	**100%**
	58%	**7%**	**5%**	**8%**	**0%**	**0%**	**22%**	**100%**	
Vehicle Trips	3,921	1,092	573	895	0	0	2,542	9,023	
	43%	12%	6%	10%	0%	0%	28%	100%	
Avg. veh. occupancy	*4.94*	*1.85*	*2.19*	*2.19*	*0.00*	*0.00*	*1.97*	*3.28*	

Person-trips by Mode	PM Peak Hour Trips Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	633	182	170	265	0	0	298	1,547	30%
Transit	772	52	75	118	0	0	506	1,524	29%
Taxi/Shuttle (Event)	1,484							1,484	29%
Walk	71	63	50	78	0	0	87	350	7%
Other	154	6	25	40	0	0	40	265	5%
Total	**3,113**	**304**	**321**	**501**	**0**	**0**	**931**	**5,169**	**100%**
	60%	**6%**	**6%**	**10%**	**0%**	**0%**	**18%**	**100%**	
Vehicle Trips	423	98	77	121	0	0	200	919	
	46%	11%	8%	13%	0%	0%	22%	100%	
Avg. veh. occupancy	*5.01*	*1.85*	*2.19*	*2.19*	*0.00*	*0.00*	*1.49*	*3.30*	

Person-trips by Mode	Percent of Daily during PM Peak Hour Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Auto	10.8%	9.0%	13.5%	13.5%	0.0%	0.0%	6.0%	9.6%
Transit	10.6%	9.0%	13.5%	13.5%	0.0%	0.0%	13.5%	11.7%
Taxi/Shuttle (Event)	11.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	11.0%
Walk	10.5%	9.0%	13.5%	13.5%	0.0%	0.0%	5.9%	9.2%
Other	10.9%	9.0%	13.5%	13.5%	0.0%	0.0%	5.5%	9.8%
Total	**10.9%**	**9.0%**	**13.5%**	**13.5%**	**0.0%**	**0.0%**	**8.5%**	**10.5%**
Vehicle Trips	10.8%	9.0%	13.5%	13.5%	0.0%	0.0%	7.9%	10.2%

Weekday Distribution	Total Daily Person-trips	PM Peak Hour Person-Trips Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	17,161	1,645	19	40	62	0	0	80	1,846
Superdistrict 2	4,019	163	28	43	68	0	0	99	400
Superdistrict 3	10,133	180	172	133	208	0	0	242	936
Superdistrict 4	2,862	159	16	23	35	0	0	68	301
East Bay	5,084	263	17	36	55	0	0	228	599
North Bay	1,095	79	7	4	6	0	0	29	125
South Bay	5,354	324	31	32	51	0	0	161	599
Out of Region	3,390	301	14	9	15	0	0	24	363
Total	**49,097**	**3,113**	**304**	**321**	**501**	**0**	**0**	**931**	**5,169**

Weekday Distribution	PM Peak Hour Transit-Trips Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	396	6	9	14	0	0	42	467
Superdistrict 2	20	6	8	13	0	0	53	99
Superdistrict 3	28	19	31	48	0	0	101	228
Superdistrict 4	27	3	5	8	0	0	38	81
East Bay	168	8	15	24	0	0	171	387
North Bay	3	1	1	1	0	0	14	19
South Bay	50	5	4	7	0	0	73	139
Out of Region	80	3	2	4	0	0	15	104
Total	**772**	**52**	**75**	**118**	**0**	**0**	**506**	**1,524**

Weekday Distribution	PM Peak Hour Vehicle-Trips Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total		Avg. Veh. Occ.
Superdistrict 1	130	4	7	11	0	0	9	161	18%	8.10
Superdistrict 2	18	10	15	23	0	0	21	87	9%	3.00
Superdistrict 3	13	50	24	37	0	0	40	165	18%	2.40
Superdistrict 4	17	7	6	9	0	0	15	54	6%	3.77
East Bay	38	5	8	12	0	0	30	93	10%	2.18
North Bay	37	4	1	1	0	0	9	51	6%	2.04
South Bay	126	13	14	21	0	0	71	245	27%	1.86
Out of Region	43	5	4	6	0	0	5	62	7%	1.67
Total	**423**	**98**	**77**	**121**	**0**	**0**	**200**	**919**	**100%**	**3.30**

Assumptions for PM Peak Hour bet. 4 PM & 6 PM	Arena Empl.	Arena Attend.	Retail Work	Retail Non-work	Q.S. Rest. Work	Q.S. Rest. Non-work	Sit-down Rest. Work	Sit-down Rest. Non-work	XXX Work	XXX Non-work	XXX Work	XXX Non-work	Office Work	Office Non-work
Inbound	50%	10%	0%	50%	0%	50%	0%	50%	100%	100%	100%	55%	0%	50%
Outbound	50%	90%	100%	50%	100%	50%	100%	50%	0%	0%	0%	45%	100%	50%

PM Peak Hour bet. 4 PM & 6 PM	Inbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	369	135	143	222	0	0	79	948
	12%	44%	44%	44%	0%	0%	9%	18%
Transit Trips	113	16	27	42	0	0	15	212
	15%	30%	35%	35%	0%	0%	3%	14%
Vehicle Trips	102	46	35	55	0	0	19	256
	24%	46%	45%	45%	0%	0%	10%	28%

PM Peak Hour bet. 4 PM & 6 PM	Outbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	2,745	169	178	278	0	0	852	4,221
	88%	56%	56%	56%	0%	0%	92%	82%
Transit Trips	659	37	49	76	0	0	492	1,312
	85%	70%	65%	65%	0%	0%	97%	86%
Vehicle Trips	321	53	42	66	0	0	180	663
	76%	54%	55%	55%	0%	0%	90%	72%

PM Peak Hour bet. 4 PM & 6 PM	Total Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	3,113	304	321	501	0	0	931	5,169
Transit Trips	772	52	75	118	0	0	506	1,524
Vehicle Trips	423	98	77	121	0	0	200	919

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Inbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	8	4	7	10	0	0	4	32
Superdistrict 2	3	8	14	21	0	0	8	53
Superdistrict 3	4	50	27	43	0	0	15	139
Superdistrict 4	3	6	7	10	0	0	4	30
East Bay	13	3	9	14	0	0	5	43
North Bay	9	2	1	2	0	0	1	15
South Bay	33	10	12	19	0	0	7	81
Out of Region	7	4	3	5	0	0	2	21
Total	**79**	**87**	**80**	**125**	**0**	**0**	**44**	**415**

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Outbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	64	4	7	11	0	0	11	97
Superdistrict 2	12	8	14	23	0	0	24	81
Superdistrict 3	9	51	29	45	0	0	50	184
Superdistrict 4	16	6	8	12	0	0	21	63
East Bay	81	5	11	17	0	0	48	161
North Bay	68	3	2	3	0	0	13	89
South Bay	241	14	16	24	0	0	80	374
Out of Region	64	4	3	5	0	0	6	83
Total	**555**	**96**	**90**	**140**	**0**	**0**	**253**	**1,133**

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Total Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Taxi + Shuttle Arena
Superdistrict 1	72	8	14	21	0	0	15	129	1,174
Superdistrict 2	15	16	28	44	0	0	32	134	126
Superdistrict 3	13	101	56	88	0	0	65	323	71
Superdistrict 4	19	12	14	22	0	0	25	93	112
East Bay	93	8	20	30	0	0	53	204	0
North Bay	76	5	3	5	0	0	14	104	0
South Bay	274	24	28	43	0	0	87	455	0
Out of Region	72	8	6	10	0	0	8	104	0
Total	**633**	**182**	**170**	**265**	**0**	**0**	**298**	**1,547**	**1,484**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION - WEEKDAY DAILY AND PM PEAK HOUR BETWEEN 4 AND 6 PM
SUMMARY OF TRIPS WITH CONVENTION EVENT

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Transit Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	42	2	4	6	0	0	2	56	354	4	5	8	0	0	40	411	396	6	9	14	0	0	42	467
Superdistrict 2	6	2	3	5	0	0	2	17	14	4	5	8	0	0	51	82	20	6	8	13	0	0	53	99
Superdistrict 3	9	8	13	21	0	0	7	59	19	12	17	27	0	0	94	169	28	19	31	48	0	0	101	228
Superdistrict 4	5	1	2	3	0	0	1	11	22	2	3	5	0	0	37	70	27	3	5	8	0	0	38	81
East Bay	29	1	4	6	0	0	2	42	139	8	12	18	0	0	169	346	168	8	15	24	0	0	171	387
North Bay	1	0	0	0	0	0	0	2	1	1	1	1	0	0	14	18	3	1	1	1	0	0	14	19
South Bay	10	1	0	1	0	0	0	13	40	4	4	6	0	0	72	126	50	5	4	7	0	0	73	139
Out of Region	9	1	1	1	0	0	1	13	71	2	2	2	0	0	14	91	80	3	2	4	0	0	15	104
Total	**113**	**16**	**27**	**42**	**0**	**0**	**15**	**212**	**659**	**37**	**49**	**76**	**0**	**0**	**492**	**1,312**	**772**	**52**	**75**	**118**	**0**	**0**	**506**	**1,524**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Bike (Event)	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1								0								0	0	0	0	0	0	0	0	0
Superdistrict 2								0								0	0	0	0	0	0	0	0	0
Superdistrict 3								0								0	0	0	0	0	0	0	0	0
Superdistrict 4								0								0	0	0	0	0	0	0	0	0
East Bay								0								0	0	0	0	0	0	0	0	0
North Bay								0								0	0	0	0	0	0	0	0	0
South Bay								0								0	0	0	0	0	0	0	0	0
Out of Region								0								0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Taxi/Walk/Other	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	119	2	8	13	0	0	5	147	1,058	3	9	14	0	0	19	1,103	1,177	5	17	27	0	0	24	1,250
Superdistrict 2	14	3	3	5	0	0	2	27	115	3	4	6	0	0	12	140	128	6	7	11	0	0	14	167
Superdistrict 3	18	25	22	34	0	0	12	111	122	27	24	38	0	0	63	275	140	52	46	72	0	0	76	385
Superdistrict 4	12	0	2	3	0	0	1	17	101	1	2	3	0	0	4	110	113	1	3	5	0	0	5	127
East Bay	0	1	0	0	0	0	0	2	0	1	0	1	0	0	4	7	1	1	1	1	0	0	4	8
North Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	1	2
South Bay	0	1	0	0	0	0	0	1	0	1	0	0	0	0	1	3	0	1	1	1	0	0	1	4
Out of Region	15	2	0	0	0	0	0	17	134	2	0	0	0	0	1	138	149	3	1	1	0	0	1	155
Total	**177**	**33**	**36**	**56**	**0**	**0**	**20**	**322**	**1,531**	**37**	**40**	**62**	**0**	**0**	**107**	**1,777**	**1,708**	**69**	**76**	**118**	**0**	**0**	**127**	**2,098**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Total Person Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	169	8	19	29	0	0	10	235	1,476	11	21	33	0	0	70	1,611	1,645	19	40	62	0	0	80	1,846
Superdistrict 2	22	12	20	31	0	0	11	96	141	15	23	37	0	0	87	304	163	28	43	68	0	0	99	400
Superdistrict 3	31	82	63	98	0	0	35	309	150	90	71	110	0	0	207	628	180	172	133	208	0	0	242	936
Superdistrict 4	20	7	10	16	0	0	6	58	139	9	13	20	0	0	62	243	159	16	23	35	0	0	68	301
East Bay	42	4	13	20	0	0	7	86	220	13	23	35	0	0	221	513	263	17	36	55	0	0	228	599
North Bay	10	3	1	2	0	0	1	17	69	4	3	4	0	0	28	108	79	7	4	6	0	0	29	125
South Bay	43	12	13	20	0	0	7	95	281	19	20	31	0	0	154	503	324	31	32	51	0	0	161	599
Out of Region	31	7	4	7	0	0	2	52	269	8	5	8	0	0	22	312	301	14	9	15	0	0	24	363
Total	**369**	**135**	**143**	**222**	**0**	**0**	**79**	**948**	**2,745**	**169**	**178**	**278**	**0**	**0**	**852**	**4,221**	**3,113**	**304**	**321**	**501**	**0**	**0**	**931**	**5,169**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Vehicle-Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	51	2	3	5	0	0	2	63	79	2	4	6	0	0	8	98	130	4	7	11	0	0	9	161
Superdistrict 2	7	5	7	11	0	0	4	33	12	6	8	12	0	0	17	53	18	10	15	23	0	0	21	87
Superdistrict 3	6	24	11	18	0	0	6	65	8	26	13	20	0	0	34	99	13	50	24	37	0	0	40	165
Superdistrict 4	6	3	3	4	0	0	1	18	11	4	3	5	0	0	13	37	17	7	6	9	0	0	15	54
East Bay	6	2	3	5	0	0	2	18	32	3	5	7	0	0	29	75	38	5	8	12	0	0	30	93
North Bay	4	2	0	0	0	0	0	7	32	2	1	1	0	0	9	44	37	4	1	1	0	0	9	51
South Bay	17	5	5	8	0	0	3	39	109	8	8	13	0	0	68	206	126	13	14	21	0	0	71	245
Out of Region	4	2	2	3	0	0	1	13	38	2	2	3	0	0	4	50	43	5	4	6	0	0	5	62
Total	**102**	**46**	**35**	**55**	**0**	**0**	**19**	**256**	**321**	**53**	**42**	**66**	**0**	**0**	**180**	**663**	**423**	**98**	**77**	**121**	**0**	**0**	**200**	**919**

INDIVIDUAL LAND USE TRAVEL DEMAND CALCULATIONS

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION

LAND USE: ARENA - NO EVENT (WORK TRIPS)

Proposed Size:	105 employees	
DAILY:		
Linked Trip Factor [a]:	0%	
Work Person-trip Generation Rate [b]:	2.50	trips/employee
Work Trips (w/ linked trip factor):	263	person-trips

	Weekday Peak Hour of	Weekday Peak Hour of	Weekday Peak Hour of	Saturday Peak Hour of
PEAK HOUR PERIOD:	4-6 PM Period	6-8 PM Period	9-11 PM Period	7-9 PM Period
% Work trips arrive/depart during peak hour:	8.5% [c]	2.0% [d]	0%	0%
Peak hour Work Trips (w/ linked trip factor):	22	5	0	0

Origins	Distribution [f]	Mode	Percent [f]	Avg. Vehicle Occupancy [e]	WEEKDAY/SATURDAY All Day		WEEKDAY 4-6 PM Peak Hour		WEEKDAY 7-9 PM Peak Hour		WEEKDAY 9-11 PM Peak Hour		SATURDAY 7-9 PM Peak Hour	
					Person Trips	Vehicle-Trips	Person Trips	Vehicle-Trips	Person Trips	Vehicle-Trips	Person Trips	Vehicle-Trips	Person Trips	Vehicle-Trips
Superdistrict 1	7.7%	Auto	12.4%	1.30	3	2	0	0	0	0	0	0	0	0
		Transit	63.0%		13		1		0		0		0	
		Walk	21.4%		4		0		0		0		0	
		Other	3.1%		1		0		0		0		0	
		TOTAL	*100.0%*		*20*	*2*	*2*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Superdistrict 2	9.9%	Auto	21.8%	1.26	6	4	0	0	0	0	0	0	0	0
		Transit	64.6%		17		1		0		0		0	
		Walk	10.6%		3		0		0		0		0	
		Other	3.1%		1		0		0		0		0	
		TOTAL	*100.0%*		*26*	*4*	*2*	*0*	*1*	*0*	*0*	*0*	*0*	*0*
Superdistrict 3	22.3%	Auto	20.0%	1.25	12	9	1	1	0	0	0	0	0	0
		Transit	50.2%		29		2		1		0		0	
		Walk	23.1%		14		1		0		0		0	
		Other	6.7%		4		0		0		0		0	
		TOTAL	*100.0%*		*59*	*9*	*5*	*1*	*1*	*0*	*0*	*0*	*0*	*0*
Superdistrict 4	7.4%	Auto	31.0%	1.48	6	4	1	0	0	0	0	0	0	0
		Transit	64.0%		12		1		0		0		0	
		Walk	0.0%		0		0		0		0		0	
		Other	5.0%		1		0		0		0		0	
		TOTAL	*100.0%*		*19*	*4*	*2*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
East Bay	27.7%	Auto	20.1%	1.61	15	9	1	1	0	0	0	0	0	0
		Transit	78.0%		57		5		1		0		0	
		Walk	0.0%		0		0		0		0		0	
		Other	2.0%		1		0		0		0		0	
		TOTAL	*100.0%*		*73*	*9*	*6*	*1*	*1*	*0*	*0*	*0*	*0*	*0*
North Bay	3.5%	Auto	44.4%	1.44	4	3	0	0	0	0	0	0	0	0
		Transit	51.1%		5		0		0		0		0	
		Walk	0.0%		0		0		0		0		0	
		Other	4.4%		0		0		0		0		0	
		TOTAL	*100.0%*		*9*	*3*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
South Bay	19.0%	Auto	50.0%	1.13	25	22	2	2	0	0	0	0	0	0
		Transit	49.2%		24		2		0		0		0	
		Walk	0.0%		0		0		0		0		0	
		Other	0.8%		0		0		0		0		0	
		TOTAL	*100.0%*		*50*	*22*	*4*	*2*	*1*	*0*	*0*	*0*	*0*	*0*
Out of Region	2.5%	Auto	21.9%	1.56	1	1	0	0	0	0	0	0	0	0
		Transit	71.9%		5		0		0		0		0	
		Walk	0.0%		0		0		0		0		0	
		Other	6.3%		0		0		0		0		0	
		TOTAL	*100.0%*		*7*	*1*	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
TOTAL	**100.0%**	Auto	27.0%	1.30	71	55	6	5	1	1	0	0	0	0
		Transit	61.7%		162		14		3		0		0	
		Walk	7.9%		21		2		0		0		0	
		Other	3.4%		9		1		0		0		0	
		TOTAL	*100.0%*		*263*	*55*	*22*	*5*	*5*	*1*	*0*	*0*	*0*	*0*

[a] No linked-trip factor assumed for arena
[b] Assumes that 25% of the employees will make four trips to/from the project site (e.g., for lunch, errands, etc.).
[c] SF Guidelines, Appendix C - Table C-1 (General Office)
[d] Based on Pushkarev and Zupan, Urban Space for Pedestrians (1978) for general office
[e] SF Guidelines, Appendix E - Table E-5 Work Trips to SD3 (All)

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION

LAND USE: ARENA - BASKETBALL GAME (WORK TRIPS)

Proposed Size:	18,064 attendees plus 1,000 employees	
DAILY:		
Linked Trip Factor [a]:	0%	
Overall Person-trip Generation Rate [b]:	2.11	trips/attendee
Total Person-trips (w/out linked trip factor):	38,128	person-trips
Percent of Work Trips [f]:	5.2%	
Work Person-trip Generation Rate [g]:	2.00	trips/employee
Work Trips (w/ linked trip factor):	2,000	person-trips

PEAK HOUR PERIOD:	Weekday Peak Hour of 4-6 PM Period	Weekday Peak Hour of 6-8 PM Period	Weekday Peak Hour of 9-11 PM Period	Saturday Peak Hour of 7-9 PM Period
Overall peak hour trips as a % of daily trips:	4.7% [c]	30.8% [c]	33.7% [e]	30.8% [d]
Overall peak hour person-trip rate (trips/attendee):	0.10	0.65	0.71	0.65
Total peak hour person-trips (w/ linked trip factor):	1,803	11,742	12,845	11,742
% Work trips arrive/depart during peak hour:	45% [h]	0% [h]	10% [h]	0% [h]
Peak hour Work Trips (w/ linked trip factor):	900	0	200	0

Origins	Distribution [j]	Mode	Percent [j]	Avg. Vehicle Occupancy [i]	WEEKDAY/SATURDAY All Day Person Trips	WEEKDAY/SATURDAY All Day Vehicle-Trips	WEEKDAY 4-6 PM Peak Hour Person Trips	WEEKDAY 4-6 PM Peak Hour Vehicle-Trips	WEEKDAY 6-8 PM Peak Hour Person Trips	WEEKDAY 6-8 PM Peak Hour Vehicle-Trips	WEEKDAY 9-11 PM Peak Hour Person Trips	WEEKDAY 9-11 PM Peak Hour Vehicle-Trips	SATURDAY 7-9 PM Peak Hour Person Trips	SATURDAY 7-9 PM Peak Hour Vehicle-Trips
Superdistrict 1	7.7%	Auto	12.4%	1.30	19	15	9	7	0	0	2	1	0	0
		Transit	63.0%		98		44		0		10		0	
		Walk	21.4%		33		15		0		3		0	
		Other	3.1%		5		2		0		0		0	
		TOTAL	*100.0%*		*155*	*15*	*70*	*7*	*0*	*0*	*15*	*1*	*0*	*0*
Superdistrict 2	9.9%	Auto	21.8%	1.26	43	34	19	15	0	0	4	3	0	0
		Transit	64.6%		128		57		0		13		0	
		Walk	10.6%		21		9		0		2		0	
		Other	3.1%		6		3		0		1		0	
		TOTAL	*100.0%*		*198*	*34*	*89*	*15*	*0*	*0*	*20*	*3*	*0*	*0*
Superdistrict 3	22.3%	Auto	20.0%	1.25	89	71	40	32	0	0	9	7	0	0
		Transit	50.2%		224		101		0		22		0	
		Walk	23.1%		103		46		0		10		0	
		Other	6.7%		30		13		0		3		0	
		TOTAL	*100.0%*		*446*	*71*	*201*	*32*	*0*	*0*	*45*	*7*	*0*	*0*
Superdistrict 4	7.4%	Auto	31.0%	1.48	46	31	21	14	0	0	5	3	0	0
		Transit	64.0%		94		42		0		9		0	
		Walk	0.0%		0		0		0		0		0	
		Other	5.0%		7		3		0		1		0	
		TOTAL	*100.0%*		*147*	*31*	*66*	*14*	*0*	*0*	*15*	*3*	*0*	*0*
East Bay	27.7%	Auto	20.1%	1.61	111	69	50	31	0	0	11	7	0	0
		Transit	78.0%		432		195		0		43		0	
		Walk	0.0%		0		0		0		0		0	
		Other	2.0%		11		5		0		1		0	
		TOTAL	*100.0%*		*554*	*69*	*249*	*31*	*0*	*0*	*55*	*7*	*0*	*0*
North Bay	3.5%	Auto	44.4%	1.44	31	22	14	10	0	0	3	2	0	0
		Transit	51.1%		36		16		0		4		0	
		Walk	0.0%		0		0		0		0		0	
		Other	4.4%		3		1		0		0		0	
		TOTAL	*100.0%*		*70*	*22*	*32*	*10*	*0*	*0*	*7*	*2*	*0*	*0*
South Bay	19.0%	Auto	50.0%	1.13	190	168	85	75	0	0	19	17	0	0
		Transit	49.2%		186		84		0		19		0	
		Walk	0.0%		0		0		0		0		0	
		Other	0.8%		3		1		0		0		0	
		TOTAL	*100.0%*		*379*	*168*	*171*	*75*	*0*	*0*	*38*	*17*	*0*	*0*
Out of Region	2.5%	Auto	21.9%	1.56	11	7	5	3	0	0	1	1	0	0
		Transit	71.9%		36		16		0		4		0	
		Walk	0.0%		0		0		0		0		0	
		Other	6.3%		3		1		0		0		0	
		TOTAL	*100.0%*		*50*	*7*	*23*	*3*	*0*	*0*	*5*	*1*	*0*	*0*
TOTAL	**100.0%**	Auto	27.0%	1.30	540	417	243	188	0	0	54	42	0	0
		Transit	61.7%		1,234		555		0		123		0	
		Walk	7.9%		157		71		0		16		0	
		Other	3.4%		68		31		0		7		0	
		TOTAL	*100.0%*		*2,000*	*417*	*900*	*188*	*0*	*0*	*200*	*42*	*0*	*0*

[a] No linked-trip factor assumed for arena
[b] Calculated by the model by dividing the total number of person-trips by the expected event attendance.
[c] Calculated by the model assuming project demand up to 7 PM; Madison Square Garden (2003) value is 14%, Arco Arena value is 23%, GSW value is 16%
[d] Calculated by the model; Atlantic Yards Arena Transportation Planning (2006) value is 19%, Madison Square Garden (2003) value is 27%, Arco Arena value is 28%, GSW value is 30%
[e] Calculated by the model; Atlantic Yards Arena Transportation Planning (2006) value is 22%, GSW value is 35%
[f] Calculated by the model.
[g] Two daily person trips made by each employee.
[h] Assumes 90 percent of event employees arrive to work between 4 and 6 PM, and 80 percent depart after 11 PM.
[i] SF Guidelines, Appendix E - Table E-5 Work Trips to SD3 (All)

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION

LAND USE: ARENA - BASKETBALL GAME (NON-WORK TRIPS)

Proposed Size:	18,064 attendees plus 1,000 employees	
DAILY:		
Linked Trip Factor [a]:	0%	
Overall Person-trip Generation Rate [b]:	2.11	trips per attendee
Total Person-trips (w/out linked trip factor):	38,128	person-trips
Percent of Non-Work Trips [f]:	94.8%	
Non-Work Person-trip Generation Rate [g]:	2.00	trips per attendee
Non-Work Trips (w/ linked trip factor):	36,128	person-trips

PEAK HOUR PERIOD:	Weekday Peak Hour of 4-6 PM Period	Weekday Peak Hour of 6-8 PM Period	Weekday Peak Hour of 9-11 PM Period	Saturday Peak Hour of 7-9 PM Period
Overall peak hour trips as a % of daily trips:	4.7% [c]	30.8% [c]	33.7% [e]	30.8% [d]
Overall peak hour person-trip rate (trips/attendee):	0.10	0.65	0.71	0.65
Total peak hour person-trips (w/ linked trip factor):	1,803	11,742	12,845	11,742
% Non-Work trips arrive/depart during peak hour:	2.5% [h]	32.5% [h]	35.0% [h]	32.5% [h]
Peak hour Non-Work Trips (w/ linked trip factor):	903	11,742	12,645	11,742

Origins Distribution Weekday In [i]	Origins Distribution All Other [i]	Mode	Weekday Percent [j]	Saturday Percent [j]	Average Vehicle Occupancy [k]	WEEKDAY All Day Person Trips	WEEKDAY All Day Vehicle-Trips	WEEKDAY 4-7 PM Peak Hour Person Trips	WEEKDAY 4-7 PM Peak Hour Vehicle-Trips	WEEKDAY 6-8 PM Peak Hour Person Trips	WEEKDAY 6-8 PM Peak Hour Vehicle-Trips	WEEKDAY 9-11 PM Peak Hour Person Trips	WEEKDAY 9-11 PM Peak Hour Vehicle-Trips	SATURDAY All Day Person Trips	SATURDAY All Day Vehicle-Trips	SATURDAY 7-9 PM Peak Hour Person Trips	SATURDAY 7-9 PM Peak Hour Vehicle-Trips
Superdistrict 1		Auto	27.3%	33.1%	2.7	1,277	473	36	13	474	175	383	142	1,328	492	432	160
14.8%	11.1%	Transit	46.9%	52.1%		2,189		62		812		657		2,089		679	
		Taxi	6.5%	2.5%	2.7	304	113	9	3	113	42	91	34	99	37	32	12
		Bike	3.9%	3.3%		182		5		68		55		134		43	
		Walk	15.4%	8.9%		718		21		267		216		358		116	
		Coach	0.0%	0.0%	35.0	0	0	0	0	0	0	0	0	0	0	0	0
		Other	0.0%	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*	*100.0%*		*4,670*	*586*	*133*	*17*	*1,733*	*217*	*1,403*	*176*	*4,007*	*528*	*1,302*	*172*
Superdistrict 2		Auto	44.6%	53.2%	2.7	646	239	18	7	240	89	194	72	661	245	215	80
4.6%	3.4%	Transit	29.4%	32.2%		425		12		158		128		400		130	
		Taxi	6.0%	2.2%	2.7	87	32	2	1	32	12	26	10	28	10	9	3
		Bike	3.6%	3.0%		52		1		19		16		38		12	
		Walk	16.4%	9.4%		238		7		88		72		117		38	
		Coach	0.0%	0.0%	35.0	0	0	0	0	0	0	0	0	0	0	0	0
		Other	0.0%	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*	*100.0%*		*1,449*	*271*	*41*	*8*	*538*	*101*	*435*	*82*	*1,243*	*255*	*404*	*83*
Superdistrict 3		Auto	48.4%	59.1%	2.7	848	314	24	9	315	116	255	94	888	329	288	107
5.5%	4.2%	Transit	20.3%	22.7%		355		10		132		107		341		111	
		Taxi	3.0%	1.1%	2.7	53	19	2	1	20	7	16	6	17	6	6	2
		Bike	1.8%	1.6%		32		1		12		9		23		8	
		Walk	26.5%	15.5%		463		13		172		139		232		76	
		Coach	0.0%	0.0%	35.0	0	0	0	0	0	0	0	0	0	0	0	0
		Other	0.0%	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*	*100.0%*		*1,750*	*333*	*50*	*10*	*649*	*124*	*525*	*100*	*1,501*	*335*	*488*	*109*
Superdistrict 4		Auto	67.4%	73.4%	2.7	939	348	27	10	349	129	282	104	878	325	285	106
4.4%	3.3%	Transit	20.5%	20.5%		286		8		106		86		245		80	
		Taxi	6.0%	2.0%	2.7	83	31	2	1	31	11	25	9	24	9	8	3
		Bike	3.6%	2.7%		50		1		18		15		33		11	
		Walk	2.6%	1.3%		36		1		13		11		16		5	
		Coach	0.0%	0.0%	35.0	0	0	0	0	0	0	0	0	0	0	0	0
		Other	0.0%	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*	*100.0%*		*1,394*	*379*	*40*	*11*	*517*	*141*	*419*	*114*	*1,196*	*334*	*389*	*109*
East Bay		Auto	52.0%	55.2%	2.7	6,021	2,230	146	54	1,900	704	2,169	803	6,586	2,439	2,141	793
31.1%	33.0%	Transit	43.3%	42.3%		5,018		122		1,583		1,808		5,039		1,638	
		Taxi	2.5%	0.8%	2.7	287	106	7	3	90	34	103	38	98	36	32	12
		Bike	2.2%	1.7%		257		6		81		93		199		65	
		Walk	0.0%	0.0%		0		0		0		0		0		0	
		Coach	0.0%	0.0%	35.0	0	0	0	0	0	0	0	0	0	0	0	0
		Other	0.0%	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*	*100.0%*		*11,584*	*2,336*	*281*	*57*	*3,655*	*737*	*4,173*	*842*	*11,922*	*2,476*	*3,875*	*805*
North Bay		Auto	72.5%	74.1%	2.7	2,872	1,064	58	22	760	282	1,191	441	3,482	1,290	1,132	419
8.9%	13.0%	Transit	27.5%	25.9%		1,091		22		289		453		1,215		395	
		Taxi	0.0%	0.0%	2.7	0	0	0	0	0	0	0	0	0	0	0	0
		Bike	0.0%	0.0%		0		0		0		0		0		0	
		Walk	0.0%	0.0%		0		0		0		0		0		0	
		Coach	0.0%	0.0%	35.0	0	0	0	0	0	0	0	0	0	0	0	0
		Other	0.0%	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*	*100.0%*		*3,963*	*1,064*	*81*	*22*	*1,049*	*282*	*1,644*	*441*	*4,697*	*1,290*	*1,526*	*419*
South Bay		Auto	69.3%	72.7%	2.7	6,846	2,536	167	62	2,171	804	2,455	909	7,350	2,722	2,389	885
26.7%	28.0%	Transit	26.3%	25.3%		2,593		63		822		930		2,555		830	
		Taxi	2.9%	0.9%	2.7	283	105	7	3	90	33	102	38	95	35	31	11
		Bike	1.5%	1.1%		152		4		48		55		116		38	
		Walk	0.0%	0.0%		0		0		0		0		0		0	
		Coach	0.0%	0.0%	35.0	0	0	0	0	0	0	0	0	0	0	0	0
		Other	0.0%	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*	*100.0%*		*9,874*	*2,640*	*241*	*64*	*3,131*	*837*	*3,541*	*947*	*10,116*	*2,757*	*3,288*	*896*
Out of region		Auto	28.4%	34.9%	2.7	410	152	10	4	133	49	143	53	504	187	164	61
4.0%	4.0%	Transit	46.6%	52.6%		674		17		219		236		761		247	
		Taxi	0.0%	0.0%	2.7	0	0	0	0	0	0	0	0	0	0	0	0
		Bike	0.0%	0.0%		0		0		0		0		0		0	
		Walk	0.0%	0.0%		0		0		0		0		0		0	
		Coach	12.5%	5.0%	35.0	181	5	5	0	59	2	63	2	72	2	23	1
		Other	12.5%	7.5%		181		5		59		63		108		35	
		TOTAL	*100.0%*	*100.0%*		*1,445*	*157*	*36*	*4*	*470*	*51*	*506*	*55*	*1,445*	*189*	*470*	*61*
TOTAL		Auto	55.0%	60.0%	2.7	19,858	7,355	488	181	6,340	2,348	7,072	2,619	21,677	8,028	7,045	2,609
100.0%	**100.0%**	Transit	35.0%	35.0%		12,631		317		4,121		4,404		12,645		4,110	
		Taxi	3.0%	1.0%	2.7	1,097	406	29	11	376	139	363	134	361	134	117	43
		Bike	2.0%	1.5%		725		19		247		242		542		176	
		Walk	4.0%	2.0%		1,455		42		540		437		723		235	
		Coach	0.5%	0.2%	35.0	181	5	5	0	59	2	63	2	72	2	23	1
		Other	0.5%	0.3%		181		5		59		63		108		35	
		TOTAL	*100.0%*	*100.0%*		*36,128*	*7,766*	*903*	*191*	*11,742*	*2,489*	*12,645*	*2,756*	*36,128*	*8,164*	*11,742*	*2,653*

[a] No linked-trip factor assumed for arena
[b] Calculated by the model by dividing the total number of person-trips by the expected event attendance
[c] Calculated by the model assuming project demand up to 7 PM; Madison Square Garden (2003) value is 14%, Arco Arena value is 23%, GSW value is 16%
[d] Calculated by the model; Atlantic Yards Arena Transportation Planning (2006) value is 19%, Madison Square Garden (2003) value is 27%, Arco Arena value is 28%, GSW value is 30%
[e] Calculated by the model; Atlantic Yards Arena Transportation Planning (2006) value is 22%, GSW value is 35%
[f] Calculated by the model
[g] Two daily person trips made by each attendee
[h] Based on Atlantic Yards (2006) and GSW survey data (2013)
[i] Based on GS Warriors estimate for 2017-18 season; includes adjustments for live/work locations for weekday inbound trips based on GSW surveys (2013)
[j] Based on SF Giants 2012 survey data for weekdays and weekends, combined with visitor trips to SD1 (All Other) from the SF Guideline
[k] Based on SF Giants 2007 survey data for evening games; assumes taxis would have the same average occupancy as private vehicles

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION
LAND USE: ARENA - CONVENTION EVENT (WORK TRIPS)

Proposed Size:	9,000 attendees	plus 675 employees		Weekday Peak Hour of 4-6 PM Period
DAILY:			**PEAK HOUR PERIOD:**	
Linked Trip Factor [a]:	0%		Overall peak hour trips as a % of daily trips:	10.9% [c]
Overall Person-trip Generation Rate [b]:	3.19	trips/attendee	Overall peak hour person-trip rate (trips/attendee):	0.35
Total Person-trips (w/out linked trip factor):	28,688	person-trips	Total peak hour person-trips (w/ linked trip factor):	3,113
Percent of Work Trips [c]:	5.9%		% Work trips arrive/depart during peak hour:	8.5% [e]
Work Person-trip Generation Rate [d]:	2.50	trips/employee	Peak hour Work Trips (w/ linked trip factor):	143
Work Trips (w/ linked trip factor):	1,688	person-trips		

Origins	Distribution [g]	Mode	Percent [g]	Avg. Vehicle Occupancy [f]	WEEKDAY All Day Person Trips	WEEKDAY All Day Vehicle-Trips	WEEKDAY 4-6 PM Peak Hour Person Trips	WEEKDAY 4-6 PM Peak Hour Vehicle-Trips
Superdistrict 1	7.7%	Auto	12.4%	1.30	16	13	1	1
		Transit	63.0%		82		7	
		Walk	21.4%		28		2	
		Other	3.1%		4		0	
		TOTAL	*100.0%*		*131*	*13*	*11*	*1*
Superdistrict 2	9.9%	Auto	21.8%	1.26	36	29	3	2
		Transit	64.6%		108		9	
		Walk	10.6%		18		2	
		Other	3.1%		5		0	
		TOTAL	*100.0%*		*167*	*29*	*14*	*2*
Superdistrict 3	22.3%	Auto	20.0%	1.25	75	60	6	5
		Transit	50.2%		189		16	
		Walk	23.1%		87		7	
		Other	6.7%		25		2	
		TOTAL	*100.0%*		*376*	*60*	*32*	*5*
Superdistrict 4	7.4%	Auto	31.0%	1.48	39	26	3	2
		Transit	64.0%		80		7	
		Walk	0.0%		0		0	
		Other	5.0%		6		1	
		TOTAL	*100.0%*		*124*	*26*	*11*	*2*
East Bay	27.7%	Auto	20.1%	1.61	94	58	8	5
		Transit	78.0%		365		31	
		Walk	0.0%		0		0	
		Other	2.0%		9		1	
		TOTAL	*100.0%*		*468*	*58*	*40*	*5*
North Bay	3.5%	Auto	44.4%	1.44	26	18	2	2
		Transit	51.1%		30		3	
		Walk	0.0%		0		0	
		Other	4.4%		3		0	
		TOTAL	*100.0%*		*59*	*18*	*5*	*2*
South Bay	19.0%	Auto	50.0%	1.13	160	142	14	12
		Transit	49.2%		157		13	
		Walk	0.0%		0		0	
		Other	0.8%		3		0	
		TOTAL	*100.0%*		*320*	*142*	*27*	*12*
Out of Region	2.5%	Auto	21.9%	1.56	9	6	1	1
		Transit	71.9%		30		3	
		Walk	0.0%		0		0	
		Other	6.3%		3		0	
		TOTAL	*100.0%*		*42*	*6*	*4*	*1*
TOTAL	**100.0%**	Auto	27.0%	1.30	456	352	39	30
		Transit	61.7%		1,041		89	
		Walk	7.9%		133		11	
		Other	3.4%		58		5	
		TOTAL	*100.0%*		*1,688*	*352*	*143*	*30*

[a] No linked-trip factor assumed for arena
[b] Calculated by the model by dividing the total number of person-trips by the expected event attendance.
[c] Calculated by the model
[d] Assumes that 25% of the employees will make four trips to/from the project site (e.g., for lunch, errands, etc.).
[e] SF Guidelines, Appendix C - Table C-1 (General Office)
[f] SF Guidelines, Appendix E - Table E-5 Work Trips to SD3 (All)

PROJECT TRIP GENERATION
LAND USE: ARENA - CONVENTION EVENT (NON-WORK TRIPS)

Proposed Size:	9,000 attendees	plus 675 employees		Weekday Peak Hour of 4-6 PM Period
DAILY:			**PEAK HOUR PERIOD:**	
Linked Trip Factor [a]:	0%		Overall peak hour trips as a % of daily trips:	10.9% [c]
Overall Person-trip Generation Rate [b]:	3.19	trips/attendee	Overall peak hour person-trip rate (trips/attendee):	0.35
Total Person-trips (w/out linked trip factor):	28,688	person-trips	Total peak hour person-trips (w/ linked trip factor):	3,113
Percent of Non-Work Trips [c]:	94.1%		% Non-Work trips arrive/depart during peak hour:	11% [e]
Non-Work Person-trip Generation Rate [d]:	3.00	trips/attendee	Peak hour Non-Work Trips (w/ linked trip factor):	2,970
Non-Work Trips (w/ linked trip factor):	27,000	person-trips		

Origins	Distribution [f]	Mode	Percent [f]	Avg. Vehicle Occupancy [g]	WEEKDAY All Day Person Trips	WEEKDAY All Day Vehicle-Trips	WEEKDAY 4-6 PM Peak Hour Person Trips	WEEKDAY 4-6 PM Peak Hour Vehicle-Trips
Superdistrict 1	55.0%	Auto	4.3%	2.03	640	315	70	35
		Transit	23.8%		3,536		389	
		Taxi/Shuttle	71.9%	25.00	10,674	427	1,174	47
		Walk	0.0%		0		0	
		Other	0.0%		0		0	
		TOTAL	*100.0%*		*14,850*	*742*	*1,634*	*82*
Superdistrict 2	5.0%	Auto	7.7%	1.97	104	53	11	6
		Transit	7.2%		97		11	
		Taxi/Shuttle	85.1%	25.00	1,149	46	126	5
		Walk	0.0%		0		0	
		Other	0.0%		0		0	
		TOTAL	*100.0%*		*1,350*	*99*	*149*	*11*
Superdistrict 3	5.0%	Auto	4.3%	2.43	58	24	6	3
		Transit	7.9%		107		12	
		Taxi/Shuttle	47.8%	25.00	646	26	71	3
		Walk	40.0%		539		59	
		Other	0.0%		0		0	
		TOTAL	*100.0%*		*1,350*	*50*	*149*	*5*
Superdistrict 4	5.0%	Auto	10.5%	2.51	142	57	16	6
		Transit	13.8%		186		20	
		Taxi/Shuttle	75.7%	25.00	1,022	41	112	4
		Walk	0.0%		0		0	
		Other	0.0%		0		0	
		TOTAL	*100.0%*		*1,350*	*97*	*149*	*11*
East Bay	7.5%	Auto	38.3%	2.59	777	300	85	33
		Transit	61.7%		1,248		137	
		Taxi/Shuttle	0.0%	25.00	0	0	0	0
		Walk	0.0%		0		0	
		Other	0.0%		0		0	
		TOTAL	*100.0%*		*2,025*	*300*	*223*	*33*
North Bay	2.5%	Auto	100.0%	2.11	675	320	74	35
		Transit	0.0%		0		0	
		Taxi/Shuttle	0.0%	25.00	0	0	0	0
		Walk	0.0%		0		0	
		Other	0.0%		0		0	
		TOTAL	*100.0%*		*675*	*320*	*74*	*35*
South Bay	10.0%	Auto	87.6%	2.28	2,365	1,037	260	114
		Transit	12.4%		335		37	
		Taxi/Shuttle	0.0%	25.00	0	0	0	0
		Walk	0.0%		0		0	
		Other	0.0%		0		0	
		TOTAL	*100.0%*		*2,700*	*1,037*	*297*	*114*
Out of Region	10.0%	Auto	23.9%	1.68	646	384	71	42
		Transit	26.0%		701		77	
		Taxi/Shuttle	0.0%	25.00	0	0	0	0
		Walk	0.0%		0		0	
		Other	50.1%		1,353		149	
		TOTAL	*100.0%*		*2,700*	*384*	*297*	*42*
TOTAL	**100.0%**	Auto	20.0%	2.17	5,406	2,490	595	274
		Transit	23.0%		6,210		683	
		Taxi/Shuttle	50.0%	25.00	13,491	540	1,484	59
		Walk	2.0%		539		59	
		Other	5.0%		1,353		149	
		TOTAL	*100.0%*		*27,000*	*3,030*	*2,970*	*333*

[a] No linked-trip factor assumed for arena
[b] Calculated by the model by dividing the total number of person-trips by the expected event attendance
[c] Calculated by the model
[d] Assumes that half of the convention attendees will leave the project site for lunch, shopping, other meetings, etc
[e] Based on Moscone Center survey data
[f] Based on Moscone Center data, adjusted for SD3; all walk trips excepts those from SD3 proportionally added to auto and transi
[g] SF Guidelines, Appendix E - Table E-15 Visitor Trips to SD3 (All Other) for auto trips; shuttle buses/taxis assumed to carry 25 people per vehicle on average

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION
LAND USE: OFFICE (WORK TRIPS)
Proposed Size: 605,000 gsf

DAILY:		
Linked Trip Factor [a]:	0%	
Weekday person-trip Generation Rate [b]:	18.1	trips/1000 gsf
Total Weekday Person-trips (w/out linked trip factor):		10,951
Weekday Work Trips (w/ linked trip factor) [g]:	36%	3,942
Saturday person-trip Generation Rate [c]:	4.0	trips/1000 gsf
Total Saturday Person-trips (w/out linked trip factor):		2,442
Saturday Work Trips (w/ linked trip factor) [h]:	100%	2,442

PEAK HOUR PERIOD:		Weekday Peak Hour of 4-6 PM Period	Weekday Peak Hour of 6-8 PM Period	Weekday Peak Hour of 9-11 PM Period	Saturday Peak Hour of 0 7-9 PM Period
Linked Trip Factor before 6 PM [a]:	0%				
Linked Trip Factor after 6 PM [a]:	0%				
Peak hour trips as a % of daily trips:		8.5% [b]	1.7% [d]	0.4% [d]	1.1% [e]
Total peak hour person-trip rate (trips/1,000 gsf):		1.5	0.3	0.1	0.0
Total peak hour person-trips (w/ linked trip factor):		931	186	47	27
Percent of Work Trips during peak hour:		83% [g]	100% [f]	100% [f]	100% [f]
Peak hour Work Trips (w/ linked trip factor):		773	186	47	27

					WEEKDAY								SATURDAY			
				Average	All Day		4-6 PM Peak Hour		6-8 PM Peak Hour		9-11 PM Peak Hour		All Day		7-9 PM Peak Hour	
Origins	Distribution [j]	Mode	Percent [j]	Vehicle Occup. [i]	Person Trips	Vehicle-Trips	Person Trips	Vehicle-Trips	Person Trips	Vehicle-Trips	Person Trips	Vehicle-Trips	Person Trips	Vehicle-Trips	Person Trips	Vehicle-Trips
Superdistrict 1	7.7%	Auto	12.4%	1.30	38	29	7	6	2	1	0	0	24	18	0	0
		Transit	63.0%		192		38		9		2		119		1	
		Walk	21.4%		65		13		3		1		41		0	
		Other	3.1%		9		2		0		0		6		0	
		TOTAL	*100.0%*		*305*	*29*	*60*	*6*	*14*	*1*	*4*	*0*	*189*	*18*	*2*	*0*
Superdistrict 2	9.9%	Auto	21.8%	1.26	85	67	17	13	4	3	1	1	53	42	1	0
		Transit	64.6%		252		49		12		3		156		2	
		Walk	10.6%		41		8		2		0		26		0	
		Other	3.1%		12		2		1		0		7		0	
		TOTAL	*100.0%*		*390*	*67*	*76*	*13*	*18*	*3*	*5*	*1*	*242*	*42*	*3*	*0*
Superdistrict 3	22.3%	Auto	20.0%	1.25	176	141	34	28	8	7	2	2	109	87	1	1
		Transit	50.2%		441		86		21		5		273		3	
		Walk	23.1%		203		40		10		2		126		1	
		Other	6.7%		59		11		3		1		36		0	
		TOTAL	*100.0%*		*879*	*141*	*172*	*28*	*42*	*7*	*10*	*2*	*545*	*87*	*6*	*1*
Superdistrict 4	7.4%	Auto	31.0%	1.48	90	61	18	12	4	3	1	1	56	38	1	0
		Transit	64.0%		186		36		9		2		115		1	
		Walk	0.0%		0		0		0		0		0		0	
		Other	5.0%		14		3		1		0		9		0	
		TOTAL	*100.0%*		*291*	*61*	*57*	*12*	*14*	*3*	*3*	*1*	*180*	*38*	*2*	*0*
East Bay	27.7%	Auto	20.1%	1.61	219	136	43	27	10	6	3	2	136	84	1	1
		Transit	78.0%		852		167		40		10		528		6	
		Walk	0.0%		0		0		0		0		0		0	
		Other	2.0%		22		4		1		0		13		0	
		TOTAL	*100.0%*		*1,093*	*136*	*214*	*27*	*52*	*6*	*13*	*2*	*677*	*84*	*7*	*1*
North Bay	3.5%	Auto	44.4%	1.44	62	43	12	8	3	2	1	1	38	27	0	0
		Transit	51.1%		71		14		3		1		44		0	
		Walk	0.0%		0		0		0		0		0		0	
		Other	4.4%		6		1		0		0		4		0	
		TOTAL	*100.0%*		*139*	*43*	*27*	*8*	*7*	*2*	*2*	*1*	*86*	*27*	*1*	*0*
South Bay	19.0%	Auto	50.0%	1.13	374	331	73	65	18	16	4	4	231	205	3	2
		Transit	49.2%		367		72		17		4		228		3	
		Walk	0.0%		0		0		0		0		0		0	
		Other	0.8%		6		1		0		0		4		0	
		TOTAL	*100.0%*		*747*	*331*	*146*	*65*	*35*	*16*	*9*	*4*	*463*	*205*	*5*	*2*
Out of Region	2.5%	Auto	21.9%	1.56	22	14	4	3	1	1	0	0	13	9	0	0
		Transit	71.9%		71		14		3		1		44		0	
		Walk	0.0%		0		0		0		0		0		0	
		Other	6.3%		6		1		0		0		4		0	
		TOTAL	*100.0%*		*99*	*14*	*19*	*3*	*5*	*1*	*1*	*0*	*61*	*9*	*1*	*0*
TOTAL	**100.0%**	Auto	27.0%	1.30	1,065	822	209	161	50	39	13	10	660	509	7	6
		Transit	61.7%		2,433		477		115		29		1,507		17	
		Walk	7.9%		310		61		15		4		192		2	
		Other	3.4%		134		26		6		2		83		1	
		TOTAL	*100.0%*		*3,942*	*822*	*773*	*161*	*186*	*39*	*47*	*10*	*2,442*	*509*	*27*	*6*

[a] No linked-trip factor assumed for work trips
[b] SF Guidelines, Appendix C - Table C-1 (General Office Rate)
[c] The Saturday daily and p.m. peak hour trip generation rates are based on the weekday to Saturday ratio for General Office Building [LU 710] from ITE Trip Generation, 9th Edition (2012)
[d] The weekday late p.m. percentage is based on Pushkarev and Zupan, Urban Space for Pedestrians (1978)
[e] The weekday late p.m. percentage is based on a combination of the weekday p.m. peak hour-to-late p.m. and weekday-to-Saturday ratios
[f] All weekday and Saturday late p.m. peak hour trips are assumed to be for work purposes
[g] SF Guidelines, Appendix C - Table C-2 (General Office)
[h] All Saturday daily and p.m. peak hour trips are assumed to be for work purposes
[i] SF Guidelines, Appendix E - Table E-5 Work Trips to SD3 (All)

PROJECT TRIP GENERATION
LAND USE: OFFICE (NON-WORK TRIPS)
Proposed Size: 605,000 gsf

DAILY:		
Linked Trip Factor [a]:	0%	
Weekday person-trip Generation Rate [b]:	18.1	trips/1000 gsf
Total Weekday Person-trips (w/out linked trip factor):		10,951
Wday Non-Work Trips (w/ linked trip factor) [g]:	64%	7,008
Saturday person-trip Generation Rate [c]:	4.0	trips/1000 gsf
Total Saturday Person-trips (w/out linked trip factor):		2,442
Sat. Non-Work Trips (w/ linked trip factor) [h]:	0%	0

PEAK HOUR PERIOD:		Weekday Peak Hour of 4-6 PM Period	Weekday Peak Hour of 6-8 PM Period	Weekday Peak Hour of 9-11 PM Period	Saturday Peak Hour of 0 7-9 PM Period
Linked Trip Factor before 6 PM [a]:	0%				
Linked Trip Factor after 6 PM [a]:	0%				
Peak hour trips as a % of daily trips:		8.5% [b]	1.7% [d]	0.4% [d]	1.1% [e]
Total peak hour person-trip rate (trips/1,000 gsf):		1.5	0.3	0.1	0.0
Total peak hour person-trips (w/ linked trip factor):		931	186	47	27
Percent of Non-Work Trips during peak hour:		17% [g]	0% [f]	0% [f]	0% [h]
Peak hour Non-Work Trips (w/ linked trip factor):		158	0	0	0

					WEEKDAY								SATURDAY			
				Average	All Day		4-6 PM Peak Hour		6-8 PM Peak Hour		9-11 PM Peak Hour		All Day		7-9 PM Peak Hour	
Origins	Distribution [i]	Mode	Percent [i]	Vehicle Occup. [i]	Person Trips	Vehicle-Trips	Person Trips	Vehicle-Trips	Person Trips	Vehicle-Trips	Person Trips	Vehicle-Trips	Person Trips	Vehicle-Trips	Person Trips	Vehicle-Trips
Superdistrict 1	13.0%	Auto	36.0%	2.03	328	162	7	4	0	0	0	0	0	0	0	0
		Transit	19.2%		175		4		0		0		0		0	
		Walk	33.3%		303		7		0		0		0		0	
		Other	11.5%		105		2		0		0		0		0	
		TOTAL	*100.0%*		*911*	*162*	*21*	*4*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Superdistrict 2	14.0%	Auto	68.6%	1.97	673	342	15	8	0	0	0	0	0	0	0	0
		Transit	14.5%		142		3		0		0		0		0	
		Walk	2.4%		24		1		0		0		0		0	
		Other	14.5%		142		3		0		0		0		0	
		TOTAL	*100.0%*		*981*	*342*	*22*	*8*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Superdistrict 3	44.0%	Auto	43.7%	2.43	1,348	555	30	13	0	0	0	0	0	0	0	0
		Transit	21.5%		663		15		0		0		0		0	
		Walk	25.4%		783		18		0		0		0		0	
		Other	9.4%		290		7		0		0		0		0	
		TOTAL	*100.0%*		*3,084*	*555*	*70*	*13*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Superdistrict 4	7.0%	Auto	67.4%	2.51	331	132	7	3	0	0	0	0	0	0	0	0
		Transit	16.3%		80		2		0		0		0		0	
		Walk	7.0%		34		1		0		0		0		0	
		Other	9.3%		46		1		0		0		0		0	
		TOTAL	*100.0%*		*491*	*132*	*11*	*3*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
East Bay	9.0%	Auto	68.4%	2.59	431	167	10	4	0	0	0	0	0	0	0	0
		Transit	29.8%		188		4		0		0		0		0	
		Walk	1.8%		11		0		0		0		0		0	
		Other	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*		*631*	*167*	*14*	*4*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
North Bay	1.0%	Auto	100.0%	7.00	70	10	2	0	0	0	0	0	0	0	0	0
		Transit	0.0%		0		0		0		0		0		0	
		Walk	0.0%		0		0		0		0		0		0	
		Other	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*		*70*	*10*	*2*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
South Bay	9.0%	Auto	94.6%	2.28	597	262	13	6	0	0	0	0	0	0	0	0
		Transit	3.6%		23		1		0		0		0		0	
		Walk	1.8%		11		0		0		0		0		0	
		Other	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*		*631*	*262*	*14*	*6*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Out of Region	3.0%	Auto	73.6%	1.68	155	92	3	2	0	0	0	0	0	0	0	0
		Transit	21.1%		44		1		0		0		0		0	
		Walk	0.0%		0		0		0		0		0		0	
		Other	5.3%		11		0		0		0		0		0	
		TOTAL	*100.0%*		*210*	*92*	*5*	*2*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
TOTAL	**100.0%**	Auto	56.1%	2.29	3,932	1,720	89	39	0	0	0	0	0	0	0	0
		Transit	18.8%		1,315		30		0		0		0		0	
		Walk	16.7%		1,167		26		0		0		0		0	
		Other	8.5%		594		13		0		0		0		0	
		TOTAL	*100.0%*		*7,008*	*1,720*	*158*	*39*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*

[a] No linked-trip factor assumed for non-work trips
[b] SF Guidelines, Appendix C - Table C-1 (General Office Rate)
[c] The Saturday daily and p.m. peak hour trip generation rates are based on the weekday to Saturday ratio for General Office Building [LU 710] from ITE Trip Generation, 9th Edition (2012)
[d] The weekday late p.m. percentage is based on Pushkarev and Zupan, Urban Space for Pedestrians (1978)
[e] The weekday late p.m. percentage is based on a combination of the weekday p.m. peak hour-to-late p.m. and weekday-to-Saturday ratios
[f] All weekday and Saturday late p.m. peak hour trips are assumed to be for work purposes
[g] SF Guidelines, Appendix C - Table C-2 (General Office)
[h] All Saturday daily and p.m. peak hour trips are assumed to be for work purposes
[i] SF Guidelines, Appendix E - Table E-15 Visitor Trips to SD3 (All Other)

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION
LAND USE: RETAIL (WORK TRIPS)
Proposed Size: 62,500 gsf

DAILY:		
Linked Trip Factor [a]:	0%	
Weekday person-trip Generation Rate [b]:	150.0	trips/1000 gsf
Total Weekday Person-trips (w/out linked trip factor):		9,375
Weekday Work Trips (w/ linked trip factor) [g]:	4%	375
Saturday person-trip Generation Rate [c]:	175.5	trips/1000 gsf
Total Saturday Person-trips (w/out linked trip factor):		10,971
Saturday Work Trips (w/ linked trip factor) [h]:	4%	439

PEAK HOUR PERIOD:		Weekday Peak Hour of 4-6 PM Period	Weekday Peak Hour of 6-8 PM Period	Weekday Peak Hour of 9-11 PM Period	Saturday Peak Hour of 7-9 PM Period
Linked Trip Factor before 6 PM [a]:	0%				
Linked Trip Factor after 6 PM [a]:	0%				
Peak hour trips as a % of daily trips:		9.0% [b]	6.8% [d]	3.2% [d]	4.0% [e]
Total peak hour person-trip rate (trips/1,000 gsf):		13.5	10.1	4.7	7.0
Total peak hour person-trips (w/ linked trip factor):		304	56	26	39
Percent of Work Trips during peak hour:		4% [g]	4% [f]	4% [f]	4% [f]
Peak hour Work Trips (w/ linked trip factor):		34	25	12	18

Origins	Distribution [j]	Mode	Percent [j]	Average Vehicle Occup. [i]	WEEKDAY All Day Person Trips	WEEKDAY All Day Vehicle-Trips	4-6 PM Peak Hour Person Trips	4-6 PM Peak Hour Vehicle-Trips	6-8 PM Peak Hour Person Trips	6-8 PM Peak Hour Vehicle-Trips	9-11 PM Peak Hour Person Trips	9-11 PM Peak Hour Vehicle-Trips	SATURDAY All Day Person Trips	SATURDAY All Day Vehicle-Trips	7-9 PM Peak Hour Person Trips	7-9 PM Peak Hour Vehicle-Trips
Superdistrict 1	7.7%	Auto	12.4%	1.30	4	3	0	0	0	0	0	0	4	3	0	0
		Transit	63.0%		18		2		1		1		21		1	
		Walk	21.4%		6		1		0		0		7		0	
		Other	3.1%		1		0		0		0		1		0	
		TOTAL	*100.0%*		*29*	*3*	*3*	*0*	*2*	*0*	*1*	*0*	*34*	*3*	*1*	*0*
Superdistrict 2	9.9%	Auto	21.8%	1.26	8	6	1	1	1	0	0	0	9	7	0	0
		Transit	64.6%		24		2		2		1		28		1	
		Walk	10.6%		4		0		0		0		5		0	
		Other	3.1%		1		0		0		0		1		0	
		TOTAL	*100.0%*		*37*	*6*	*3*	*1*	*3*	*0*	*1*	*0*	*43*	*7*	*2*	*0*
Superdistrict 3	22.3%	Auto	20.0%	1.25	17	13	2	1	1	1	1	0	20	16	1	1
		Transit	50.2%		42		4		3		1		49		2	
		Walk	23.1%		19		2		1		1		23		1	
		Other	6.7%		6		1		0		0		7		0	
		TOTAL	*100.0%*		*84*	*13*	*8*	*1*	*6*	*1*	*3*	*0*	*98*	*16*	*4*	*1*
Superdistrict 4	7.4%	Auto	31.0%	1.48	9	6	1	1	1	0	0	0	10	7	0	0
		Transit	64.0%		18		2		1		1		21		1	
		Walk	0.0%		0		0		0		0		0		0	
		Other	5.0%		1		0		0		0		2		0	
		TOTAL	*100.0%*		*28*	*6*	*2*	*1*	*2*	*0*	*1*	*0*	*32*	*7*	*1*	*0*
East Bay	27.7%	Auto	20.1%	1.61	21	13	2	1	1	1	1	0	24	15	1	1
		Transit	78.0%		81		7		5		3		95		4	
		Walk	0.0%		0		0		0		0		0		0	
		Other	2.0%		2		0		0		0		2		0	
		TOTAL	*100.0%*		*104*	*13*	*9*	*1*	*7*	*1*	*3*	*0*	*122*	*15*	*5*	*1*
North Bay	3.5%	Auto	44.4%	1.44	6	4	1	0	0	0	0	0	7	5	0	0
		Transit	51.1%		7		1		0		0		8		0	
		Walk	0.0%		0		0		0		0		0		0	
		Other	4.4%		1		0		0		0		1		0	
		TOTAL	*100.0%*		*13*	*4*	*1*	*0*	*1*	*0*	*0*	*0*	*15*	*5*	*1*	*0*
South Bay	19.0%	Auto	50.0%	1.13	36	31	3	3	2	2	1	1	42	37	2	1
		Transit	49.2%		35		3		2		1		41		2	
		Walk	0.0%		0		0		0		0		0		0	
		Other	0.8%		1		0		0		0		1		0	
		TOTAL	*100.0%*		*71*	*31*	*6*	*3*	*5*	*2*	*2*	*1*	*83*	*37*	*3*	*1*
Out of Region	2.5%	Auto	21.9%	1.56	2	1	0	0	0	0	0	0	2	2	0	0
		Transit	71.9%		7		1		0		0		8		0	
		Walk	0.0%		0		0		0		0		0		0	
		Other	6.3%		1		0		0		0		1		0	
		TOTAL	*100.0%*		*9*	*1*	*1*	*0*	*1*	*0*	*0*	*0*	*11*	*2*	*0*	*0*
TOTAL	**100.0%**	Auto	27.0%	1.30	101	78	9	7	7	5	3	2	119	91	5	4
		Transit	61.7%		231		21		16		7		271		11	
		Walk	7.9%		29		3		2		1		35		1	
		Other	3.4%		13		1		1		0		15		1	
		TOTAL	*100.0%*		*375*	*78*	*34*	*7*	*25*	*5*	*12*	*2*	*439*	*91*	*18*	*4*

[a] No linked-trip factor assumed for work trips
[b] SF Guidelines, Appendix C - Table C-1 (General Retail)
[c] The Saturday daily and p.m. peak hour trip generation rates are based on the weekday to Saturday ratio for Shopping Center [LU 820] from ITE Trip Generation, 9th Edition (2012)
[d] The weekday late p.m. percentage is based on Pushkarev and Zupan, Urban Space for Pedestrians (1978)
[e] The weekday late p.m. percentage is based on a combination of the weekday p.m. peak hour-to-late p.m. and weekday-to-Saturday ratios
[f] The weekday and Saturday late p.m. peak hour percentages of work/non-work trips are assumed to be the same as the weekday p.m. peak hour percentages shown in Table C-2 of the SF Guidelines
[g] SF Guidelines, Appendix C - Table C-2 (Retail)
[h] The Saturday daily and p.m. peak hour percentages of work/non-work trips are assumed to be the same as the weekday p.m. peak hour percentages shown in Table C-2 of the SF Guidelines
[i] SF Guidelines, Appendix E - Table E-5 Work Trips to SD3 (All)

PROJECT TRIP GENERATION
LAND USE: RETAIL (NON-WORK TRIPS WITH EVENT)
Proposed Size: 62,500 gsf

DAILY:		
Linked Trip Factor [a]:	67%	
Weekday person-trip Generation Rate [b]:	150.0	trips/1000 gsf
Total Weekday Person-trips (w/out linked trip factor):		9,375
Wday Non-Work Trips (w/ linked trip factor) [g]:	96%	3,000
Saturday person-trip Generation Rate [c]:	175.5	trips/1000 gsf
Total Saturday Person-trips (w/out linked trip factor):		10,971
Sat. Non-Work Trips (w/ linked trip factor) [h]:	96%	3,511

PEAK HOUR PERIOD:		Weekday Peak Hour of 4-6 PM Period	Weekday Peak Hour of 6-8 PM Period	Weekday Peak Hour of 9-11 PM Period	Saturday Peak Hour of 7-9 PM Period
Linked Trip Factor before 6 PM [a]:	67%				
Linked Trip Factor after 6 PM [a]:	95%				
Peak hour trips as a % of daily trips:		9.0% [b]	6.8% [d]	3.2% [d]	4.0% [e]
Total peak hour person-trip rate (trips/1,000 gsf):		13.5	10.1	4.7	7.0
Total peak hour person-trips (w/ linked trip factor):		304	56	26	39
Percent of Non-Work Trips during peak hour:		96% [g]	96% [f]	96% [f]	96% [f]
Peak hour Non-Work Trips (w/ linked trip factor):		270	30	14	21

Origins	Distribution [i]	Mode	Percent [i]	Average Vehicle Occup. [i]	WEEKDAY All Day Person Trips	WEEKDAY All Day Vehicle-Trips	4-6 PM Peak Hour Person Trips	4-6 PM Peak Hour Vehicle-Trips	6-8 PM Peak Hour Person Trips	6-8 PM Peak Hour Vehicle-Trips	9-11 PM Peak Hour Person Trips	9-11 PM Peak Hour Vehicle-Trips	SATURDAY All Day Person Trips	SATURDAY All Day Vehicle-Trips	7-9 PM Peak Hour Person Trips	7-9 PM Peak Hour Vehicle-Trips
Superdistrict 1	6.0%	Auto	45.0%	1.76	81	46	7	4	1	0	0	0	95	54	1	0
		Transit	29.0%		52		5		1		0		61		0	
		Walk	22.0%		40		4		0		0		46		0	
		Other	4.0%		7		1		0		0		8		0	
		TOTAL	*100.0%*		*180*	*46*	*16*	*4*	*2*	*0*	*1*	*0*	*211*	*54*	*1*	*0*
Superdistrict 2	9.0%	Auto	61.8%	1.52	167	110	15	10	2	1	1	1	195	128	1	1
		Transit	15.3%		41		4		0		0		48		0	
		Walk	19.8%		53		5		1		0		63		0	
		Other	3.1%		8		1		0		0		10		0	
		TOTAL	*100.0%*		*270*	*110*	*24*	*10*	*3*	*1*	*1*	*1*	*316*	*128*	*2*	*1*
Superdistrict 3	61.0%	Auto	60.4%	2.04	1,105	542	99	49	11	5	5	3	1,294	634	8	4
		Transit	9.5%		174		16		2		1		203		1	
		Walk	28.7%		525		47		5		2		615		4	
		Other	1.4%		26		2		0		0		30		0	
		TOTAL	*100.0%*		*1,830*	*542*	*165*	*49*	*19*	*5*	*9*	*3*	*2,142*	*634*	*13*	*4*
Superdistrict 4	5.0%	Auto	84.7%	1.78	127	71	11	6	1	1	1	0	149	84	1	1
		Transit	9.7%		15		1		0		0		17		0	
		Walk	2.8%		4		0		0		0		5		0	
		Other	2.8%		4		0		0		0		5		0	
		TOTAL	*100.0%*		*150*	*71*	*14*	*6*	*2*	*1*	*1*	*0*	*176*	*84*	*1*	*1*
East Bay	3.0%	Auto	75.0%	1.77	68	38	6	3	1	0	0	0	79	45	0	0
		Transit	12.5%		11		1		0		0		13		0	
		Walk	12.5%		11		1		0		0		13		0	
		Other	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*		*90*	*38*	*8*	*3*	*1*	*0*	*0*	*0*	*105*	*45*	*1*	*0*
North Bay	2.0%	Auto	87.5%	1.44	53	36	5	3	1	0	0	0	61	43	0	0
		Transit	12.5%		8		1		0		0		9		0	
		Walk	0.0%		0		0		0		0		0		0	
		Other	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*		*60*	*36*	*5*	*3*	*1*	*0*	*0*	*0*	*70*	*43*	*0*	*0*
South Bay	9.0%	Auto	86.4%	1.98	233	118	21	11	2	1	1	1	273	138	2	1
		Transit	9.1%		25		2		0		0		29		0	
		Walk	3.2%		9		1		0		0		10		0	
		Other	1.3%		4		0		0		0		4		0	
		TOTAL	*100.0%*		*270*	*118*	*24*	*11*	*3*	*1*	*1*	*1*	*316*	*138*	*2*	*1*
Out of Region	5.0%	Auto	59.2%	1.69	89	53	8	5	1	1	0	0	104	61	1	0
		Transit	16.9%		25		2		0		0		30		0	
		Walk	19.7%		30		3		0		0		35		0	
		Other	4.2%		6		1		0		0		7		0	
		TOTAL	*100.0%*		*150*	*53*	*14*	*5*	*2*	*1*	*1*	*0*	*176*	*61*	*1*	*0*
TOTAL	**100.0%**	Auto	64.1%	1.90	1,922	1,014	173	91	19	10	9	5	2,250	1,187	13	7
		Transit	11.7%		351		32		4		2		410		2	
		Walk	22.4%		672		60		7		3		786		5	
		Other	1.8%		55		5		1		0		65		0	
		TOTAL	*100.0%*		*3,000*	*1,014*	*270*	*91*	*30*	*10*	*14*	*5*	*3,511*	*1,187*	*21*	*7*

[a] Assumes that 50 to 95 percent of the retail customers are already in the Mission Bay area when there is an event.
[b] SF Guidelines, Appendix C - Table C-1 (General Retail)
[c] The Saturday daily and p.m. peak hour trip generation rates are based on the weekday to Saturday ratio for Shopping Center [LU 820] from ITE Trip Generation, 9th Edition (2012)
[d] The weekday late p.m. percentage is based on Pushkarev and Zupan, Urban Space for Pedestrians (1978)
[e] The weekday late p.m. percentage is based on a combination of the weekday p.m. peak hour-to-late p.m. and weekday-to-Saturday ratios
[f] The weekday and Saturday late p.m. peak hour percentages of work/non-work trips are assumed to be the same as the weekday p.m. peak hour percentages shown in Table C-2 of the SF Guidelines
[g] SF Guidelines, Appendix C - Table C-2 (Retail)
[h] The Saturday daily and p.m. peak hour percentages of work/non-work trips are assumed to be the same as the weekday p.m. peak hour percentages shown in Table C-2 of the SF Guidelines
[i] SF Guidelines, Appendix E - Table E-14 Visitor Trips to SD3 (Retail)

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION
LAND USE: RETAIL (NON-WORK TRIPS WITHOUT EVENT)
Proposed Size: 62,500 gsf

DAILY:		
Linked Trip Factor [a]:	33%	
Weekday person-trip Generation Rate [b]:	150.0	trips/1000 gsf
Total Weekday Person-trips (w/out linked trip factor):		9,375
Wday Non-Work Trips (w/ linked trip factor) [g]:	96%	6,030
Saturday person-trip Generation Rate [c]:	175.5	trips/1000 gsf
Total Saturday Person-trips (w/out linked trip factor):		10,971
Sat. Non-Work Trips (w/ linked trip factor) [h]:	96%	7,057

PEAK HOUR PERIOD:		Weekday Peak Hour of 4-6 PM Period	Weekday Peak Hour of 6-8 PM Period	Weekday Peak Hour of 9-11 PM Period	Saturday Peak Hour o 0 7-9 PM Period
Linked Trip Factor before 6 PM [a]:	33%				
Linked Trip Factor after 6 PM [a]:	33%				
Peak hour trips as a % of daily trips:		9.0% [b]	6.8% [d]	3.2% [d]	4.0% [e]
Total peak hour person-trip rate (trips/1,000 gsf):		13.5	10.1	4.7	7.0
Total peak hour person-trips (w/ linked trip factor):		576	432	202	300
Percent of Non-Work Trips during peak hour:		96% [g]	96% [f]	96% [f]	96% [f]
Peak hour Non-Work Trips (w/ linked trip factor):		543	407	190	282

Origins	Distribution [i]	Mode	Percent [i]	Average Vehicle Occup. [i]	WEEKDAY All Day Person Trips	WEEKDAY All Day Vehicle-Trips	4-6 PM Peak Hour Person Trips	4-6 PM Peak Hour Vehicle-Trips	6-8 PM Peak Hour Person Trips	6-8 PM Peak Hour Vehicle-Trips	9-11 PM Peak Hour Person Trips	9-11 PM Peak Hour Vehicle-Trips	SATURDAY All Day Person Trips	SATURDAY All Day Vehicle-Trips	7-9 PM Peak Hour Person Trips	7-9 PM Peak Hour Vehicle-Trips
Superdistrict 1	6.0%	Auto	45.0%	1.76	163	93	15	8	11	6	5	3	191	108	8	4
		Transit	29.0%		105		9		7		3		123		5	
		Walk	22.0%		80		7		5		3		93		4	
		Other	4.0%		14		1		1		0		17		1	
		TOTAL	*100.0%*		*362*	*93*	*33*	*8*	*24*	*6*	*11*	*3*	*423*	*108*	*17*	*4*
Superdistrict 2	9.0%	Auto	61.8%	1.52	335	221	30	20	23	15	11	7	392	258	16	10
		Transit	15.3%		83		7		6		3		97		4	
		Walk	19.8%		107		10		7		3		126		5	
		Other	3.1%		17		2		1		1		20		1	
		TOTAL	*100.0%*		*543*	*221*	*49*	*20*	*37*	*15*	*17*	*7*	*635*	*258*	*25*	*10*
Superdistrict 3	61.0%	Auto	60.4%	2.04	2,222	1,089	200	98	150	74	70	34	2,600	1,274	104	51
		Transit	9.5%		349		31		24		11		409		16	
		Walk	28.7%		1,056		95		71		33		1,235		49	
		Other	1.4%		51		5		3		2		60		2	
		TOTAL	*100.0%*		*3,678*	*1,089*	*331*	*98*	*248*	*74*	*116*	*34*	*4,305*	*1,274*	*172*	*51*
Superdistrict 4	5.0%	Auto	84.7%	1.78	255	143	23	13	17	10	8	5	299	168	12	7
		Transit	9.7%		29		3		2		1		34		1	
		Walk	2.8%		8		1		1		0		10		0	
		Other	2.8%		8		1		1		0		10		0	
		TOTAL	*100.0%*		*302*	*143*	*27*	*13*	*20*	*10*	*9*	*5*	*353*	*168*	*14*	*7*
East Bay	3.0%	Auto	75.0%	1.77	136	77	12	7	9	5	4	2	159	90	6	4
		Transit	12.5%		23		2		2		1		26		1	
		Walk	12.5%		23		2		2		1		26		1	
		Other	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*		*181*	*77*	*16*	*7*	*12*	*5*	*6*	*2*	*212*	*90*	*8*	*4*
North Bay	2.0%	Auto	87.5%	1.44	106	73	9	7	7	5	3	2	123	86	5	3
		Transit	12.5%		15		1		1		0		18		1	
		Walk	0.0%		0		0		0		0		0		0	
		Other	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*		*121*	*73*	*11*	*7*	*8*	*5*	*4*	*2*	*141*	*86*	*6*	*3*
South Bay	9.0%	Auto	86.4%	1.98	469	237	42	21	32	16	15	7	549	277	22	11
		Transit	9.1%		49		4		3		2		58		2	
		Walk	3.2%		17		2		1		1		20		1	
		Other	1.3%		7		1		0		0		8		0	
		TOTAL	*100.0%*		*543*	*237*	*49*	*21*	*37*	*16*	*17*	*7*	*635*	*277*	*25*	*11*
Out of Region	5.0%	Auto	59.2%	1.69	178	106	16	10	12	7	6	3	209	124	8	5
		Transit	16.9%		51		5		3		2		60		2	
		Walk	19.7%		59		5		4		2		70		3	
		Other	4.2%		13		1		1		0		15		1	
		TOTAL	*100.0%*		*302*	*106*	*27*	*10*	*20*	*7*	*9*	*3*	*353*	*124*	*14*	*5*
TOTAL	**100.0%**	Auto	64.1%	1.90	3,864	2,038	348	183	261	138	122	64	4,522	2,385	181	95
		Transit	11.7%		705		63		48		22		825		33	
		Walk	22.4%		1,351		122		91		43		1,580		63	
		Other	1.8%		111		10		7		3		130		5	
		TOTAL	*100.0%*		*6,030*	*2,038*	*543*	*183*	*407*	*138*	*190*	*64*	*7,057*	*2,385*	*282*	*95*

[a] Assumes that one third of the retail customers are already in the area when there is no event, based on 1998 Mission Bay SEIR
[b] SF Guidelines, Appendix C - Table C-1 (General Retail)
[c] The Saturday daily and p.m. peak hour trip generation rates are based on the weekday to Saturday ratio for Shopping Center [LU 820] from ITE Trip Generation, 9th Edition (2012)
[d] The weekday late p.m. percentage is based on Pushkarev and Zupan, Urban Space for Pedestrians (1978)
[e] The weekday late p.m. percentage is based on a combination of the weekday p.m. peak hour-to-late p.m. and weekday-to-Saturday ratios
[f] The weekday and Saturday late p.m. peak hour percentages of work/non-work trips are assumed to be the same as the weekday p.m. peak hour percentages shown in Table C-2 of the SF Guidelines
[g] SF Guidelines, Appendix C - Table C-2 (Retail)
[h] The Saturday daily and p.m. peak hour percentages of work/non-work trips are assumed to be the same as the weekday p.m. peak hour percentages shown in Table C-2 of the SF Guidelines
[i] SF Guidelines, Appendix E - Table E-14 Visitor Trips to SD3 (Retail)

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION
LAND USE: SIT-DOWN RESTAURANT (WORK TRIPS)
Proposed Size: 51,500 gsf

DAILY:		
Linked Trip Factor [a]:	0%	
Weekday person-trip Generation Rate [b]:	200.0	trips/1000 gsf
Total Weekday Person-trips (w/out linked trip factor):		10,300
Weekday Work Trips (w/ linked trip factor) [g]:	4%	412
Saturday person-trip Generation Rate [c]:	249.1	trips/1000 gsf
Total Saturday Person-trips (w/out linked trip factor):		12,829
Saturday Work Trips (w/ linked trip factor) [h]:	4%	513

PEAK HOUR PERIOD:		Weekday Peak Hour of 4-6 PM Period	Weekday Peak Hour of 6-8 PM Period	Weekday Peak Hour of 9-11 PM Period	Saturday Peak Hour of 7-9 PM Period
Linked Trip Factor before 6 PM [a]:	0%				
Linked Trip Factor after 6 PM [a]:	0%				
Peak hour trips as a % of daily trips:		13.5% [b]	20.3% [d]	20.3% [d]	24.0% [e]
Total peak hour person-trip rate (trips/1,000 gsf):		27.0	40.5	40.5	59.8
Total peak hour person-trips (w/ linked trip factor):		501	184	184	271
Percent of Work Trips during peak hour:		4% [g]	4% [f]	4% [f]	4% [f]
Peak hour Work Trips (w/ linked trip factor):		56	83	83	123

Origins	Distribution [j]	Mode	Percent [j]	Average Vehicle Occup. [i]	WEEKDAY All Day Person Trips	WEEKDAY All Day Vehicle-Trips	4-6 PM Peak Hour Person Trips	4-6 PM Peak Hour Vehicle-Trips	6-8 PM Peak Hour Person Trips	6-8 PM Peak Hour Vehicle-Trips	9-11 PM Peak Hour Person Trips	9-11 PM Peak Hour Vehicle-Trips	SATURDAY All Day Person Trips	SATURDAY All Day Vehicle-Trips	7-9 PM Peak Hour Person Trips	7-9 PM Peak Hour Vehicle-Trips
Superdistrict 1	7.7%	Auto	12.4%	1.30	4	3	1	0	1	1	1	1	5	4	1	1
		Transit	63.0%		20		3		4		4		25		6	
		Walk	21.4%		7		1		1		1		9		2	
		Other	3.1%		1		0		0		0		1		0	
		TOTAL	*100.0%*		*32*	*3*	*4*	*0*	*6*	*1*	*6*	*1*	*40*	*4*	*10*	*1*
Superdistrict 2	9.9%	Auto	21.8%	1.26	9	7	1	1	2	1	2	1	11	9	3	2
		Transit	64.6%		26		4		5		5		33		8	
		Walk	10.6%		4		1		1		1		5		1	
		Other	3.1%		1		0		0		0		2		0	
		TOTAL	*100.0%*		*41*	*7*	*6*	*1*	*8*	*1*	*8*	*1*	*51*	*9*	*12*	*2*
Superdistrict 3	22.3%	Auto	20.0%	1.25	18	15	2	2	4	3	4	3	23	18	5	4
		Transit	50.2%		46		6		9		9		57		14	
		Walk	23.1%		21		3		4		4		26		6	
		Other	6.7%		6		1		1		1		8		2	
		TOTAL	*100.0%*		*92*	*15*	*12*	*2*	*19*	*3*	*19*	*3*	*114*	*18*	*27*	*4*
Superdistrict 4	7.4%	Auto	31.0%	1.48	9	6	1	1	2	1	2	1	12	8	3	2
		Transit	64.0%		19		3		4		4		24		6	
		Walk	0.0%		0		0		0		0		0		0	
		Other	5.0%		2		0		0		0		2		0	
		TOTAL	*100.0%*		*30*	*6*	*4*	*1*	*6*	*1*	*6*	*1*	*38*	*8*	*9*	*2*
East Bay	27.7%	Auto	20.1%	1.61	23	14	3	2	5	3	5	3	29	18	7	4
		Transit	78.0%		89		12		18		18		111		27	
		Walk	0.0%		0		0		0		0		0		0	
		Other	2.0%		2		0		0		0		3		1	
		TOTAL	*100.0%*		*114*	*14*	*15*	*2*	*23*	*3*	*23*	*3*	*142*	*18*	*34*	*4*
North Bay	3.5%	Auto	44.4%	1.44	6	4	1	1	1	1	1	1	8	6	2	1
		Transit	51.1%		7		1		2		2		9		2	
		Walk	0.0%		0		0		0		0		0		0	
		Other	4.4%		1		0		0		0		1		0	
		TOTAL	*100.0%*		*15*	*4*	*2*	*1*	*3*	*1*	*3*	*1*	*18*	*6*	*4*	*1*
South Bay	19.0%	Auto	50.0%	1.13	39	35	5	5	8	7	8	7	49	43	12	10
		Transit	49.2%		38		5		8		8		48		11	
		Walk	0.0%		0		0		0		0		0		0	
		Other	0.8%		1		0		0		0		1		0	
		TOTAL	*100.0%*		*78*	*35*	*11*	*5*	*16*	*7*	*16*	*7*	*97*	*43*	*23*	*10*
Out of Region	2.5%	Auto	21.9%	1.56	2	1	0	0	0	0	0	0	3	2	1	0
		Transit	71.9%		7		1		2		2		9		2	
		Walk	0.0%		0		0		0		0		0		0	
		Other	6.3%		1		0		0		0		1		0	
		TOTAL	*100.0%*		*10*	*1*	*1*	*0*	*2*	*0*	*2*	*0*	*13*	*2*	*3*	*0*
TOTAL	**100.0%**	Auto	27.0%	1.30	111	86	15	12	23	17	23	17	139	107	33	26
		Transit	61.7%		254		34		51		51		317		76	
		Walk	7.9%		32		4		7		7		40		10	
		Other	3.4%		14		2		3		3		18		4	
		TOTAL	*100.0%*		*412*	*86*	*56*	*12*	*83*	*17*	*83*	*17*	*513*	*107*	*123*	*26*

[a] No linked-trip factor assumed for work trips
[b] SF Guidelines, Appendix C - Table C-1 (Quality Sit-Down Restaurant Rate)
[c] The Saturday daily and p.m. peak hour trip generation rates are based on the weekday to Saturday ratio for Restaurant High Turn-Over [LU 932] from ITE Trip Generation, 9th Edition (2012)
[d] The weekday late p.m. percentage is based on Pushkarev and Zupan, Urban Space for Pedestrians (1978)
[e] The weekday late p.m. percentage is based on a combination of the weekday p.m. peak hour-to-late p.m. and weekday-to-Saturday ratios
[f] The weekday and Saturday late p.m. peak hour percentages of work/non-work trips are assumed to be the same as the weekday p.m. peak hour percentages shown in Table C-2 of the SF Guidelines
[g] SF Guidelines, Appendix C - Table C-2 (Eating establishments)
[h] The Saturday daily and p.m. peak hour percentages of work/non-work trips are assumed to be the same as the weekday p.m. peak hour percentages shown in Table C-2 of the SF Guidelines
[i] SF Guidelines, Appendix E - Table E-5 Work Trips to SD3 (All)

PROJECT TRIP GENERATION
LAND USE: SIT-DOWN RESTAURANT (NON-WORK TRIPS WITH EVENT)
Proposed Size: 51,500 gsf

DAILY:		
Linked Trip Factor [a]:	67%	
Weekday person-trip Generation Rate [b]:	200.0	trips/1000 gsf
Total Weekday Person-trips (w/out linked trip factor):		10,300
Wday Non-Work Trips (w/ linked trip factor) [g]:	96%	3,296
Saturday person-trip Generation Rate [c]:	249.1	trips/1000 gsf
Total Saturday Person-trips (w/out linked trip factor):		12,829
Sat. Non-Work Trips (w/ linked trip factor) [h]:	96%	4,105

PEAK HOUR PERIOD:		Weekday Peak Hour of 4-6 PM Period	Weekday Peak Hour of 6-8 PM Period	Weekday Peak Hour of 9-11 PM Period	Saturday Peak Hour of 7-9 PM Period
Linked Trip Factor before 6 PM [a]:	67%				
Linked Trip Factor after 6 PM [a]:	95%				
Peak hour trips as a % of daily trips:		13.5% [b]	20.3% [d]	20.3% [d]	24.0% [e]
Total peak hour person-trip rate (trips/1,000 gsf):		27.0	40.5	40.5	59.8
Total peak hour person-trips (w/ linked trip factor):		501	184	184	271
Percent of Non-Work Trips during peak hour:		96% [g]	96% [f]	96% [f]	96% [f]
Peak hour Non-Work Trips (w/ linked trip factor):		445	100	100	148

Origins	Distribution [i]	Mode	Percent [i]	Average Vehicle Occup. [i]	WEEKDAY All Day Person Trips	WEEKDAY All Day Vehicle-Trips	4-6 PM Peak Hour Person Trips	4-6 PM Peak Hour Vehicle-Trips	6-8 PM Peak Hour Person Trips	6-8 PM Peak Hour Vehicle-Trips	9-11 PM Peak Hour Person Trips	9-11 PM Peak Hour Vehicle-Trips	SATURDAY All Day Person Trips	SATURDAY All Day Vehicle-Trips	7-9 PM Peak Hour Person Trips	7-9 PM Peak Hour Vehicle-Trips
Superdistrict 1	13.0%	Auto	36.0%	2.03	154	76	21	10	5	2	5	2	192	95	7	3
		Transit	19.2%		82		11		2		2		102		4	
		Walk	33.3%		143		19		4		4		178		6	
		Other	11.5%		49		7		1		1		61		2	
		TOTAL	*100.0%*		*428*	*76*	*58*	*10*	*13*	*2*	*13*	*2*	*534*	*95*	*19*	*3*
Superdistrict 2	14.0%	Auto	68.6%	1.97	317	161	43	22	10	5	10	5	394	200	14	7
		Transit	14.5%		67		9		2		2		83		3	
		Walk	2.4%		11		1		0		0		14		0	
		Other	14.5%		67		9		2		2		83		3	
		TOTAL	*100.0%*		*461*	*161*	*62*	*22*	*14*	*5*	*14*	*5*	*575*	*200*	*21*	*7*
Superdistrict 3	44.0%	Auto	43.7%	2.43	634	261	86	35	19	8	19	8	789	325	28	12
		Transit	21.5%		312		42		9		9		388		14	
		Walk	25.4%		368		50		11		11		459		17	
		Other	9.4%		136		18		4		4		170		6	
		TOTAL	*100.0%*		*1,450*	*261*	*196*	*35*	*44*	*8*	*44*	*8*	*1,806*	*325*	*65*	*12*
Superdistrict 4	7.0%	Auto	67.4%	2.51	156	62	21	8	5	2	5	2	194	77	7	3
		Transit	16.3%		38		5		1		1		47		2	
		Walk	7.0%		16		2		0		0		20		1	
		Other	9.3%		21		3		1		1		27		1	
		TOTAL	*100.0%*		*231*	*62*	*31*	*8*	*7*	*2*	*7*	*2*	*287*	*77*	*10*	*3*
East Bay	9.0%	Auto	68.4%	2.59	203	78	27	11	6	2	6	2	253	98	9	4
		Transit	29.8%		88		12		3		3		110		4	
		Walk	1.8%		5		1		0		0		7		0	
		Other	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*		*297*	*78*	*40*	*11*	*9*	*2*	*9*	*2*	*369*	*98*	*13*	*4*
North Bay	1.0%	Auto	100.0%	7.00	33	5	4	1	1	0	1	0	41	6	1	0
		Transit	0.0%		0		0		0		0		0		0	
		Walk	0.0%		0		0		0		0		0		0	
		Other	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*		*33*	*5*	*4*	*1*	*1*	*0*	*1*	*0*	*41*	*6*	*1*	*0*
South Bay	9.0%	Auto	94.6%	2.28	281	123	38	17	9	4	9	4	350	153	13	6
		Transit	3.6%		11		1		0		0		13		0	
		Walk	1.8%		5		1		0		0		7		0	
		Other	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*		*297*	*123*	*40*	*17*	*9*	*4*	*9*	*4*	*369*	*153*	*13*	*6*
Out of Region	3.0%	Auto	73.6%	1.68	73	43	10	6	2	1	2	1	91	54	3	2
		Transit	21.1%		21		3		1		1		26		1	
		Walk	0.0%		0		0		0		0		0		0	
		Other	5.3%		5		1		0		0		7		0	
		TOTAL	*100.0%*		*99*	*43*	*13*	*6*	*3*	*1*	*3*	*1*	*123*	*54*	*4*	*2*
TOTAL	**100.0%**	Auto	56.1%	2.29	1,849	809	250	109	56	25	56	25	2,303	1,007	83	36
		Transit	18.8%		619		84		19		19		770		28	
		Walk	16.7%		549		74		17		17		684		25	
		Other	8.5%		279		38		8		8		348		13	
		TOTAL	*100.0%*		*3,296*	*809*	*445*	*109*	*100*	*25*	*100*	*25*	*4,105*	*1,007*	*148*	*36*

[a] Assumes that 50 to 95 percent of the restaurant customers are already in the Mission Bay area when there is an event; based on surveys.
[b] SF Guidelines, Appendix C - Table C-1 (Quality Sit-Down Restaurant Rate)
[c] The Saturday daily and p.m. peak hour trip generation rates are based on the weekday to Saturday ratio for Restaurant High Turn-Over [LU 932] from ITE Trip Generation, 9th Edition (2012)
[d] The weekday late p.m. percentage is based on Pushkarev and Zupan, Urban Space for Pedestrians (1978)
[e] The weekday late p.m. percentage is based on a combination of the weekday p.m. peak hour-to-late p.m. and weekday-to-Saturday ratios
[f] The weekday and Saturday late p.m. peak hour percentages of work/non-work trips are assumed to be the same as the weekday p.m. peak hour percentages shown in Table C-2 of the SF Guidelines
[g] SF Guidelines, Appendix C - Table C-2 (Eating establishments)
[h] The Saturday daily and p.m. peak hour percentages of work/non-work trips are assumed to be the same as the weekday p.m. peak hour percentages shown in Table C-2 of the SF Guidelines
[i] SF Guidelines, Appendix E - Table E-15 Visitor Trips to SD3 (All Other)

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION

LAND USE: SIT-DOWN RESTAURANT (NON-WORK TRIPS WITHOUT EVENT)

Proposed Size: 51,500 gsf

DAILY:			
Linked Trip Factor [a]:	33%		
Weekday person-trip Generation Rate [b]:	200.0	trips/1000 gsf	
Total Weekday Person-trips (w/out linked trip factor):			10,300
Wday Non-Work Trips (w/ linked trip factor) [g]:	96%		6,592
Saturday person-trip Generation Rate [c]:	249.1	trips/1000 gsf	
Total Saturday Person-trips (w/out linked trip factor):			12,829
Sat. Non-Work Trips (w/ linked trip factor) [h]:	96%		8,211

PEAK HOUR PERIOD:		Weekday Peak Hour of 4-6 PM Period	Weekday Peak Hour of 6-8 PM Period	Weekday Peak Hour of 9-11 PM Period	Saturday Peak Hour of 7-9 PM Period
Linked Trip Factor before 6 PM [a]:	33%				
Linked Trip Factor after 6 PM [a]:	33%				
Peak hour trips as a % of daily trips:		13.5% [b]	20.3% [d]	20.3% [d]	24.0% [e]
Total peak hour person-trip rate (trips/1,000 gsf):		27.0	40.5	40.5	59.8
Total peak hour person-trips (w/ linked trip factor):		946	1,418	1,418	2,093
Percent of Non-Work Trips during peak hour:		96% [g]	96% [f]	96% [f]	96% [f]
Peak hour Non-Work Trips (w/ linked trip factor):		890	1,335	1335	1,970

Origins	Distribution [i]	Mode	Percent [i]	Average Vehicle Occup. [i]	WEEKDAY All Day Person Trips	WEEKDAY All Day Vehicle-Trips	WEEKDAY 4-6 PM Peak Hour Person Trips	WEEKDAY 4-6 PM Peak Hour Vehicle-Trips	WEEKDAY 6-8 PM Peak Hour Person Trips	WEEKDAY 6-8 PM Peak Hour Vehicle-Trips	WEEKDAY 9-11 PM Peak Hour Person Trips	WEEKDAY 9-11 PM Peak Hour Vehicle-Trips	SATURDAY All Day Person Trips	SATURDAY All Day Vehicle-Trips	SATURDAY 7-9 PM Peak Hour Person Trips	SATURDAY 7-9 PM Peak Hour Vehicle-Trips
Superdistrict 1	13.0%	Auto	36.0%	2.03	309	152	42	21	62	31	62	31	384	189	92	45
		Transit	19.2%		165		22		33		33		205		49	
		Walk	33.3%		285		39		58		58		355		85	
		Other	11.5%		99		13		20		20		123		29	
		TOTAL	*100.0%*		*857*	*152*	*116*	*21*	*174*	*31*	*174*	*31*	*1,067*	*189*	*256*	*45*
Superdistrict 2	14.0%	Auto	68.6%	1.97	633	321	85	43	128	65	128	65	789	400	189	96
		Transit	14.5%		134		18		27		27		167		40	
		Walk	2.4%		22		3		4		4		28		7	
		Other	14.5%		134		18		27		27		167		40	
		TOTAL	*100.0%*		*923*	*321*	*125*	*43*	*187*	*65*	*187*	*65*	*1,149*	*400*	*276*	*96*
Superdistrict 3	44.0%	Auto	43.7%	2.43	1,268	522	171	70	257	106	257	106	1,579	650	379	156
		Transit	21.5%		624		84		126		126		777		186	
		Walk	25.4%		737		99		149		149		918		220	
		Other	9.4%		273		37		55		55		340		81	
		TOTAL	*100.0%*		*2,900*	*522*	*392*	*70*	*587*	*106*	*587*	*106*	*3,613*	*650*	*867*	*156*
Superdistrict 4	7.0%	Auto	67.4%	2.51	311	124	42	17	63	25	63	25	387	154	93	37
		Transit	16.3%		75		10		15		15		94		22	
		Walk	7.0%		32		4		7		7		40		10	
		Other	9.3%		43		6		9		9		53		13	
		TOTAL	*100.0%*		*461*	*124*	*62*	*17*	*93*	*25*	*93*	*25*	*575*	*154*	*138*	*37*
East Bay	9.0%	Auto	68.4%	2.59	406	157	55	21	82	32	82	32	505	195	121	47
		Transit	29.8%		177		24		36		36		220		53	
		Walk	1.8%		11		1		2		2		13		3	
		Other	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*		*593*	*157*	*80*	*21*	*120*	*32*	*120*	*32*	*739*	*195*	*177*	*47*
North Bay	1.0%	Auto	100.0%	7.00	66	9	9	1	13	2	13	2	82	12	20	3
		Transit	0.0%		0		0		0		0		0		0	
		Walk	0.0%		0		0		0		0		0		0	
		Other	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*		*66*	*9*	*9*	*1*	*13*	*2*	*13*	*2*	*82*	*12*	*20*	*3*
South Bay	9.0%	Auto	94.6%	2.28	561	246	76	33	114	50	114	50	699	307	168	74
		Transit	3.6%		21		3		4		4		27		6	
		Walk	1.8%		11		1		2		2		13		3	
		Other	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*		*593*	*246*	*80*	*33*	*120*	*50*	*120*	*50*	*739*	*307*	*177*	*74*
Out of Region	3.0%	Auto	73.6%	1.68	146	87	20	12	29	18	29	18	181	108	44	26
		Transit	21.1%		42		6		8		8		52		12	
		Walk	0.0%		0		0		0		0		0		0	
		Other	5.3%		10		1		2		2		13		3	
		TOTAL	*100.0%*		*198*	*87*	*27*	*12*	*40*	*18*	*40*	*18*	*246*	*108*	*59*	*26*
TOTAL	**100.0%**	Auto	56.1%	2.29	3,699	1,618	499	218	749	328	749	328	4,607	2,015	1,106	484
		Transit	18.8%		1,237		167		251		251		1,541		370	
		Walk	16.7%		1,098		148		222		222		1,367		328	
		Other	8.5%		558		75		113		113		696		167	
		TOTAL	*100.0%*		*6,592*	*1,618*	*890*	*218*	*1,335*	*328*	*1,335*	*328*	*8,211*	*2,015*	*1,970*	*484*

[a] Assumes that one third of the sit-down restaurant customers are already in the Mission Bay area when there is no event
[b] SF Guidelines, Appendix C - Table C-1 (Quality Sit-Down Restaurant Rate)
[c] The Saturday daily and p.m. peak hour trip generation rates are based on the weekday to Saturday ratio for Restaurant High Turn-Over [LU 932] from ITE Trip Generation, 9th Edition (2012)
[d] The weekday late p.m. percentage is based on Pushkarev and Zupan, Urban Space for Pedestrians (1978)
[e] The weekday late p.m. percentage is based on a combination of the weekday p.m. peak hour-to-late p.m. and weekday-to-Saturday ratios
[f] The weekday and Saturday late p.m. peak hour percentages of work/non-work trips are assumed to be the same as the weekday p.m. peak hour percentages shown in Table C-2 of the SF Guidelines
[g] SF Guidelines, Appendix C - Table C-2 (Eating establishments)
[h] The Saturday daily and p.m. peak hour percentages of work/non-work trips are assumed to be the same as the weekday p.m. peak hour percentages shown in Table C-2 of the SF Guidelines
[i] SF Guidelines, Appendix E - Table E-15 Visitor Trips to SD3 (All Other)

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT TRIP GENERATION
LAND USE: QUICK SERVICE RESTAURANT (WORK TRIPS)
Proposed Size: 11,000 gsf

DAILY:		
Linked Trip Factor [a]:	0%	
Weekday person-trip Generation Rate [b]:	600.0	trips/1000 gsf
Total Weekday Person-trips (w/out linked trip factor):		6,600
Weekday Work Trips (w/ linked trip factor) [g]:	4%	264
Saturday person-trip Generation Rate [c]:	747.3	trips/1000 gsf
Total Saturday Person-trips (w/out linked trip factor):		8,221
Saturday Work Trips (w/ linked trip factor) [h]:	4%	329

PEAK HOUR PERIOD:		Weekday Peak Hour of 4-6 PM Period	Weekday Peak Hour of 6-8 PM Period	Weekday Peak Hour of 9-11 PM Period	Saturday Peak Hour o' 0 7-9 PM Period
Linked Trip Factor before 6 PM [a]:	0%				
Linked Trip Factor after 6 PM [a]:	0%				
Peak hour trips as a % of daily trips:		13.5% [b]	20.3% [d]	20.3% [d]	24.0% [e]
Total peak hour person-trip rate (trips/1,000 gsf):		81.0	121.5	121.5	179.3
Total peak hour person-trips (w/ linked trip factor):		321	118	118	174
Percent of Work Trips during peak hour:		4% [g]	4% [f]	4% [f]	4% [f]
Peak hour Work Trips (w/ linked trip factor):		36	53	53	79

Origins	Distribution [j]	Mode	Percent [j]	Average Vehicle Occup. [i]	WEEKDAY All Day Person Trips	WEEKDAY All Day Vehicle-Trips	WEEKDAY 4-6 PM Peak Hour Person Trips	WEEKDAY 4-6 PM Peak Hour Vehicle-Trips	WEEKDAY 6-8 PM Peak Hour Person Trips	WEEKDAY 6-8 PM Peak Hour Vehicle-Trips	WEEKDAY 9-11 PM Peak Hour Person Trips	WEEKDAY 9-11 PM Peak Hour Vehicle-Trips	SATURDAY All Day Person Trips	SATURDAY All Day Vehicle-Trips	SATURDAY 7-9 PM Peak Hour Person Trips	SATURDAY 7-9 PM Peak Hour Vehicle-Trips
Superdistrict 1	7.7%	Auto	12.4%	1.30	3	2	0	0	1	0	1	0	3	2	1	1
		Transit	63.0%		13		2		3		3		16		4	
		Walk	21.4%		4		1		1		1		5		1	
		Other	3.1%		1		0		0		0		1		0	
		TOTAL	*100.0%*		*20*	*2*	*3*	*0*	*4*	*0*	*4*	*0*	*25*	*2*	*6*	*1*
Superdistrict 2	9.9%	Auto	21.8%	1.26	6	5	1	1	1	1	1	1	7	6	2	1
		Transit	64.6%		17		2		3		3		21		5	
		Walk	10.6%		3		0		1		1		3		1	
		Other	3.1%		1		0		0		0		1		0	
		TOTAL	*100.0%*		*26*	*5*	*4*	*1*	*5*	*1*	*5*	*1*	*33*	*6*	*8*	*1*
Superdistrict 3	22.3%	Auto	20.0%	1.25	12	9	2	1	2	2	2	2	15	12	4	3
		Transit	50.2%		30		4		6		6		37		9	
		Walk	23.1%		14		2		3		3		17		4	
		Other	6.7%		4		1		1		1		5		1	
		TOTAL	*100.0%*		*59*	*9*	*8*	*1*	*12*	*2*	*12*	*2*	*73*	*12*	*18*	*3*
Superdistrict 4	7.4%	Auto	31.0%	1.48	6	4	1	1	1	1	1	1	8	5	2	1
		Transit	64.0%		12		2		3		3		16		4	
		Walk	0.0%		0		0		0		0		0		0	
		Other	5.0%		1		0		0		0		1		0	
		TOTAL	*100.0%*		*19*	*4*	*3*	*1*	*4*	*1*	*4*	*1*	*24*	*5*	*6*	*1*
East Bay	27.7%	Auto	20.1%	1.61	15	9	2	1	3	2	3	2	18	11	4	3
		Transit	78.0%		57		8		12		12		71		17	
		Walk	0.0%		0		0		0		0		0		0	
		Other	2.0%		1		0		0		0		2		0	
		TOTAL	*100.0%*		*73*	*9*	*10*	*1*	*15*	*2*	*15*	*2*	*91*	*11*	*22*	*3*
North Bay	3.5%	Auto	44.4%	1.44	4	3	1	0	1	1	1	1	5	4	1	1
		Transit	51.1%		5		1		1		1		6		1	
		Walk	0.0%		0		0		0		0		0		0	
		Other	4.4%		0		0		0		0		1		0	
		TOTAL	*100.0%*		*9*	*3*	*1*	*0*	*2*	*1*	*2*	*1*	*12*	*4*	*3*	*1*
South Bay	19.0%	Auto	50.0%	1.13	25	22	3	3	5	4	5	4	31	28	7	7
		Transit	49.2%		25		3		5		5		31		7	
		Walk	0.0%		0		0		0		0		0		0	
		Other	0.8%		0		0		0		0		1		0	
		TOTAL	*100.0%*		*50*	*22*	*7*	*3*	*10*	*4*	*10*	*4*	*62*	*28*	*15*	*7*
Out of Region	2.5%	Auto	21.9%	1.56	1	1	0	0	0	0	0	0	2	1	0	0
		Transit	71.9%		5		1		1		1		6		1	
		Walk	0.0%		0		0		0		0		0		0	
		Other	6.3%		0		0		0		0		1		0	
		TOTAL	*100.0%*		*7*	*1*	*1*	*0*	*1*	*0*	*1*	*0*	*8*	*1*	*2*	*0*
TOTAL	**100.0%**	Auto	27.0%	1.30	71	55	10	7	14	11	14	11	89	69	21	16
		Transit	61.7%		163		22		33		33		203		49	
		Walk	7.9%		21		3		4		4		26		6	
		Other	3.4%		9		1		2		2		11		3	
		TOTAL	*100.0%*		*264*	*55*	*36*	*7*	*53*	*11*	*53*	*11*	*329*	*69*	*79*	*16*

[a] No linked-trip factor assumed for work trips
[b] SF Guidelines, Appendix C - Table C-1 (Composite Restaurant Rate)
[c] The Saturday daily and p.m. peak hour trip generation rates are based on the weekday to Saturday ratio for Restaurant High Turn-Over [LU 932] from ITE Trip Generation, 9th Edition (2012)
[d] The weekday late p.m. percentage is based on Pushkarev and Zupan, Urban Space for Pedestrians (1978)
[e] The weekday late p.m. percentage is based on a combination of the weekday p.m. peak hour-to-late p.m. and weekday-to-Saturday ratios
[f] The weekday and Saturday late p.m. peak hour percentages of work/non-work trips are assumed to be the same as the weekday p.m. peak hour percentages shown in Table C-2 of the SF Guidelines
[g] SF Guidelines, Appendix C - Table C-2 (Eating establishments)
[h] The Saturday daily and p.m. peak hour percentages of work/non-work trips are assumed to be the same as the weekday p.m. peak hour percentages shown in Table C-2 of the SF Guidelines
[i] SF Guidelines, Appendix E - Table E-5 Work Trips to SD3 (All)

PROJECT TRIP GENERATION
LAND USE: QUICK SERVICE RESTAURANT (NON-WORK TRIPS WITH EVENT)
Proposed Size: 11,000 gsf

DAILY:		
Linked Trip Factor [a]:	67%	
Weekday person-trip Generation Rate [b]:	600.0	trips/1000 gsf
Total Weekday Person-trips (w/out linked trip factor):		6,600
Wday Non-Work Trips (w/ linked trip factor) [g]:	96%	2,112
Saturday person-trip Generation Rate [c]:	747.3	trips/1000 gsf
Total Saturday Person-trips (w/out linked trip factor):		8,221
Sat. Non-Work Trips (w/ linked trip factor) [h]:	96%	2,631

PEAK HOUR PERIOD:		Weekday Peak Hour of 4-6 PM Period	Weekday Peak Hour of 6-8 PM Period	Weekday Peak Hour of 9-11 PM Period	Saturday Peak Hour o' 0 7-9 PM Period
Linked Trip Factor before 6 PM [a]:	67%				
Linked Trip Factor after 6 PM [a]:	95%				
Peak hour trips as a % of daily trips:		13.5% [b]	20.3% [d]	20.3% [d]	24.0% [e]
Total peak hour person-trip rate (trips/1,000 gsf):		81.0	121.5	121.5	179.3
Total peak hour person-trips (w/ linked trip factor):		321	118	118	174
Percent of Non-Work Trips during peak hour:		96% [g]	96% [f]	96% [f]	96% [f]
Peak hour Non-Work Trips (w/ linked trip factor):		285	64	64	95

Origins	Distribution [i]	Mode	Percent [i]	Average Vehicle Occup. [i]	WEEKDAY All Day Person Trips	WEEKDAY All Day Vehicle-Trips	WEEKDAY 4-6 PM Peak Hour Person Trips	WEEKDAY 4-6 PM Peak Hour Vehicle-Trips	WEEKDAY 6-8 PM Peak Hour Person Trips	WEEKDAY 6-8 PM Peak Hour Vehicle-Trips	WEEKDAY 9-11 PM Peak Hour Person Trips	WEEKDAY 9-11 PM Peak Hour Vehicle-Trips	SATURDAY All Day Person Trips	SATURDAY All Day Vehicle-Trips	SATURDAY 7-9 PM Peak Hour Person Trips	SATURDAY 7-9 PM Peak Hour Vehicle-Trips
Superdistrict 1	13.0%	Auto	36.0%	2.03	99	49	13	7	3	1	3	1	123	61	4	2
		Transit	19.2%		53		7		2		2		66		2	
		Walk	33.3%		91		12		3		3		114		4	
		Other	11.5%		32		4		1		1		39		1	
		TOTAL	*100.0%*		*275*	*49*	*37*	*7*	*8*	*1*	*8*	*1*	*342*	*61*	*12*	*2*
Superdistrict 2	14.0%	Auto	68.6%	1.97	203	103	27	14	6	3	6	3	253	128	9	5
		Transit	14.5%		43		6		1		1		53		2	
		Walk	2.4%		7		1		0		0		9		0	
		Other	14.5%		43		6		1		1		53		2	
		TOTAL	*100.0%*		*296*	*103*	*40*	*14*	*9*	*3*	*9*	*3*	*368*	*128*	*13*	*5*
Superdistrict 3	44.0%	Auto	43.7%	2.43	406	167	55	23	12	5	12	5	506	208	18	7
		Transit	21.5%		200		27		6		6		249		9	
		Walk	25.4%		236		32		7		7		294		11	
		Other	9.4%		87		12		3		3		109		4	
		TOTAL	*100.0%*		*929*	*167*	*125*	*23*	*28*	*5*	*28*	*5*	*1,157*	*208*	*42*	*7*
Superdistrict 4	7.0%	Auto	67.4%	2.51	100	40	13	5	3	1	3	1	124	49	4	2
		Transit	16.3%		24		3		1		1		30		1	
		Walk	7.0%		10		1		0		0		13		0	
		Other	9.3%		14		2		0		0		17		1	
		TOTAL	*100.0%*		*148*	*40*	*20*	*5*	*4*	*1*	*4*	*1*	*184*	*49*	*7*	*2*
East Bay	9.0%	Auto	68.4%	2.59	130	50	18	7	4	2	4	2	162	63	6	2
		Transit	29.8%		57		8		2		2		71		3	
		Walk	1.8%		3		0		0		0		4		0	
		Other	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*		*190*	*50*	*26*	*7*	*6*	*2*	*6*	*2*	*237*	*63*	*9*	*2*
North Bay	1.0%	Auto	100.0%	7.00	21	3	3	0	1	0	1	0	26	4	1	0
		Transit	0.0%		0		0		0		0		0		0	
		Walk	0.0%		0		0		0		0		0		0	
		Other	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*		*21*	*3*	*3*	*0*	*1*	*0*	*1*	*0*	*26*	*4*	*1*	*0*
South Bay	9.0%	Auto	94.6%	2.28	180	79	24	11	5	2	5	2	224	98	8	4
		Transit	3.6%		7		1		0		0		9		0	
		Walk	1.8%		3		0		0		0		4		0	
		Other	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*		*190*	*79*	*26*	*11*	*6*	*2*	*6*	*2*	*237*	*98*	*9*	*4*
Out of Region	3.0%	Auto	73.6%	1.68	47	28	6	4	1	1	1	1	58	35	2	1
		Transit	21.1%		13		2		0		0		17		1	
		Walk	0.0%		0		0		0		0		0		0	
		Other	5.3%		3		0		0		0		4		0	
		TOTAL	*100.0%*		*63*	*28*	*9*	*4*	*2*	*1*	*2*	*1*	*79*	*35*	*3*	*1*
TOTAL	**100.0%**	Auto	56.1%	2.29	1,185	518	160	70	36	16	36	16	1,476	646	53	23
		Transit	18.8%		396		54		12		12		494		18	
		Walk	16.7%		352		47		11		11		438		16	
		Other	8.5%		179		24		5		5		223		8	
		TOTAL	*100.0%*		*2,112*	*518*	*285*	*70*	*64*	*16*	*64*	*16*	*2,631*	*646*	*95*	*23*

[a] Assumes that between two thirds and 95 percent of the quick-service restaurant customers are already in the Mission Bay area when there is an event
[b] SF Guidelines, Appendix C - Table C-1 (Composite Restaurant Rate)
[c] The Saturday daily and p.m. peak hour trip generation rates are based on the weekday to Saturday ratio for Restaurant High Turn-Over [LU 932] from ITE Trip Generation, 9th Edition (2012)
[d] The weekday late p.m. percentage is based on Pushkarev and Zupan, Urban Space for Pedestrians (1978)
[e] The weekday late p.m. percentage is based on a combination of the weekday p.m. peak hour-to-late p.m. and weekday-to-Saturday ratios
[f] The weekday and Saturday late p.m. peak hour percentages of work/non-work trips are assumed to be the same as the weekday p.m. peak hour percentages shown in Table C-2 of the SF Guidelines
[g] SF Guidelines, Appendix C - Table C-2 (Eating establishments)
[h] The Saturday daily and p.m. peak hour percentages of work/non-work trips are assumed to be the same as the weekday p.m. peak hour percentages shown in Table C-2 of the SF Guidelines
[i] SF Guidelines, Appendix E - Table E-15 Visitor Trips to SD3 (All Other)

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32
PROJECT TRIP GENERATION
LAND USE: QUICK SERVICE RESTAURANT (NON-WORK TRIPS WITHOUT EVENT)
Proposed Size: 11,000 gsf

DAILY:		
Linked Trip Factor [a]:	67%	
Weekday person-trip Generation Rate [b]:	600.0	trips/1000 gsf
Total Weekday Person-trips (w/out linked trip factor):		6,600
Wday Non-Work Trips (w/ linked trip factor) [g]:	96%	2,112
Saturday person-trip Generation Rate [c]:	747.3	trips/1000 gsf
Total Saturday Person-trips (w/out linked trip factor):		8,221
Sat. Non-Work Trips (w/ linked trip factor) [h]:	96%	2,631

PEAK HOUR PERIOD:		Weekday Peak Hour of 4-6 PM Period	Weekday Peak Hour of 6-8 PM Period	Weekday Peak Hour of 9-11 PM Period	Saturday Peak Hour o 0 7-9 PM Period
Linked Trip Factor before 6 PM [a]:	67%				
Linked Trip Factor after 6 PM [a]:	67%				
Peak hour trips as a % of daily trips:		13.5% [b]	20.3% [d]	20.3% [d]	24.0% [e]
Total peak hour person-trip rate (trips/1,000 gsf):		81.0	121.5	121.5	179.3
Total peak hour person-trips (w/ linked trip factor):		321	481	481	710
Percent of Non-Work Trips during peak hour:		96% [g]	96% [f]	96% [f]	96% [f]
Peak hour Non-Work Trips (w/ linked trip factor):		285	428	428	631

Origins	Distribution [i]	Mode	Percent [i]	Average Vehicle Occup. [i]	WEEKDAY All Day Person Trips	WEEKDAY All Day Vehicle-Trips	WEEKDAY 4-6 PM Peak Hour Person Trips	WEEKDAY 4-6 PM Peak Hour Vehicle-Trips	WEEKDAY 6-8 PM Peak Hour Person Trips	WEEKDAY 6-8 PM Peak Hour Vehicle-Trips	WEEKDAY 9-11 PM Peak Hour Person Trips	WEEKDAY 9-11 PM Peak Hour Vehicle-Trips	SATURDAY All Day Person Trips	SATURDAY All Day Vehicle-Trips	SATURDAY 7-9 PM Peak Hour Person Trips	SATURDAY 7-9 PM Peak Hour Vehicle-Trips
Superdistrict 1	13.0%	Auto	36.0%	2.03	99	49	13	7	20	10	20	10	123	61	30	15
		Transit	19.2%		53		7		11		11		66		16	
		Walk	33.3%		91		12		19		19		114		27	
		Other	11.5%		32		4		6		6		39		9	
		TOTAL	*100.0%*		*275*	*49*	*37*	*7*	*56*	*10*	*56*	*10*	*342*	*61*	*82*	*15*
Superdistrict 2	14.0%	Auto	68.6%	1.97	203	103	27	14	41	21	41	21	253	128	61	31
		Transit	14.5%		43		6		9		9		53		13	
		Walk	2.4%		7		1		1		1		9		2	
		Other	14.5%		43		6		9		9		53		13	
		TOTAL	*100.0%*		*296*	*103*	*40*	*14*	*60*	*21*	*60*	*21*	*368*	*128*	*88*	*31*
Superdistrict 3	44.0%	Auto	43.7%	2.43	406	167	55	23	82	34	82	34	506	208	121	50
		Transit	21.5%		200		27		40		40		249		60	
		Walk	25.4%		236		32		48		48		294		71	
		Other	9.4%		87		12		18		18		109		26	
		TOTAL	*100.0%*		*929*	*167*	*125*	*23*	*188*	*34*	*188*	*34*	*1,157*	*208*	*278*	*50*
Superdistrict 4	7.0%	Auto	67.4%	2.51	100	40	13	5	20	8	20	8	124	49	30	12
		Transit	16.3%		24		3		5		5		30		7	
		Walk	7.0%		10		1		2		2		13		3	
		Other	9.3%		14		2		3		3		17		4	
		TOTAL	*100.0%*		*148*	*40*	*20*	*5*	*30*	*8*	*30*	*8*	*184*	*49*	*44*	*12*
East Bay	9.0%	Auto	68.4%	2.59	130	50	18	7	26	10	26	10	162	63	39	15
		Transit	29.8%		57		8		11		11		71		17	
		Walk	1.8%		3		0		1		1		4		1	
		Other	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*		*190*	*50*	*26*	*7*	*38*	*10*	*38*	*10*	*237*	*63*	*57*	*15*
North Bay	1.0%	Auto	100.0%	7.00	21	3	3	0	4	1	4	1	26	4	6	1
		Transit	0.0%		0		0		0		0		0		0	
		Walk	0.0%		0		0		0		0		0		0	
		Other	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*		*21*	*3*	*3*	*0*	*4*	*1*	*4*	*1*	*26*	*4*	*6*	*1*
South Bay	9.0%	Auto	94.6%	2.28	180	79	24	11	36	16	36	16	224	98	54	24
		Transit	3.6%		7		1		1		1		9		2	
		Walk	1.8%		3		0		1		1		4		1	
		Other	0.0%		0		0		0		0		0		0	
		TOTAL	*100.0%*		*190*	*79*	*26*	*11*	*38*	*16*	*38*	*16*	*237*	*98*	*57*	*24*
Out of Region	3.0%	Auto	73.6%	1.68	47	28	6	4	9	6	9	6	58	35	14	8
		Transit	21.1%		13		2		3		3		17		4	
		Walk	0.0%		0		0		0		0		0		0	
		Other	5.3%		3		0		1		1		4		1	
		TOTAL	*100.0%*		*63*	*28*	*9*	*4*	*13*	*6*	*13*	*6*	*79*	*35*	*19*	*8*
TOTAL	**100.0%**	Auto	56.1%	2.29	1,185	518	160	70	240	105	240	105	1,476	646	354	155
		Transit	18.8%		396		54		80		80		494		118	
		Walk	16.7%		352		47		71		71		438		105	
		Other	8.5%		179		24		36		36		223		53	
		TOTAL	*100.0%*		*2,112*	*518*	*285*	*70*	*428*	*105*	*428*	*105*	*2,631*	*646*	*631*	*155*

[a] Assumes that two thirds of the quick-service restaurant customers are already in the Mission Bay area when there is no event
[b] SF Guidelines, Appendix C - Table C-1 (Composite Restaurant Rate)
[c] The Saturday daily and p.m. peak hour trip generation rates are based on the weekday to Saturday ratio for Restaurant High Turn-Over [LU 932] from ITE Trip Generation, 9th Edition (2012)
[d] The weekday late p.m. percentage is based on Pushkarev and Zupan, Urban Space for Pedestrians (1978)
[e] The weekday late p.m. percentage is based on a combination of the weekday p.m. peak hour-to-late p.m. and weekday-to-Saturday ratios
[f] The weekday and Saturday late p.m. peak hour percentages of work/non-work trips are assumed to be the same as the weekday p.m. peak hour percentages shown in Table C-2 of the SF Guidelines
[g] SF Guidelines, Appendix C - Table C-2 (Eating establishments)
[h] The Saturday daily and p.m. peak hour percentages of work/non-work trips are assumed to be the same as the weekday p.m. peak hour percentages shown in Table C-2 of the SF Guidelines
[i] SF Guidelines, Appendix E - Table E-15 Visitor Trips to SD3 (All Other)

APPENDIX C
PROPOSED PROJECT PARKING DEMAND

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PARKING DEMAND CALCULATIONS

PROPOSED PROJECT

Office:	605,000 gsf
Retail:	62,500 gsf
Quick Service Restaurant:	11,000 gsf
Sit-down Restaurant:	51,500 gsf

No Event:	----	attendees and	105	employees
Basketball:	18,064	attendees and	1,000	employees
Convention:	9,000	attendees and	675	employees

	WEEKDAY DEMAND		SATURDAY DEMAND	
	Midday (1 PM to 3 PM)	**Evening** (7 PM to 9 PM)	**Midday** (1 PM to 3 PM)	**Evening** (7 PM to 9 PM)
OFFICE (w/ and w/out arena event)				
Short-Term	1,720 daily visitor vehicle-trips	1,720 daily visitor vehicle-trips	0 daily visitor vehicle-trips	0 daily visitor vehicle-trips
	5.5 turn-over rate	5.5 turn-over rate	5.5 turn-over rate	5.5 turn-over rate
	100% of the peak demand [a]	5% of the peak demand [a]	80% of the peak demand [b]	0% of the peak demand [b]
	156 short-term spaces	8 short-term spaces	0 short-term spaces	0 short-term spaces
Long-Term	276 gsf per employee	276 gsf per employee	276 gsf per employee	276 gsf per employee
	2,192 daily employees	2,192 daily employees	489 daily employees [h]	489 daily employees [h]
	27% employees who drive	27% employees who drive	27% employees who drive	27% employees who drive
	1.30 vehicle occupancy	1.30 vehicle occupancy	1.30 vehicle occupancy	1.30 vehicle occupancy
	100% of the peak demand [a]	10% of the peak demand [a]	80% of the peak demand [b]	0% of the peak demand [b]
	457 long-term spaces	46 long-term spaces	82 long-term spaces	0 long-term spaces
Subtotal	**613 spaces**	**54 spaces**	**82 spaces**	**0 spaces**
RETAIL (w/ arena event)				
Short-Term	1,014 daily visitor vehicle-trips	1,014 daily visitor vehicle-trips	1,187 daily visitor vehicle-trips	1,187 daily visitor vehicle-trips
	4.0 turn-over rate	4.0 turn-over rate	4.0 turn-over rate	4.0 turn-over rate
	100% of the peak demand [a]	95% of the peak demand [a]	100% of the peak demand [b]	75% of the peak demand [b]
	127 short-term spaces	120 short-term spaces	148 short-term spaces	111 short-term spaces
Long-Term	350 gsf per employee	350 gsf per employee	350 gsf per employee	350 gsf per employee
	179 daily employees	179 daily employees	179 daily employees	179 daily employees
	27% employees who drive	27% employees who drive	27% employees who drive	27% employees who drive
	1.30 vehicle occupancy	1.30 vehicle occupancy	1.30 vehicle occupancy	1.30 vehicle occupancy
	100% of the peak demand [a]	95% of the peak demand [a]	100% of the peak demand [b]	80% of the peak demand [b]
	37 long-term spaces	35 long-term spaces	37 long-term spaces	30 long-term spaces
Subtotal	**164 spaces**	**155 spaces**	**185 spaces**	**141 spaces**
RETAIL (w/out arena event)				
Short-Term	2,038 daily visitor vehicle-trips	2,038 daily visitor vehicle-trips	2,385 daily visitor vehicle-trips	2,385 daily visitor vehicle-trips
	5.5 turn-over rate	5.5 turn-over rate	5.5 turn-over rate	5.5 turn-over rate
	100% of the peak demand [a]	95% of the peak demand [a]	100% of the peak demand [b]	75% of the peak demand [b]
	185 short-term spaces	176 short-term spaces	217 short-term spaces	163 short-term spaces
Long-Term	350 gsf per employee	350 gsf per employee	350 gsf per employee	350 gsf per employee
	179 daily employees	179 daily employees	179 daily employees	179 daily employees
	27% employees who drive	27% employees who drive	27% employees who drive	27% employees who drive
	1.30 vehicle occupancy	1.30 vehicle occupancy	1.30 vehicle occupancy	1.30 vehicle occupancy
	100% of the peak demand [a]	95% of the peak demand [a]	100% of the peak demand [b]	80% of the peak demand [b]
	37 long-term spaces	35 long-term spaces	37 long-term spaces	30 long-term spaces
Subtotal	**222 spaces**	**211 spaces**	**254 spaces**	**193 spaces**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PARKING DEMAND CALCULATIONS

QUICK SERVICE RESTAURANT (w/ arena event)

Short-Term	518 daily visitor vehicle-trips	518 daily visitor vehicle-trips	646 daily visitor vehicle-trips	646 daily visitor vehicle-trips
	5.5 turn-over rate	5.5 turn-over rate	5.5 turn-over rate	5.5 turn-over rate
	100% of the peak demand [a]	80% of the peak demand [a]	100% of the peak demand [b]	80% of the peak demand [b]
	47 short-term spaces	38 short-term spaces	59 short-term spaces	47 short-term spaces
Long-Term	350 gsf per employee	350 gsf per employee	350 gsf per employee	350 gsf per employee
	31 daily employees	31 daily employees	31 daily employees	31 daily employees
	27% employees who drive	27% employees who drive	27% employees who drive	27% employees who drive
	1.30 vehicle occupancy	1.30 vehicle occupancy	1.30 vehicle occupancy	1.30 vehicle occupancy
	100% of the peak demand [a]	90% of the peak demand [a]	100% of the peak demand [b]	90% of the peak demand [b]
	7 long-term spaces	6 long-term spaces	7 long-term spaces	6 long-term spaces
Subtotal	**54 spaces**	**44 spaces**	**66 spaces**	**53 spaces**

QUICK SERVICE RESTAURANT (w/out arena event)

Short-Term	518 daily visitor vehicle-trips	518 daily visitor vehicle-trips	646 daily visitor vehicle-trips	646 daily visitor vehicle-trips
	5.5 turn-over rate	5.5 turn-over rate	5.5 turn-over rate	5.5 turn-over rate
	100% of the peak demand [a]	80% of the peak demand [j]	100% of the peak demand [b]	80% of the peak demand [j]
	47 short-term spaces	38 short-term spaces	59 short-term spaces	47 short-term spaces
Long-Term	350 gsf per employee	350 gsf per employee	350 gsf per employee	350 gsf per employee
	31 daily employees	31 daily employees	31 daily employees	31 daily employees
	27% employees who drive	27% employees who drive	27% employees who drive	27% employees who drive
	1.30 vehicle occupancy	1.30 vehicle occupancy	1.30 vehicle occupancy	1.30 vehicle occupancy
	100% of the peak demand [a]	90% of the peak demand [j]	100% of the peak demand [b]	90% of the peak demand [j]
	7 long-term spaces	6 long-term spaces	7 long-term spaces	6 long-term spaces
Subtotal	**54 spaces**	**44 spaces**	**66 spaces**	**53 spaces**

SIT-DOWN RESTAURANT (w/ arena event)

Short-Term	809 daily visitor vehicle-trips	809 daily visitor vehicle-trips	1,007 daily visitor vehicle-trips	1,007 daily visitor vehicle-trips
	4.0 turn-over rate	4.0 turn-over rate	4.0 turn-over rate	4.0 turn-over rate
	75% of the peak demand [a]	100% of the peak demand [a]	75% of the peak demand [c]	100% of the peak demand [c]
	76 short-term spaces	101 short-term spaces	94 short-term spaces	126 short-term spaces
Long-Term	350 gsf per employee	350 gsf per employee	350 gsf per employee	350 gsf per employee
	147 daily employees	147 daily employees	147 daily employees	147 daily employees
	27% employees who drive	27% employees who drive	27% employees who drive	27% employees who drive
	1.30 vehicle occupancy	1.30 vehicle occupancy	1.30 vehicle occupancy	1.30 vehicle occupancy
	90% of the peak demand [a]	100% of the peak demand [a]	90% of the peak demand [c]	100% of the peak demand [c]
	28 long-term spaces	31 long-term spaces	28 long-term spaces	31 long-term spaces
Subtotal	**104 spaces**	**132 spaces**	**122 spaces**	**157 spaces**

SIT-DOWN RESTAURANT (w/out arena event)

Short-Term	1,618 daily visitor vehicle-trips	1,618 daily visitor vehicle-trips	2,015 daily visitor vehicle-trips	2,015 daily visitor vehicle-trips
	5.5 turn-over rate	5.5 turn-over rate	5.5 turn-over rate	5.5 turn-over rate
	75% of the peak demand [a]	100% of the peak demand [a]	75% of the peak demand [c]	100% of the peak demand [c]
	110 short-term spaces	147 short-term spaces	137 short-term spaces	183 short-term spaces
Long-Term	350 gsf per employee	350 gsf per employee	350 gsf per employee	350 gsf per employee
	147 daily employees	147 daily employees	147 daily employees	147 daily employees
	27% employees who drive	27% employees who drive	27% employees who drive	27% employees who drive
	1.30 vehicle occupancy	1.30 vehicle occupancy	1.30 vehicle occupancy	1.30 vehicle occupancy
	90% of the peak demand [a]	100% of the peak demand [a]	90% of the peak demand [c]	100% of the peak demand [c]
	28 long-term spaces	31 long-term spaces	28 long-term spaces	31 long-term spaces
Subtotal	**138 spaces**	**178 spaces**	**165 spaces**	**214 spaces**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PARKING DEMAND CALCULATIONS

ARENA (No Event)

Short-Term	0	short-term spaces	0	short-term spaces	0	short-term spaces	0	short-term spaces
Long-Term	105	daily employees	105	daily employees	105	daily employees	105	daily employees
	27%	employees who drive	27%	employees who drive	27%	employees who drive	27%	employees who drive
	1.30	vehicle occupancy	1.30	vehicle occupancy	1.30	vehicle occupancy	1.30	vehicle occupancy
	100%	of the peak demand [e]	10%	of the peak demand [e]	100%	of the peak demand [e]	10%	of the peak demand [e]
	22	long-term spaces	2	long-term spaces	22	long-term spaces	2	long-term spaces
Subtotal	**22**	**spaces**	**2**	**spaces**	**22**	**spaces**	**2**	**spaces**

ARENA (Basketball Game)

Short-Term	7,355	daily visitor vehicle-trips	7,355	daily visitor vehicle-trips	8,028	daily visitor vehicle-trips	8,028	daily visitor vehicle-trips
	1	turn-over rate	1	turn-over rate	1	turn-over rate	1	turn-over rate
	2%	of the peak demand [f]	100%	of the peak demand [a]	2%	of the peak demand [f]	100%	of the peak demand [g]
	74	short-term spaces	3,677	short-term spaces	80	short-term spaces	4,014	short-term spaces
Long-Term	1000	daily employees	1000	daily employees	1000	daily employees	1000	daily employees
	27%	employees who drive	27%	employees who drive	27%	employees who drive	27%	employees who drive
	1.30	vehicle occupancy	1.30	vehicle occupancy	1.30	vehicle occupancy	1.30	vehicle occupancy
	30%	of the peak demand [a]	100%	of the peak demand [a]	30%	of the peak demand [g]	100%	of the peak demand [g]
	63	long-term spaces	208	long-term spaces	63	long-term spaces	208	long-term spaces
Subtotal	**137**	**spaces**	**3,885**	**spaces**	**143**	**spaces**	**4,222**	**spaces**

ARENA (Convention Event)

Short-Term	2,490	daily visitor vehicle-trips	2,490	daily visitor vehicle-trips
	1.5	turn-over rate	1.5	turn-over rate
	100%	of the peak demand [a]	30%	of the peak demand [a]
	830	short-term spaces	249	short-term spaces
Long-Term	675	daily employees	675	daily employees
	27%	employees who drive	27%	employees who drive
	1.30	vehicle occupancy	1.30	vehicle occupancy
	100%	of the peak demand [a]	25%	of the peak demand [a]
	141	long-term spaces	35	long-term spaces
Subtotal	**971**	**spaces**	**284**	**spaces**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PARKING DEMAND CALCULATIONS

TOTAL PARKING DEMAND SUMMARY

	WEEKDAY DEMAND		SATURDAY DEMAND	
	Midday (1 PM to 3 PM)	Evening (7 PM to 9 PM)	Midday (1 PM to 3 PM)	Evening (7 PM to 9 PM)
No Arena Event				
Short-Term	498 spaces	369 spaces	413 spaces	393 spaces
Long-Term	551 spaces	120 spaces	176 spaces	69 spaces
TOTAL	**1,049 spaces**	**489 spaces**	**589 spaces**	**462 spaces**
Basketball Game				
Short-Term	480 spaces	3,944 spaces	381 spaces	4,298 spaces
Long-Term	592 spaces	326 spaces	217 spaces	275 spaces
TOTAL	**1,072 spaces**	**4,270 spaces**	**598 spaces**	**4,573 spaces**
Convention Event				
Short-Term	1,236 spaces	516 spaces		
Long-Term	670 spaces	153 spaces		
TOTAL	**1,906 spaces**	**669 spaces**		

Notes

[a] Table 2-5 Recommended Time-of-Day Factores for Weekdays (pp. 16 and 17), Shared Parking, Second Edition, Urban Land Institute, 2005.
[b] Table 2-6 Recommended Time-of-Day Factores for Weekends (pp. 18 and 19), Shared Parking, Second Edition, Urban Land Institute, 2005.
[c] Based on more conservatively weekday time-of-day factors; Table 2-6 from ULI indicates 55% of the short-term peak parking demand and 75% of the long-term peak parking demand.
[d] Parking Generation, 4th Edition (p. 109), ITE, 2010.
[e] Based on weekday time-of-day factors for office land uses.
[f] Derived from more conservative assumptions; Table 2-6 from ULI indicates 1 percent of the peak demand for short-term parking.
[g] Weekday time-of-day factors from ULI Shared Parking Table 2-5 have been used since ULI weekend data presented in Table 2-6 includes a matinee event.
[h] A Saturday-to-Weekday ratio based on ITE office trip generation rates has been applied to derive the number of office employees on a Saturday.
[i] Appendix G; Transportation Impact Analysis Guidelines for Environmental Review, SF Planning Department, 2002.
[j] Assumed open late on no-event days; same demand percenatges as on an event day.

Sources: SF Guidelines, ULI Shared Parking, ITE Parking Generation, Golden State Warriors

APPENDIX D
LOADING DEMAND CALCULATIONS

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32
Truck and Service Vehicle Loading Demand

Land Use	Gross Square Feet	Truck Trip Generation Ratio (R)	Daily Trucks/ Service Vehicles	Loading Space Demand Average Hour	Loading Space Demand Peak Hour
Event Center	750,000 gsf	NA	30	7	7
Office	605,000 gsf	0.21	127	6	7
Retail	62,500 gsf	0.22	14	1	1
Restaurant	62,500 gsf	3.60	225	10	13
Total			396	24	28

General Loading Demand Equations (SF Guidelines)
for Office, Retail, Restaurant, and Cinema Uses

Daily Trips = (GSF / 1,000) * R
Average Hour = (GSF / 1,000) * R / 9 / 2.4
Peak Hour = (GSF / 1,000) * (R * 1.25) / 9 / 2.4
R = Daily truck trip generation per 1,000 gsf of use from Table H-1 in SF Guidelines

Arena Service Vehicles/Truck Deliveries
GSW Game vendor/service truck deliveries is 6 trucks per game scheduled to avoid peak commute hours.
Non-GSW Event vendor/service truck deliveries are 20 trucks between 4 and 8 AM, and 6 food service trucks between 7 AM and 12 PM.
TV crew trucks include 2 trucks/mobile units arrive at 10 AM and leave at 11:30 PM.
ESPN/TNT games would have an additional 1 or 2 trucks that arrive day before the game.
Source: Golden State Warriors

Event Center Loading Space Demand:
Based on SF Guidelines methodology, modified to reduce number of hours loading would occur, and activities that would occupy the loading dock for one to two days.
Maximum number of deliveries would occur during non-GSW event = 20 vendor/service + 6 food service + up to 4 TV trucks = 30
Peak loading period for 26 trucks would be between 4 and 8 AM = 4 hours. Up to 4 TV trucks occupy space for duration of event.

Appendix E

Other Supporting Technical Data

CITY PLACE CROSS SHOPPING SURVEY RESULTS

DMJM Harris
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Memorandum

Date: October 18, 2007

To: Pat Siefers, Department of Major Environmental Assessment

From: Tim Erney
Geoffrey Rubendall

Subject: CityPlace Cross Shopping Survey Results

Introduction

DMJM Harris is pleased to submit this memorandum summarizing the results from the cross-shopping survey conducted as part of the transportation study for the project proposed for 935 Market Street (referred to as "CityPlace"). As specified in the approved scope of work dated September 6, 2007, DMJM Harris was commissioned to conduct surveys at two existing retail stores in the Union Square area to identify the level of cross-shopping (visitors visiting multiple stores in one shopping trip) in the project area. This survey was conducted to verify the results of another study commissioned by the project sponsor that found that visitors to large value-oriented shopping centers (like those proposed as part of this project) typically visit 1.8 stores per trip.

Survey Methodology

Approach:

During each survey, DMJM Harris staff were stationed at the doorway of each store and asked shoppers how many stores they planned to visit during their shopping trip. The responses from all shoppers were documented and tabulated.

Stores:

DMJM Harris conducted surveys at two stores in the Union Square area that are similar to those likely to be included in the proposed project. Through discussions with the project sponsor, the two stores chosen for the survey were the Ross store located at 799 Market Street and the H&M store located at 149 Powell Street.

Time Periods:

The surveys were conducted over a two-hour period at each store during the following three time periods:

- Weekend Midday Peak Period: 11am to 1pm – Saturday, September 22, 2007
- Weekday Midday Peak Period: 11am to 1pm – Wednesday, September 26, 2007
- Weekday PM Peak Period: 4pm to 6pm – Wednesday, September 26, 2007

Survey Results

The results of the surveys are presented in Table **1**. As shown, the average shopper to these two stores planned to visit an average of about 2 ½ to 3 stores regardless of the time period of the shopping trip. The detailed results of the surveys are graphically illustrated in Figure **1**. It should be noted that at both stores, weekend visitors typically visited more stores during their trips than weekday visitors.

Table 1: Survey Results

Store	Weekend Midday Peak Saturday, 9/22/07 11am to 1pm		Weekday Midday Peak Wednesday, 9/26/07 11am to 1pm		Weekday PM Peak Wednesday, 9/26/07 4pm to 6pm	
	# of Responses	Avg # Stores Visited	# of Responses	Avg # Stores Visited	# of Responses	Avg # Stores Visited
H&M	107	3.4	119	3.1	117	2.9
Ross	250	3.1	267	2.4	248	2.5
Total	**357**	**3.2**	**386**	**2.6**	**365**	**2.6**
				Overall	**1,108**	**2.8**

Source: DMJM Harris – October 2007

It should be noted that responses that were greater than five stores were put into a "5+" category. The above averages were calculated using the "5+" as five. Therefore, the averages presented in the above table are slightly underestimated.

Conclusions and Recommendations

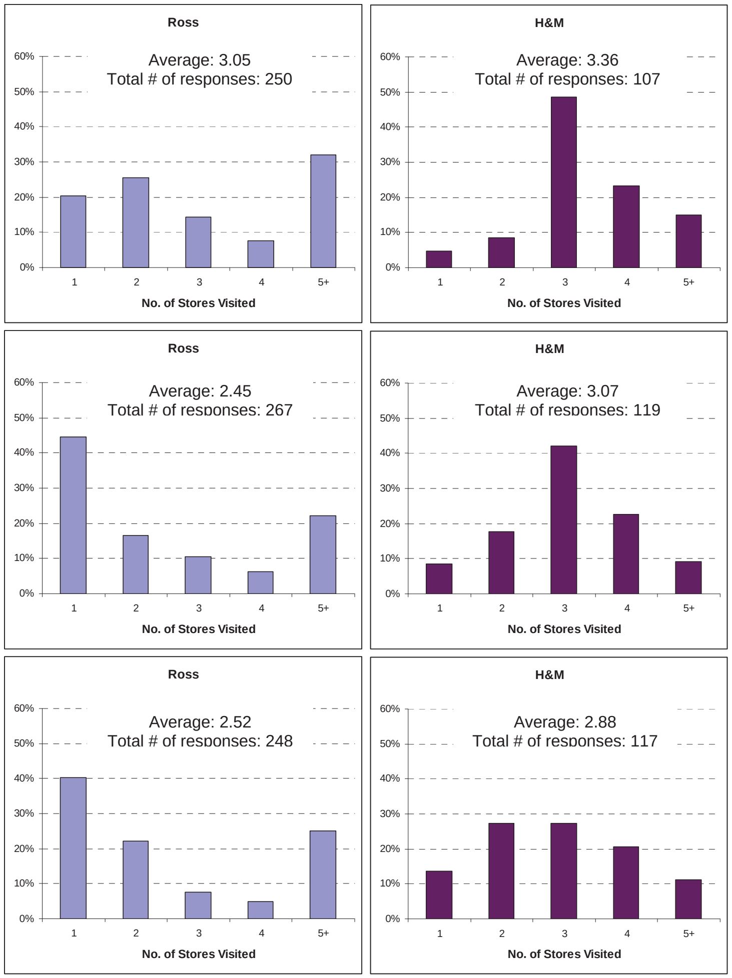
As shown in the previous table and following charts, it was found that the stores surveyed exceeded the 1.8 stores per visit figure that was found in the previous survey commissioned by the project sponsor. Therefore, it is DMJM Harris' recommendation that the 1.8 cross-shopping factor is appropriate for the analysis to account for linked trips to other retail stores in the Union Square area. The 1.8 factor is a more conservative value than the factors calculated in this doorway survey, and was determined by a more detailed survey and supplemental research.

Figure 1: Survey Results

Saturday 11am to 1pm

Wednesday 11am to 1pm

Wednesday 4pm to 6pm



TRANSPORTATION PLANNING ASSUMPTIONS FOR THE ATLANTIC YARDS ARENA AND REDEVELOPMENT

Philip Habib & Associates
Engineers and Planners • 226 West 26th Street • New York, NY 10001 • 212 929 5656 • 212 929 5605 (fax)

TECHNICAL MEMORANDUM

TO: Files

FROM: Stuart Gewirtzman

DATE: May 4, 2006

PROJECT: Atlantic Yards Arena and Redevelopment (PHA No. 0343E)

RE: Transportation Planning Assumptions

This memorandum summarizes the transportation planning assumptions to be used for the analysis of traffic, parking, transit and pedestrian conditions for the proposed Atlantic Yards Arena and Redevelopment project. Estimates of the proposed project's peak hour travel demand and trip assignment patterns are provided, along with discussions of the traffic, parking, transit and pedestrian study areas for the impact analyses.

PROJECT PROGRAM

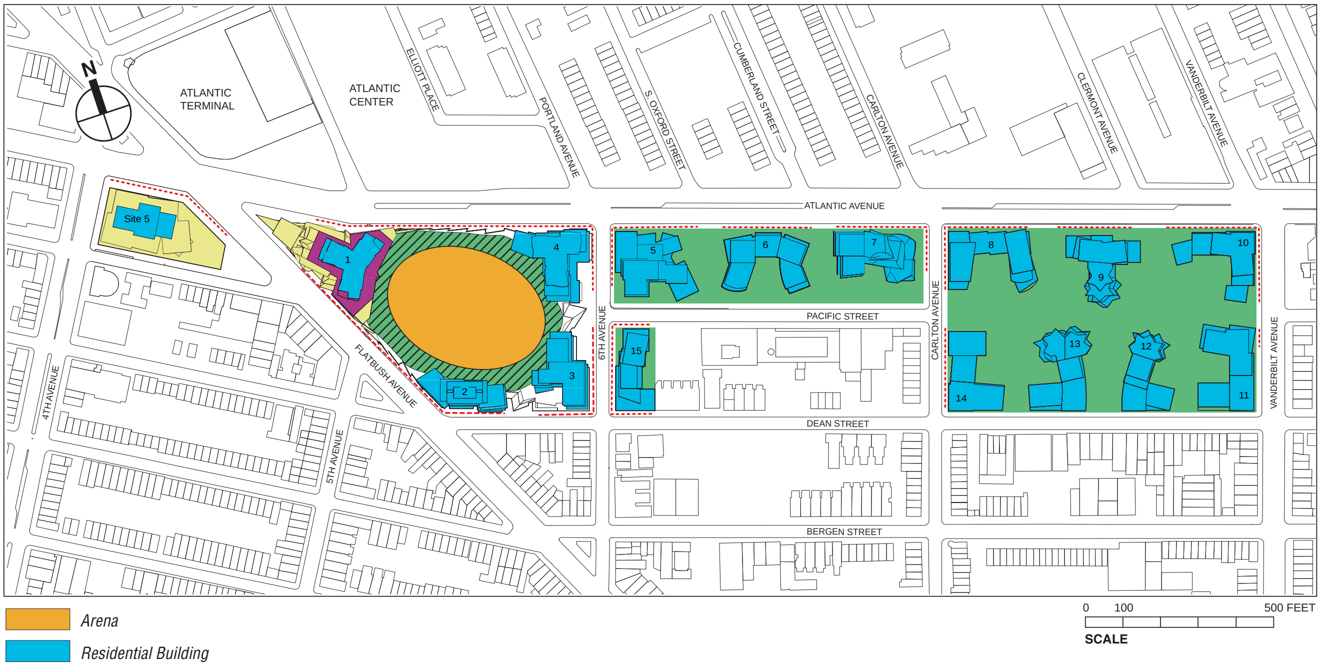
The proposed Atlantic Yards Arena and Redevelopment project would be located on an approximately 22-acre site in the Atlantic Terminal area of Brooklyn, roughly bounded by Flatbush and Fourth Avenues on the west, Vanderbilt Avenue on the east, Atlantic Avenue on the north, and Dean Street on the south (see Figure 1). In addition to an approximately 850,000 gross-square-foot (gsf) arena for use by the Nets professional basketball team and other sporting and cultural events, it is anticipated that the proposed project would include residential, office, hotel, and local retail uses, approximately seven acres of publicly accessible open space, approximately 3,800 parking spaces, and an improved Long Island Rail Road (LIRR) yard. In addition to the arena, a total of 16 buildings would be constructed on the eight blocks comprising the project site. These buildings are referred to as Site 5 and Buildings 1 through 15.

The proposed development considers two program variations: residential mixed-use and commercial mixed-use (shown in Figures 2a and 2b, respectively). The variations reflect the fact that the programs for three of the project's 17 buildings are not fixed and could be

Atlantic Yards Arena and Redevelopment Project

Project Site
Figure 1

3.29.06



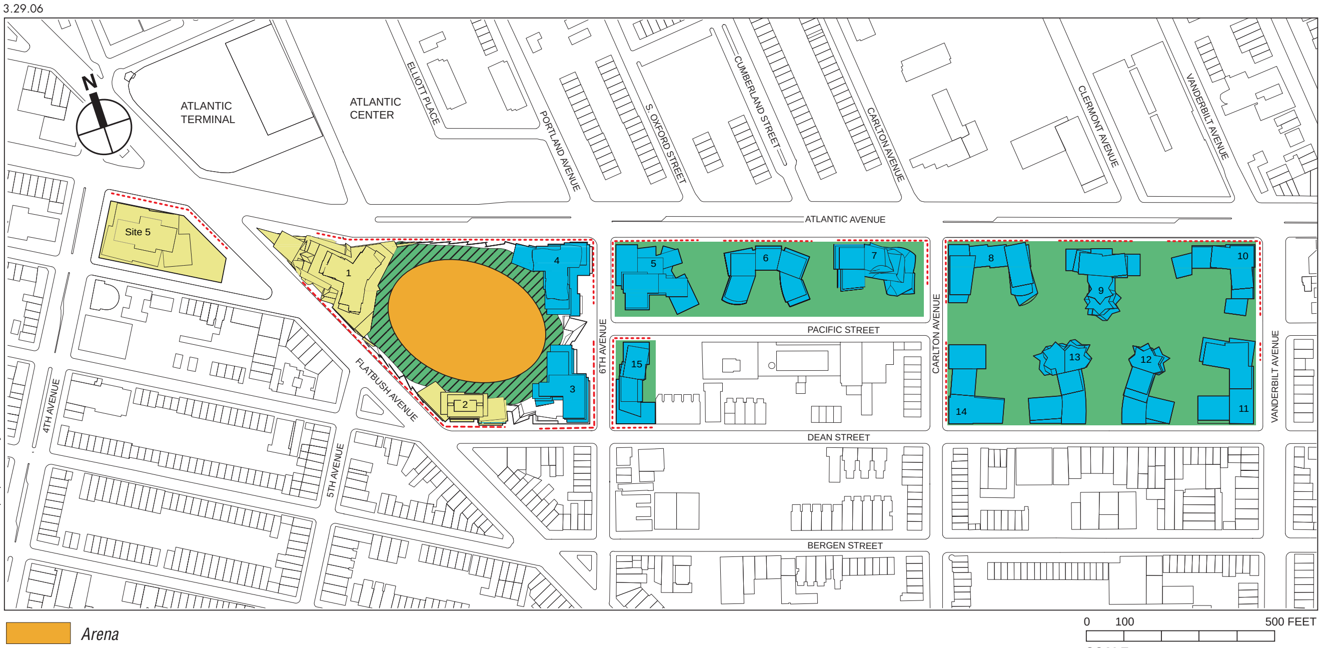
- *Arena*
- *Residential Building*
- *Commercial Building*
- *Public Open Space*
- *Private Open Space*
- *Hotel*
- *Street-Level Retail*

Atlantic Yards Arena and Redevelopment Project

Residential Mixed-Use Variation Site Plan

Figure 2a

3.29.06



- *Arena*
- *Residential Building*
- *Commercial Building*
- *Public Open Space*
- *Private Open Space*
- *Street-Level Retail*

Atlantic Yards Arena and Redevelopment Project

Commercial Mixed-Use Variation Site Plan

Figure 2b

used for a mixture of residential and commercial uses. Under the commercial mixed-use variation additional commercial space would substitute for the hotel use and a majority of the residential space in Buildings 1 and 2 on the arena site (blocks 1118, 1119, and 1127) and on Site 5 (Block 927). The other buildings and uses on the project site (the arena and Buildings 3 through 15) would remain the same under both the residential mixed-use and commercial mixed-use variations. Table 1 compares the development programs for the proposed project's two variations. As shown in Table 1, along with the 18,000-seat arena (for basketball), the residential mixed-use variation would consist of a total of approximately 6,860 dwelling units, 606,000 gsf of commercial office space, a 180-room hotel, and 247,000 gsf of ground floor local retail space that would be distributed among Site 5 and Buildings 1 through 15. A total of approximately 3,800 parking spaces would also be provided in on-site parking garages. By contrast, the commercial mixed-use variation would include approximately 5,790 dwelling units, 1,829,000 gsf of commercial office space, and no hotel use, as well as a total of approximately 3,800 parking spaces. The arena and local retail uses would remain the same under both scenarios.

Table 1
Project Development Program

Component	Residential Mixed-Use Variation	Commercial Mixed-Use Variation
Arena	850,000 gsf (18,000 seats)	850,000 sf (18,000 seats)
Residential	6,860 D.U.	5,790 D.U.
Office	606,000 gsf	1,829,000 gsf
Local Retail	247,000 gsf	247,000 gsf
Hotel	165,000 gsf (180 rooms)	0 gsf
Parking	3,800 spaces	3,800 spaces

Both the residential mixed-use and the commercial mixed-use variations are expected to include community facility uses, including a health care center and an intergenerational community center offering child care and youth and senior activities. Community facilities built as part of the proposed project would occupy some portion of the 247,000 gsf of space included as local retail in Table 1. For the purposes of the travel demand forecast, all of this space is assumed to be local retail (i.e., retail establishments serving the needs of workers and residents in the neighborhood).

It is anticipated that the proposed project would be developed in two phases. Phase I, to be completed in 2010, would include the arena, Site 5, Buildings 1 through 4, and a new on-site entrance to the Atlantic Avenue/Pacific Street subway station complex on Block 1118

at the intersection of Flatbush and Atlantic Avenues. Two parking garages located on Site 5 and the Arena Block would be constructed, along with interim parking elsewhere on the project site. Also included in this phase would be the closure of the existing LIRR yard at the west end of the site and the development of an improved LIRR yard at the east end of the site along with a new portal for direct train access between the new yard and the LIRR's Atlantic Terminal. The remainder of the project, which includes construction of Buildings 5 through 15 and additional permanent parking, would be completed by 2016.

In addition to the development program outlined above, the proposed project would entail a number of permanent roadway closures and changes in street direction, including:

- the closure of Pacific Street between Flatbush Avenue and Sixth Avenue, and between Carlton and Vanderbilt Avenues;
- the closure of Fifth Avenue between Flatbush and Atlantic Avenues;
- the conversion of Sixth Avenue between Atlantic and Flatbush Avenues from one-way southbound to two-way operation (partly in response to the closure of Fifth Avenue); and
- the conversion of Carlton Avenue from one-way northbound to two-way operation between Atlantic Avenue and Pacific Street.

SELECTION OF PEAK HOURS FOR ANALYSIS

On weekdays, the proposed project's residential, office and local retail components are expected to generate their highest demand during the traditional 8-9 AM and 5-6 PM commuter periods as well as the 12-1 PM midday (lunch time) period. By contrast, a Nets basketball game at the arena would generate much of its travel demand during the weekday evening and nighttime periods and on weekends. On weekdays, for example, it is anticipated that a Nets basketball game or other event at the arena would typically start at 7:30 PM or 8 PM. A 7-8 PM peak hour was therefore selected for the analysis of weekday pre-game conditions as it is during this period that residual commuter demand and peak demand en route to a basketball game or other event at the arena would most likely overlap. The 10-11 PM peak hour was selected for the weekday nighttime period to coincide with the peak demand generated at the end of a basketball game or other event at the arena. For the weekend period, the 1-2 PM and 4-5 PM peak hours on a Saturday were selected for analysis to coincide with the start and end times of a weekend afternoon basketball game, respectively, as well as peak retail-based travel demand from on-site and other nearby retail uses in Downtown Brooklyn (Atlantic Center, for example).

The EIS traffic analyses will examine conditions in all seven peak hours identified above. Transit (subway and bus) analyses generally examine conditions during the weekday AM and PM peak commuter periods as it is during these times that overall transit demand (and the potential for significant adverse impacts) is typically greatest. As there would be some overlap between trips en route to the arena and commuter demand during the 7-8 PM pre-game period, this peak hour will also be analyzed to identify potential impacts at subway station processors (e.g., entrance stairways, fare arrays, etc.). In addition to the weekday AM and PM peak commuter hours, the pedestrian analysis will also focus on the 7-8 PM pre-game and Saturday 1-2 PM midday peak hours as it is during these periods that trips en route to the arena would coincide with elevated demand on study area pedestrian facilities (from commuters and shoppers, respectively).

TRANSPORTATION PLANNING ASSUMPTIONS

The transportation planning assumptions used to forecast travel demand from the project's residential, office, hotel, local retail and arena components are summarized in Table 2 and discussed below. The trip generation rates, temporal distributions and mode choice assumptions shown in Table 2 were based on accepted CEQR criteria, standard professional references, and studies that have been done for similar uses in Downtown Brooklyn and Manhattan. These sources were supplemented by data from the 2000 Census, and Employee Commute Options survey data from firms and governmental/educational institutions in Downtown Brooklyn.

Residential

The forecasts of travel demand from the project's residential components were based on trip rates from *Urban Space for Pedestrians* (Pushkarev & Zupan, 1975) and *Trip Generation, 7th Edition* (ITE), and vehicle occupancy and temporal and directional distribution data from the *Downtown Brooklyn Development FEIS* (April 2004). The weekday modal split assumed for the residential components reflects journey-to-work data from the 2000 Census. Although residential-based trips in the midday would likely be more local in nature than in the peak commuter hours (and therefore have a higher walk share, for example), the modal split based on census journey-to-work data is conservatively assumed for all analyzed weekday peak periods. The modal split for the Saturday peak periods was adjusted to reflect anticipated higher walk and auto shares compared to the weekday periods.

Office

The travel demand forecasts for the project's office components were based on trip rates and temporal distributions from *Urban Space for Pedestrians* and the *Coliseum Redevelopment FSEIS* (July 1997). The estimated modal split and vehicle occupancies were derived from NYCDOT Employee Commute Options survey data from office firms and governmental/educational institutions in Downtown Brooklyn, as well as data from the *Downtown Brooklyn Development FEIS*.

Hotel

The travel demand forecast for the hotel that would be developed under the residential mixed-use variation (but not the commercial mixed-use variation) was based on data from the *Renaissance Plaza Expansion EAS* (March 2003) and from the *Marriott Hotel Transportation*

Table 2
Transportation Planning Assumptions for Project Components

Land Use:		Arena			Residential		Office		Hotel		Local Retail	
		(1)			(3,6)		(6,11)		(4)		(6,7)	
Trip Generation:	Weekday	2.00			8.075		18.00		5.82		205	
(Person-trips)	Saturday	2.00			7.679		0.90		8.61		205	
		(trips/seat)			(trips/dwelling unit)		(trips/1,000 gsf)		(trips/room)		(trips/1,000 gsf)	
		(8,9)			(2,23)		(2)		(4,5)		(2,10)	
Temporal Distribution:	AM (8-9)	1.0%			9.1%		11.8%		6.6%		3.1%	
	MD (12-1)	1.0%			4.7%		14.5%		8.3%		19.0%	
	PM (5-6)	5.0%			10.7%		13.7%		7.7%		9.6%	
	Pre-game (7-8 PM)	37.5%			8.3%		4.0%		6.6%		3.0%	
	Post-game (10-11 PM)	42.5%			3.3%		0.5%		2.0%		1.0%	
	Saturday (1-2 PM)	37.5%			7.0%		15.0%		7.5%		9.5%	
	Saturday (4-5 PM)	42.5%			7.2%		15.0%		7.5%		9.5%	
		(12)			(22)		(14,15)		(4)		(13)	
		Weekday		Sat								
Modal Split:		In	Out	All Periods	Weekday	Sat	AM/PM/EVE	MD/Sat MD	All Periods		All Periods	
	Auto	34.8%	35.9%	40.0%	14.0%	20.0%	12.0%	2.0%	30.1%		2.0%	
	Taxi	3.0%	3.0%	3.0%	1.0%	1.0%	1.0%	1.0%	12.3%		3.0%	
	Subway	49.7%	46.7%	44.0%	72.0%	45.0%	65.0%	7.0%	18.8%		20.0%	
	LIRR	7.7%	9.6%	8.0%	1.0%	1.0%	12.0%	0.0%	0.0%		0.0%	
	Bus	2.1%	2.1%	2.0%	3.0%	3.0%	6.0%	7.0%	5.5%		5.0%	
	Walk	2.7%	2.7%	3.0%	9.0%	30.0%	4.0%	83.0%	33.3%		70.0%	
		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%		100.0%	
		(16)		(16)	(13,22)		(14)		(4)		(13)	
		Weekday		Sat	All Periods		All Periods		All Periods		All Periods	
Vehicle Occupancy:	Auto	2.35		2.75	1.18		1.42		1.60		2.00	
	Taxi	2.35		2.75	1.40		1.42		1.40		2.00	
		(13,17)			(5,13)		(2,5,13)		(4,18)		(10)	
Directional		In	Out		In	Out	In	Out	In	Out	In	Out
Distribution:	AM (8-9)	96%	4%		20%	80%	96%	4%	41%	59%	50%	50%
	MD (12-1)	39%	61%		51%	49%	39%	61%	68%	32%	50%	50%
	PM (5-6)	85%	15%		65%	35%	5%	95%	59%	41%	50%	50%
	Pre-game (7-8 PM)	99%	1%		70%	30%	20%	80%	60%	40%	50%	50%
	Post-game (10-11 PM)	1%	99%		95%	5%	20%	80%	95%	5%	50%	50%
	Saturday (1-2 PM)	99%	1%		50%	50%	60%	40%	56%	44%	55%	45%
	Saturday (4-5 PM)	1%	99%		50%	50%	15%	85%	56%	44%	45%	55%
		(21)			(5,13)		(5,20)		(5,19)		(5,19)	
Daily Truck Trip	Weekday	0.07			0.07		0.16		0.06		0.35	
Generation:	Saturday	0.02			0.01		0.01		0.01		0.02	
		(trips/1,000 gsf)			(trips/dwelling unit)		(trips/1,000 gsf)		(trips/1,000 gsf)		(trips/1,000 gsf)	
		(21)			(19)		(5,20)		(5,19)		(5,19)	
Truck Trip	AM (8-9)	12%			12%		7%		12%		8%	
Temporal Distribution:	MD (12-1)	14%			9%		7%		9%		11%	
	PM (5-6)	3%			2%		3%		0%		2%	
	Pre-game (7-8 PM)	0%			0%		2%		0%		0%	
	Post-game (10-11 PM)	0%			0%		2%		0%		0%	
	Saturday (1-2 PM)	20%			9%		11%		9%		11%	
	Saturday (4-5 PM)	0%			0%		3%		0%		2%	

Notes:
(1) Although a sell-out basketball game typically has 90% attendance, a trip rate of 2 trips/seat for all 18,000 seats is assumed in order to account for trips by spectators as well as employees, players, coaches, team staff and other visitors.
(2) Source: Pushkarev & Zupan, *Urban Space for Pedestrians* .
(3) Saturday residential trip rate based on ratio of weekday/Saturday trip rates from *ITE Trip Generation* , *7th Edition* , Land Use: 220 (Apartment).
(4) Source: *Renaissance Plaza Expansion EAS* , March 2003 and data from *Marriott Hotel Transportation Survey* , AKRF, August 1999.
(5) Based on Saturday data from *Coliseum Redevelopment FSEIS* , July 1997.
(6) Source: *City Environmental Quality Review (CEQR) Technical Manual*, Appendix 3, 2001.
(7) Weekday trip generation rate assumed for Saturday as per *Coliseum Redevelopment FSEIS* , July 1997.
(8) Based on data from *Madison Square Garden Modal Split Analysis* , August 26, 2003.
(9) Post-game arena temporal distribution based on MTA data on subway ridership patterns at stations serving Madison Square Garden.
(10) Source: *Coliseum Redevelopment FSEIS* , July 1997.
(11) Saturday trip generation assumed to be 5% of weekday generation, consistent with assumptions in the *Coliseum Redevelopment FSEIS* , July 1997.
(12) Reflects the anticipated origin/destination distribution of arena spectators and the accessibility by transit of the proposed arena site in Downtown Brooklyn.
(13) Source: *Downtown Brooklyn Development FEIS* , April 2004.
(14) Source: NYCDOT ECO Survey data for Downtown Brooklyn.
(15) Source for midday modal split data: *Downtown Brooklyn Development FEIS* , April 2004. Weekday midday modal split assumed for Saturday midday.
(16) Based on data from *Madison Square Garden Modal Split Analysis* and data from a PHA parking survey prior to a Knicks game at MSG on March 9, 2003.
(17) PM and pre-game directional distribution for arena trips assumed to be predominantly inbound; post-game predominantly outbound.
(18) Weekday 10-11 PM directional distribution assumed based on pattern for residential uses.
(19) Source: *Curbside Pickup & Delivery Operations & Arterial Traffic Impacts* , FHWA, February 1981.
(20) Weekday office truck trip rate and temporal distribution based on PHA June 10, 2004 survey at existing office buildings in Midtown and Lower Manhattan.
(21) Based on FCRC projections for Arena loading dock usage.
(22) Based on 2000 Census journey-to-work data. Saturday modal split adjusted to reflect anticipated higher walk and auto shares compared to a weekday.
(23) Saturday 4-5 PM based on Sunday 4-5 PM data from the *No. 7 Subway Extension - Hudson Yards Rezoning and Development Program FGEIS* , Nov. 2004.

Survey (AKRF, August 1999). Saturday temporal distribution and truck trip generation assumptions were based on data from the *Coliseum Redevelopment FSEIS*.

Local Retail

The retail uses developed under both the residential mixed-use variation and the commercial mixed-use variation would be local (or "neighborhood") retail, attracting trips primarily from the residential and worker populations on-site and in surrounding neighborhoods. It is therefore anticipated that the majority of these trips would be via the walk mode, and that many would be "linked" trips (e.g., a trip with multiple purposes, such as stopping at a retail store while commuting to or from work) and would therefore not represent the addition of new discrete trips to the study area transportation systems. For the purposes of the travel demand forecast, it is conservatively assumed that 40 percent of retail trips would be such "linked" trips, consistent with the rates assumed for other retail developments in New York City. The travel demand forecasts for local retail uses were based on data from a variety of sources, including the *City Environmental Quality Review (CEQR) Technical Manual* (2001), *Coliseum Redevelopment FSEIS*, and *Downtown Brooklyn Development FEIS*.

Arena

The proposed 850,000 gsf Atlantic Yards Arena would accommodate 18,000 to 20,500 seats, depending on the event. The capacity for a basketball game, for example, would be 18,000 seats, whereas for a concert, ethnic event or religious/motivational show, additional space for seating could be available on the arena floor. As a reasonable worst case for the EIS transportation analyses, the weekday and Saturday travel demand forecasts examine the demand that would be generated by a Nets basketball game at the arena. A Nets basketball game was selected as a reasonable worst case scenario based on both the frequency of home games and the relatively high level of travel demand that such games are expected to generate compared to most other uses. Using the 2005-2006 season as a guide, approximately 41 games would occur at the arena during a typical basketball season from early November to late April (not including playoff games which could continue through June). Approximately 26 of these games would occur on a weekday, four on a weekend afternoon (Saturday or Sunday) and 11 on a weekend evening. Non-basketball events, such as concerts, ethnic shows, general fixed fee rentals (graduations, receptions, job fairs, etc.), religious/motivational shows, other sporting events, family shows and community events, are each expected to occur with less frequency, would often attract fewer spectators, and would typically generate a lower level of travel demand than a Nets basketball game.

The travel demand forecast for the arena assumes a sold-out game with 100 percent attendance for all 18,000 seats, and a daily trip generation rate of two trips per seat. It should be noted, however, that the actual number of spectators at a game is typically fewer than the number of tickets distributed, and that even a sold-out game typically has about 90 percent attendance. The daily trip generation rate of two trips per seat for all 18,000 seats therefore also accounts for trips by employees, players, coaches, team staff and other such non-spectator demand.

Data on the arrival patterns for spectators at a Knicks basketball game at Madison Square Garden reported in the August 26, 2003 *Madison Square Garden Modal Split Analysis* study was utilized to estimate the temporal distribution for trips to the Atlantic Yards Arena. Based on these data, it is estimated that approximately 75 percent of spectators en route to a basketball game would arrive in the peak one-hour period. The temporal distribution of post-game peak hour trips was estimated based on MTA subway ridership data for stations serving Madison Square Garden. Using a comparison of the subway ridership on both game days and non-game days, and the hourly variation in the demand attributable to Madison Square Garden, it is estimated that approximately 85 percent of spectators would typically depart the Atlantic Yards Arena in the peak one hour at the end of a basketball game.

In addition to trips by spectators before and after a Nets basketball game, it is anticipated that arena employees, players, coaches, team staff and other non-spectator visitors to the arena would generate trips outside of the immediate pre-game and post-game periods. As shown in the temporal distribution in Table 2, it is assumed that one percent of daily trips generated by the arena would occur in each of the weekday AM and midday peak hours, and five percent during the weekday 5-6 PM peak hour.

Trip origin and modal split assumptions for the Atlantic Yards Arena reflect the anticipated origin/destination distribution of arena spectators and the accessibility by transit of the proposed arena site in Downtown Brooklyn. The assumptions were developed from trip origin and modal split data reported in the *Madison Square Garden Modal Split Analysis* study, along with data specific to Downtown Brooklyn developed for other studies such as the *Downtown Brooklyn Development FEIS*. The derivations of the trip origin/destination and modal split assumptions for both a weekday and weekend sporting event at the proposed arena are presented in Appendix A. For example, it is anticipated that there would be a higher percentage of trips en route to the Atlantic Yards Arena from Brooklyn than for Madison Square Garden (30 percent versus 7 percent, respectively), and a lower percentage of trips with Manhattan origins (25 percent versus 36 percent, respectively). With its proximity to Penn Station, the Port Authority Bus Terminal, the PATH terminal at West 33rd Street and the Lincoln Tunnel, a sporting event at Madison Square Garden likely attracts a higher percentage of spectators from New Jersey than would be the case for an arena located in Downtown Brooklyn. The analysis therefore assumes that 13 percent of trips would be en route from New Jersey compared to 21 percent for Madison Square Garden.

As with trip origins, modal splits were correspondingly adjusted to reflect both the anticipated trip origins and the differences in transit access. For example, the combined weekday auto share from all origins was increased to 34.8 percent from the 29.7 percent experienced at Madison Square Garden, while the taxi share (which includes livery or "black" cars) was reduced (from 7.5 percent to 3.0 percent) in part to reflect the generally higher availability and usage of taxis in Manhattan. Trips from the northern and western suburbs served by PATH, NJ Transit and Metro-North were assumed to complete their journeys via the subway mode, accounting in part for a higher subway mode share than for Madison Square Garden (49.7 percent versus 23.6 percent on weekdays). A smaller percentage of trips were assumed to travel to the Atlantic Yards Arena via Long Island Rail Road compared to Madison Square Garden as there is no direct access to the LIRR's Brooklyn terminus from the Port Washington Branch. Walk-only trips were also assumed to be lower compared to Madison Square Garden given the higher concentration of office space and overall employment in the Garden's midtown Manhattan location compared to Downtown Brooklyn.

Based on discussions with MTA New York City Transit concerning the anticipated travel characteristics of arena patrons, separate trip origin/destination and modal split assumptions have been assumed for persons arriving and departing the arena. On weekdays it is likely that some spectators would travel to the arena from workplaces in one borough or county, and then depart en route to residences in a different borough or county at the conclusion of a game, sometimes by a different mode of travel. For example, it is likely that some spectators would travel to the arena from Manhattan by subway, and then to homes on Long Island via the Long Island Rail Road's Atlantic Terminal. Others may walk from workplaces in Downtown Brooklyn and then drive home to New Jersey. These work-based trips en route to the arena are more likely to be made by transit (primarily subway) than would be the case for post-game trips en route home which are more likely to have higher auto and commuter rail shares. The trip destination and modal split assumptions shown in Appendix A for persons departing the arena on a weekday therefore reflect a lower Manhattan share than for trips en route to the arena (20 percent versus 25 percent), and a lower subway share (46.7 percent versus 49.7 percent). The auto mode share is slightly higher for trips departing the arena (35.9 percent versus 34.8 percent) as is the LIRR share (9.8 percent versus 7.8 percent), reflecting the expected higher percentage of trips with end points outside of Manhattan in the post-game period. As work-based trips would be minimal on weekends, the travel demand forecast assumes a general balance of trip origins and destinations for the Saturday peak hours.

Truck Trips

Truck trip generation rates and temporal distributions for the project's residential, hotel and local retail components were based on data from the *Coliseum Redevelopment FSEIS* and from *Curbside Pick-Up & Delivery Operations and Arterial Traffic Impacts* (FHWA, February 1981). Truck travel demand for the project's office component was based on data from surveys at existing office buildings in Midtown and Lower Manhattan. The truck trip generation forecast for the arena was derived from projections for arena loading dock usage provided by the project sponsors. These truck trips include deliveries of food and supplies, general deliveries (e.g., UPS, Fed Ex, etc.), and trucks associated with television broadcasts.

TRIP GENERATION

Tables 3 and 4 show the trip generation in peak hour person trips that would result in 2016 from the full build-out of the residential mixed-use and commercial mixed-use variations, respectively. A comparison of the total peak hour person trips generated by each scenario is presented in Table 5 along with the total numbers of peak hour vehicle trips (auto, taxi and truck) and person trips by transit (subway, bus and LIRR).

It should be noted that the residential mixed-use variation and the commercial mixed-use variation would both displace existing land uses on the project site, such as the 46,913 square feet of retail (a Modell's Sporting Goods store and a P.C. Richards consumer electronics

Table 3
Travel Demand Forecast for the Residential Mixed-Use Variation - 2016
(Person Trips)

		Site 5			Arena Block						Residential Blocks [1]					
		Residential/ Office/Local Retail			Arena			Residential/ Office/Hotel/Local Retail			Residential/Local Retail			Total Trips		
Person Trips by Mode:		In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
AM (8-9)	Auto	74	29	103	120	5	125	135	186	321	99	378	477	428	598	1,026
	Taxi	9	5	14	10	0	10	16	20	36	16	35	51	51	60	111
	Subway	407	156	563	172	7	179	684	913	1,597	537	1,969	2,506	1,800	3,045	4,845
	LIRR	66	5	71	27	1	28	85	15	100	7	26	33	185	47	232
	Bus	38	10	48	7	0	7	56	44	100	35	95	130	136	149	285
	Walk	89	79	168	9	0	9	122	183	305	269	448	717	489	710	1,199
	Total	683	284	967	345	13	358	1,098	1,361	2,459	963	2,951	3,914	3,089	4,609	7,698
MD (12-1)	Auto	24	28	52	49	79	128	91	82	173	160	153	313	324	342	666
	Taxi	20	21	41	4	7	11	29	27	56	64	64	128	117	119	236
	Subway	170	179	349	70	103	173	424	420	844	994	969	1,963	1,658	1,671	3,329
	LIRR	1	1	2	11	21	32	4	4	8	9	9	18	25	35	60
	Bus	48	59	107	3	5	8	65	76	141	118	118	236	234	258	492
	Walk	617	746	1,363	4	6	10	701	848	1,549	1,354	1,352	2,706	2,676	2,952	5,628
	Total	880	1,034	1,914	141	221	362	1,314	1,457	2,771	2,699	2,665	5,364	5,034	5,377	10,411
PM (5-6)	Auto	33	94	127	532	97	629	185	196	381	374	210	584	1,124	597	1,721
	Taxi	10	15	25	46	8	54	26	26	52	54	41	95	136	90	226
	Subway	195	529	724	760	126	886	919	1,016	1,935	2,010	1,168	3,178	3,884	2,839	6,723
	LIRR	6	77	83	118	26	144	17	100	117	26	13	39	167	216	383
	Bus	21	55	76	32	6	38	53	81	134	122	88	210	228	230	458
	Walk	210	227	437	41	7	48	304	280	584	873	768	1,641	1,428	1,282	2,710
	Total	475	997	1,472	1,529	270	1,799	1,504	1,699	3,203	3,459	2,288	5,747	6,967	5,254	12,221
Pre-game (7-8 PM)	Auto	26	29	55	4,651	48	4,699	155	91	246	301	132	433	5,133	300	5,433
	Taxi	4	6	10	401	4	405	17	11	28	30	18	48	452	39	491
	Subway	140	160	300	6,642	63	6,705	749	444	1,193	1,583	712	2,295	9,114	1,379	10,493
	LIRR	6	20	26	1,029	13	1,042	16	27	43	21	9	30	1,072	69	1,141
	Bus	10	15	25	281	3	284	38	30	68	78	42	120	407	90	497
	Walk	75	72	147	361	4	365	160	111	271	391	282	673	987	469	1,456
	Total	261	302	563	13,365	135	13,500	1,135	714	1,849	2,404	1,195	3,599	17,165	2,346	19,511
Post-game (10-11 PM)	Auto	12	4	16	53	5,438	5,491	81	8	89	162	11	173	308	5,461	5,769
	Taxi	2	1	3	5	454	459	8	1	9	15	3	18	30	459	489
	Subway	62	22	84	76	7,074	7,150	387	41	428	842	64	906	1,367	7,201	8,568
	LIRR	2	2	4	12	1,454	1,466	6	3	9	12	0	12	32	1,459	1,491
	Bus	3	2	5	3	318	321	18	3	21	39	7	46	63	330	393
	Walk	27	21	48	4	409	413	73	22	95	171	72	243	275	524	799
	Total	108	52	160	153	15,147	15,300	573	78	651	1,241	157	1,398	2,075	15,434	17,509
Saturday (1-2 PM)	Auto	22	21	43	5,346	54	5,400	137	130	267	263	258	521	5,768	463	6,231
	Taxi	10	8	18	401	4	405	22	19	41	43	38	81	476	69	545
	Subway	97	85	182	5,881	59	5,940	319	305	624	747	710	1,457	7,044	1,159	8,203
	LIRR	1	1	2	1,069	11	1,080	6	6	12	13	13	26	1,089	31	1,120
	Bus	19	15	34	267	3	270	37	33	70	86	77	163	409	128	537
	Walk	252	208	460	401	4	405	409	360	769	1,065	938	2,003	2,127	1,510	3,637
	Total	401	338	739	13,365	135	13,500	930	853	1,783	2,217	2,034	4,251	16,913	3,360	20,273
Saturday (4-5 PM)	Auto	22	26	48	61	6,059	6,120	140	140	280	265	270	535	488	6,495	6,983
	Taxi	8	10	18	5	454	459	21	20	41	38	43	81	72	527	599
	Subway	85	98	183	67	6,665	6,732	318	348	666	725	762	1,487	1,195	7,873	9,068
	LIRR	1	1	2	12	1,212	1,224	7	11	18	13	13	26	33	1,237	1,270
	Bus	14	19	33	3	303	306	33	36	69	77	86	163	127	444	571
	Walk	202	261	463	5	454	459	354	387	741	950	1,077	2,027	1,511	2,179	3,690
	Total	332	415	747	153	15,147	15,300	873	942	1,815	2,068	2,251	4,319	3,426	18,755	22,181

Notes:
[1] Includes blocks 1120, 1121, 1128, 1129.

Table 4
Travel Demand Forecast for the Commercial Mixed-Use Variation - 2016
(Person Trips)

		Site 5			Arena Block						Residential Blocks [1]					
		Office/Local Retail			Arena			Residential/Office/ Local Retail			Residential/Local Retail			Total Trips		
Person Trips by Mode:		In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
AM (8-9)	Auto	139	8	147	120	5	125	339	120	459	99	378	477	697	511	1,208
	Taxi	14	3	17	10	0	10	31	11	42	16	35	51	71	49	120
	Subway	758	49	807	172	7	179	1,836	626	2,462	537	1,969	2,506	3,303	2,651	5,954
	LIRR	137	6	143	27	1	28	313	20	333	7	26	33	484	53	537
	Bus	72	7	79	7	0	7	165	32	197	35	95	130	279	134	413
	Walk	109	65	174	9	0	9	180	130	310	269	448	717	567	643	1,210
	Total	1,229	138	1,367	345	13	358	2,864	939	3,803	963	2,951	3,914	5,401	4,041	9,442
MD (12-1)	Auto	22	29	51	49	79	128	70	83	153	160	153	313	301	344	645
	Taxi	22	25	47	4	7	11	30	37	67	64	64	128	120	133	253
	Subway	150	172	322	70	103	173	371	415	786	994	969	1,963	1,585	1,659	3,244
	LIRR	0	0	0	11	21	32	2	2	4	9	9	18	22	32	54
	Bus	67	89	156	3	5	8	124	175	299	118	118	236	312	387	699
	Walk	855	1,121	1,976	4	6	10	1,457	2,061	3,518	1,354	1,352	2,706	3,670	4,540	8,210
	Total	1,116	1,436	2,552	141	221	362	2,054	2,773	4,827	2,699	2,665	5,364	6,010	7,095	13,105
PM (5-6)	Auto	14	163	177	532	97	629	124	416	540	374	210	584	1,044	886	1,930
	Taxi	9	21	30	46	8	54	17	42	59	54	41	95	126	112	238
	Subway	100	905	1,005	760	126	886	669	2,264	2,933	2,010	1,168	3,178	3,539	4,463	8,002
	LIRR	8	157	165	118	26	144	26	361	387	26	13	39	178	557	735
	Bus	18	92	110	32	6	38	43	204	247	122	88	210	215	390	605
	Walk	197	246	443	41	7	48	252	336	588	873	768	1,641	1,363	1,357	2,720
	Total	346	1,584	1,930	1,529	270	1,799	1,131	3,623	4,754	3,459	2,288	5,747	6,465	7,765	14,230
Pre-game (7-8 PM)	Auto	12	41	53	4,651	48	4,699	108	126	234	301	132	433	5,072	347	5,419
	Taxi	4	6	10	401	4	405	10	12	22	30	18	48	445	40	485
	Subway	69	226	295	6,642	63	6,705	565	676	1,241	1,583	712	2,295	8,859	1,677	10,536
	LIRR	10	39	49	1,029	13	1,042	28	91	119	21	9	30	1,088	152	1,240
	Bus	9	23	32	281	3	284	33	56	89	78	42	120	401	124	525
	Walk	64	74	138	361	4	365	118	109	227	391	282	673	934	469	1,403
	Total	168	409	577	13,365	135	13,500	862	1,070	1,932	2,404	1,195	3,599	16,799	2,809	19,608
Post-game (10-11 PM)	Auto	2	6	8	53	5,438	5,491	49	14	63	162	11	173	266	5,469	5,735
	Taxi	1	1	2	5	454	459	4	2	6	15	3	18	25	460	485
	Subway	13	32	45	76	7,074	7,150	252	76	328	842	64	906	1,183	7,246	8,429
	LIRR	1	5	6	12	1,454	1,466	6	11	17	12	0	12	31	1,470	1,501
	Bus	2	3	5	3	318	321	12	7	19	39	7	46	56	335	391
	Walk	20	22	42	4	409	413	49	25	74	171	72	243	244	528	772
	Total	39	69	108	153	15,147	15,300	372	135	507	1,241	157	1,398	1,805	15,508	17,313
Saturday (1-2 PM)	Auto	7	6	13	5,346	54	5,400	76	74	150	263	258	521	5,692	392	6,084
	Taxi	9	7	16	401	4	405	12	11	23	43	38	81	465	60	525
	Subway	63	51	114	5,881	59	5,940	218	205	423	747	710	1,457	6,909	1,025	7,934
	LIRR	0	0	0	1,069	11	1,080	3	3	6	13	13	26	1,085	27	1,112
	Bus	18	14	32	267	3	270	31	27	58	86	77	163	402	121	523
	Walk	249	198	447	401	4	405	386	322	708	1,065	938	2,003	2,101	1,462	3,563
	Total	346	276	622	13,365	135	13,500	726	642	1,368	2,217	2,034	4,251	16,654	3,087	19,741
Saturday (4-5 PM)	Auto	6	14	20	61	6,059	6,120	78	93	171	265	270	535	410	6,436	6,846
	Taxi	7	10	17	5	454	459	11	13	24	38	43	81	61	520	581
	Subway	56	102	158	67	6,665	6,732	221	310	531	725	762	1,487	1,069	7,839	8,908
	LIRR	1	8	9	12	1,212	1,224	7	21	28	13	13	26	33	1,254	1,287
	Bus	13	19	32	3	303	306	25	34	59	77	86	163	118	442	560
	Walk	173	214	387	5	454	459	269	310	579	950	1,077	2,027	1,397	2,055	3,452
	Total	256	367	623	153	15,147	15,300	611	781	1,392	2,068	2,251	4,319	3,088	18,546	21,634

Notes:
(1) Includes blocks 1120, 1121, 1128, 1129.

Table 5
Comparison of 2016 Peak Hour Travel
Residential Variation vs. Commercial Variation

Person Trips

Peak Hour	Residential Variation	Commercial Variation	Net Difference	% Difference
8-9 AM	7,698	9,442	(1,744)	(23%)
12-1 PM (midday)	10,411	13,105	(2,694)	(26%)
5-6 PM	12,221	14,230	(2,009)	(16%)
7-8 PM (pre-game)	19,511	19,608	(97)	(1%)
10-11 PM (post-game)	17,509	17,313	196	1%
Saturday 1-2 PM	20,273	19,741	532	3%
Saturday 4-5 PM	22,181	21,634	547	3%

Vehicle Trips (Auto/Taxi/Truck)

Peak Hour	Residential Variation	Commercial Variation	Net Difference	% Difference
8-9 AM	972	1,099	(127)	(13%)
12-1 PM (midday)	718	728	(10)	(1%)
5-6 PM	1,331	1,489	(158)	(12%)
7-8 PM (pre-game)	3,020	2,989	31	1%
10-11 PM (post-game)	2,981	2,952	29	1%
Saturday 1-2 PM	3,050	2,919	131	4%
Saturday 4-5 PM	3,380	3,251	129	4%

Transit Trips (Subway/Bus/LIRR)

Peak Hour	Residential Variation	Commercial Variation	Net Difference	% Difference
8-9 AM	5,362	6,904	(1,542)	(29%)
12-1 PM (midday)	3,881	3,997	(116)	(3%)
5-6 PM	7,564	9,342	(1,778)	(24%)
7-8 PM (pre-game)	12,131	12,301	(170)	(1%)
10-11 PM (post-game)	10,452	10,321	131	1%
Saturday 1-2 PM	9,860	9,569	291	3%
Saturday 4-5 PM	10,909	10,755	154	1%

store) currently located on Block 927 (Site 5). However, the travel demand forecast conservatively assumes no credit for the travel demand from these existing uses that would be displaced in the Build condition.

As shown in Table 5, the number of person trips generated by the residential mixed-use variation (inbound and outbound combined) would range from 7,698 in the AM peak hour to 22,181 in the Saturday 4-5 PM post-game peak hour. The commercial mixed-use variation, would generate from 9,442 peak hour person trips (in the AM) to 21,634 (in the Saturday 4-5 PM post-game). The commercial mixed-use variation would generate 1,744 more trips than the proposed project in the weekday AM peak hour, 2,694 more trips in the midday, 2,009 more trips in the PM peak hour. By contrast, the residential mixed-use variation would generate 532 more person trips than the commercial mixed-use variation during the Saturday 1-2 PM pre-game peak hour, and 547 more trips in the Saturday 4-5 PM post-game peak hour. During the weekday 7-8 PM pre-game and 10-11 PM post-game periods, the travel demand from the two variations would differ by roughly one percent (fewer than 200 trips).

The numbers of peak hour vehicle trips that would be generated by the residential mixed-use variation and the commercial mixed-use variation are also summarized in Table 5, and are shown in detail in Tables 6 and 7, respectively. As was the case for person trips, the commercial mixed-use variation would generate more vehicle trips (from 10 to 158 more) in the AM, midday and PM peak hours, while the residential mixed-use variation would generate a higher number of trips in the Saturday pre-game and post-game peak hours (131 and 129 more, respectively). During the weekday 7-8 PM pre-game and 10-11 PM post-game periods, the number of vehicle trips generated by the two variations are virtually the same, differing by roughly one percent (31 and 29 trips, respectively).

As demonstrated by the data in Table 5, the commercial mixed-use variation would generate a substantially higher level of total travel demand (from 16 to 26 percent higher) compared to the residential mixed-use variation in the key weekday AM, midday and PM peak hours. During the weekday 7-8 PM and 10-11 PM periods, the demand from the two variations would be roughly equivalent, differing by approximately one percent. By contrast, on Saturdays the residential mixed-use variation would generate approximately three percent more trips than the commercial mixed-use variation during the 1-2 PM and 4-5 PM peak hours. The commercial mixed-use variation was therefore selected as the reasonable worst case scenario (RWCS) for the weekday transportation analyses, while the residential mixed-use variation is analyzed as the RWCS for the two Saturday peak hours.

As shown in Table 4, under the commercial mixed-use variation, new trips by subway are expected to total 5,954, 8,002 and 10,536 during the analyzed weekday 8-9 AM, 5-6 PM and 7-8 PM peak hours, respectively. New bus trips would total 413 and 605 during the weekday 8-9 AM and 5-6 PM peak hours analyzed for potential bus impacts. New weekday peak hour trips on the Long Island Rail Road would range from 54 (in the midday) to 1,501 (in the 10-11 PM post-game peak hour). As shown in Table 7, the commercial mixed-use variation is expected to add between 438 and 2,581 autos to the study area street system in each weekday peak hour, and from 120 to 412 new taxi trips. Peak hour truck trips would increase by from 6 to 84 in each weekday peak hour. In general, the highest numbers of new weekday vehicle trips would occur during the 7-8 PM (pre-game) and 10-11 PM (post-

Table 6
Travel Demand Forecast for the Residential Mixed-Use Variation - 2016
(Vehicle Trips)

Peak Hour Vehicle Trips		Site 5 Residential/ Office/Local Retail			Arena Block: Arena			Arena Block: Residential/ Office/Hotel/Local Retail			Residential Blocks (2): Residential/Retail			Total Trips		
		In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
AM (8-9)	Auto	53	23	76	51	2	53	100	154	254	81	318	399	285	497	782
	Taxi (1)	5	5	10	3	3	6	18	18	36	27	27	54	53	53	106
	Truck	4	4	8	4	4	8	13	13	26	21	21	42	42	42	84
	Total	**62**	**32**	**94**	**58**	**9**	**67**	**131**	**185**	**316**	**129**	**366**	**495**	**380**	**592**	**972**
MD (12-1 PM)	Auto	16	17	33	21	34	55	68	63	131	122	117	239	227	231	458
	Taxi (1)	16	16	32	4	4	8	26	26	52	50	50	100	96	96	192
	Truck	4	4	8	4	4	8	9	9	18	17	17	34	34	34	68
	Total	**36**	**37**	**73**	**29**	**42**	**71**	**103**	**98**	**201**	**189**	**184**	**373**	**357**	**361**	**718**
PM (5-6 PM)	Auto	25	66	91	227	41	268	152	149	301	309	170	479	713	426	1,139
	Taxi (1)	12	12	24	16	16	32	22	22	44	39	39	78	89	89	178
	Truck	1	1	2	1	1	2	2	2	4	3	3	6	7	7	14
	Total	**38**	**79**	**117**	**244**	**58**	**302**	**176**	**173**	**349**	**351**	**212**	**563**	**809**	**522**	**1,331**
Pre-Game (7-8 PM)	Auto	20	21	41	1,979	21	2,000	127	71	198	255	110	365	2,381	223	2,604
	Taxi (1)	3	3	6	165	165	330	18	18	36	20	20	40	206	206	412
	Truck	1	1	2	0	0	0	1	1	2	0	0	0	2	2	4
	Total	**24**	**25**	**49**	**2,144**	**186**	**2,330**	**146**	**90**	**236**	**275**	**130**	**405**	**2,589**	**431**	**3,020**
Post-Game (10-11 PM)	Auto	9	2	11	23	2,314	2,337	67	5	72	136	7	143	235	2,328	2,563
	Taxi (1)	1	1	2	191	191	382	6	6	12	10	10	20	208	208	416
	Truck	0	0	0	0	0	0	1	1	2	0	0	0	1	1	2
	Total	**10**	**3**	**13**	**214**	**2,505**	**2,719**	**74**	**12**	**86**	**146**	**17**	**163**	**444**	**2,537**	**2,981**
Saturday (1-2 PM)	Auto	16	15	31	1,944	20	1,964	109	106	215	214	214	428	2,283	355	2,638
	Taxi (1)	8	8	16	137	137	274	23	23	46	33	33	66	201	201	402
	Truck	0	0	0	2	2	4	1	1	2	2	2	4	5	5	10
	Total	**24**	**23**	**47**	**2,083**	**159**	**2,242**	**133**	**130**	**263**	**249**	**249**	**498**	**2,489**	**561**	**3,050**
Saturday (4-5 PM)	Auto	16	20	36	22	2,203	2,225	111	112	223	219	219	438	368	2,554	2,922
	Taxi (1)	9	9	18	161	161	322	24	24	48	35	35	70	229	229	458
	Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	**25**	**29**	**54**	**183**	**2,364**	**2,547**	**135**	**136**	**271**	**254**	**254**	**508**	**597**	**2,783**	**3,380**

Notes:
(1) Balanced taxi trips shown.
(2) Includes blocks 1120, 1121, 1128, 1129.

Table 7
Travel Demand Forecast for the Commercial Mixed-Use Variation - 2016
(Vehicle Trips)

		Site 5			Arena Block			Arena Block			Residential Blocks [2]					
		Office/Local Retail			Arena			Residential/Office/ Local Retail			Residential/Local Retail			Total Trips		
Peak Hour Vehicle Trips		In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
AM (8-9)	Auto	97	5	102	51	2	53	242	99	341	81	318	399	471	424	895
	Taxi [1]	9	9	18	3	3	6	21	21	42	27	27	54	60	60	120
	Truck	4	4	8	4	4	8	13	13	26	21	21	42	42	42	84
	Total	**110**	**18**	**128**	**58**	**9**	**67**	**276**	**133**	**409**	**129**	**366**	**495**	**573**	**526**	**1,099**
MD (12-1 PM)	Auto	13	18	31	21	34	55	52	61	113	122	117	239	208	230	438
	Taxi [1]	20	20	40	4	4	8	34	34	68	50	50	100	108	108	216
	Truck	4	4	8	4	4	8	12	12	24	17	17	34	37	37	74
	Total	**37**	**42**	**79**	**29**	**42**	**71**	**98**	**107**	**205**	**189**	**184**	**373**	**353**	**375**	**728**
PM (5-6 PM)	Auto	9	113	122	227	41	268	101	301	402	309	170	479	646	625	1,271
	Taxi [1]	15	15	30	17	17	34	29	29	58	39	39	78	100	100	200
	Truck	1	1	2	1	1	2	4	4	8	3	3	6	9	9	18
	Total	**25**	**129**	**154**	**245**	**59**	**304**	**134**	**334**	**468**	**351**	**212**	**563**	**755**	**734**	**1,489**
Pre-Game (7-8 PM)	Auto	8	28	36	1,979	21	2,000	87	93	180	255	110	365	2,329	252	2,581
	Taxi [1]	4	4	8	164	164	328	13	13	26	20	20	40	201	201	402
	Truck	1	1	2	0	0	0	2	2	4	0	0	0	3	3	6
	Total	**13**	**33**	**46**	**2,143**	**185**	**2,328**	**102**	**108**	**210**	**275**	**130**	**405**	**2,533**	**456**	**2,989**
Post-Game (10-11 PM)	Auto	1	3	4	23	2,314	2,337	40	10	50	136	7	143	200	2,334	2,534
	Taxi [1]	0	0	0	193	193	386	3	3	6	10	10	20	206	206	412
	Truck	1	1	2	0	0	0	2	2	4	0	0	0	3	3	6
	Total	**2**	**4**	**6**	**216**	**2,507**	**2,723**	**45**	**15**	**60**	**146**	**17**	**163**	**409**	**2,543**	**2,952**
Saturday (1-2 PM)	Auto	4	2	6	1,944	20	1,964	62	61	123	214	214	428	2,224	297	2,521
	Taxi [1]	7	7	14	141	141	282	12	12	24	33	33	66	193	193	386
	Truck	0	0	0	2	2	4	2	2	4	2	2	4	6	6	12
	Total	**11**	**9**	**20**	**2,087**	**163**	**2,250**	**76**	**75**	**151**	**249**	**249**	**498**	**2,423**	**496**	**2,919**
Saturday (4-5 PM)	Auto	3	8	11	22	2,203	2,225	64	75	139	219	219	438	308	2,505	2,813
	Taxi [1]	7	7	14	163	163	326	14	14	28	35	35	70	219	219	438
	Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	**10**	**15**	**25**	**185**	**2,366**	**2,551**	**78**	**89**	**167**	**254**	**254**	**508**	**527**	**2,724**	**3,251**

Notes:
[1] Balanced taxi trips shown.
[2] Includes blocks 1120, 1121, 1128, 1129.

game) peak hours, primarily as a result of demand en route to and from the arena. As shown in Table 6, on Saturdays, the residential mixed-use variation (the RWCS for the Saturday analyses) would add an estimated 2,638 auto, 402 taxi and 10 truck trips to the street system in the 1-2 PM peak hour, and 2,922 auto, 458 taxi and no truck trips in the 4-5 PM peak hour.

PARKING DEMAND

Based on the travel demand assumptions discussed above, the proposed arena is expected to generate a daily parking demand of approximately 2,800 spaces on a typical Nets weekday game day, and approximately 2,600 spaces on weekends. Although some of this parking demand would be generated by arena employees and non-spectator visitors over the course of a day, the majority of the demand would occur during game times on weekday evenings, as well as on weekends.

Parking demand generated by new residential development will be forecast assuming a rate of 0.4 spaces per dwelling unit based on auto ownership data from the 2000 Census for neighborhoods in the vicinity of the site. (This rate is also consistent with the rate assumed for the residential component of the Downtown Brooklyn Development project.) The rate assumed for parking demand from new hotel space – 0.20 spaces per room overnight – is based on data from the *Renaissance Plaza Expansion EAS*. Parking demand from new office and retail space will be derived from the forecasts of daily auto trips for these uses.

To accommodate projected parking demand, it is anticipated that both the residential mixed-use variation and the commercial mixed-used variation would include approximately 3,800 spaces in parking garages located on Site 5, the Arena Block and blocks 1120, 1128 and 1129. These shared parking facilities would service demand from all project components – arena, residential and commercial. Office and retail demand would peak in the midday period and decline during the afternoon and evening, allowing for additional capacity to be used for residential and hotel demand (which typically peak in the overnight) and for demand from the arena. With the exception of the arena, parking demand generated under either variation would be fully accommodated in the off-street parking facilities that would be developed on-site. Accounting for commercial and residential demand, it is anticipated that approximately 1,100 spaces would be available on-site on weekdays to accommodate the parking needs of the arena, while the remaining arena demand (totaling approximately 1,700 spaces) would be accommodated at public off-street parking facilities located in the vicinity. The analysis of off-street parking will therefore examine conditions at public off-street parking facilities within a 1/2-mile radius of the arena. On-street parking conditions within 1/4-mile of the site will also be examined to determined the effects of street closures and other changes in on-street parking supply in the vicinity of the project site.

TRIP ASSIGNMENT

Auto/Taxi

The distribution of auto and taxi trips for each project component (office, residential, hotel, local retail and arena) by borough/county or region is shown in Table 8. The distributions for office, residential and hotel uses were based on data from the 2000 Census, while the assignment for the arena component was based on data from both the Downtown Brooklyn Development project and the expected geographical distribution of demand to the arena (see "Transportation Planning Assumptions," above). Given the differences in their travel demand characteristics, each project component is expected to have a unique trip assignment pattern. For example, a majority of the auto trips generated by the residential and hotel components are expected to have endpoints in Manhattan (60%) and Brooklyn (33%), while office trips are expected to be more widely dispersed, with five percent en route to/from Manhattan, 53 percent to/from Brooklyn, 17 percent to/from Queens, eight percent to/from Long Island and five percent to/from New Jersey. The arena is expected to draw not only from Brooklyn, Queens and Manhattan, but also from New Jersey and Long Island. As previously discussed, separate assignments for trips arriving and departing the arena on weekdays are assumed in order to reflect the fact that on weekdays some spectators would likely travel to the arena from their workplaces, and then depart to residences in a different borough or county at the conclusion of a game. As the project's retail component is expected to consist primarily of local retail uses serving the surrounding worker and residential populations, all of its trips are expected to be local Brooklyn-based.

Auto and taxi trips will be assigned to the primary corridors providing access to and from the project site based on their origin or destination as well as the most direct routes to major access points such as the Brooklyn-Queens Expressway and Brooklyn and Manhattan bridges. The auto and taxi trip assignment patterns along the corridors providing access to Site 5 and the Arena Block are illustrated in Appendix B, while the assignments for auto and taxi trips en route to and from Blocks 1120, 1121, 1128 and 1129 are provided in Appendix C. The assignments of auto and taxi (as well as truck) trips will take into account changes to the study area traffic network that are expected to occur by the 2010 and 2016 Build years as a result of No Build developments and initiatives by NYCDOT and other agencies. These include street closures and changes in street directions proposed as mitigation for the Downtown Brooklyn Development project.

As discussed above, it is anticipated that approximately 1,100 spaces would be available on-site to accommodate the parking needs of the arena, while the remaining arena demand (totaling approximately 1,700 spaces on weekdays) would be accommodated at public off-street facilities located in the vicinity. The assignment of arena auto trips will therefore reflect this distribution of trips to both on-site parking facilities and directly to off-site parking facilities.

Truck

Truck trips en route to and from the site will be assigned to designated local and through truck routes in Downtown Brooklyn. These include Atlantic, Flatbush, Third, and Fourth Avenues, and portions of Fifth Avenue and Bergen Street.

Table 8
Project Increment Auto and Taxi Trip Assignment Patterns

Auto Trips

Land Use	Bronx	Brooklyn	Manhattan	Queens	Staten Isl.	Long Island	West/Put/Duc Rock/Orange Connecticut	New Jersey	Total
Office[1]	5.0%	53.0%	5.0%	17.0%	5.0%	8.0%	2.0%	5.0%	100.0%
Residential/Hotel[1]	1.0%	33.0%	60.0%	2.5%	0.5%	1.0%	0.5%	1.5%	100.0%
Local Retail	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Arena weekday (inbound)	5.5%	34.5%	8.6%	10.1%	10.5%	9.7%	5.0%	16.1%	100.0%
Arena weekday (outbound)	5.4%	33.4%	6.7%	9.8%	10.2%	11.6%	4.9%	18.0%	100.0%
Arena weekend (in/out)	4.1%	29.9%	6.0%	8.5%	10.0%	15.0%	6.0%	20.5%	100.0%

Taxi/Black Car Trips

Land Use	Bronx	Brooklyn	Manhattan	Queens	Staten Isl.	Long Island	West/Put/Duc Rock/Orange Connecticut	New Jersey	Total
Office[1]	5.0%	53.0%	5.0%	17.0%	5.0%	8.0%	2.0%	5.0%	100.0%
Residential/Hotel[1]	1.0%	33.0%	60.0%	2.5%	0.5%	1.0%	0.5%	1.5%	100.0%
Local Retail	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Arena - weekday (inbound)	1.0%	40.3%	33.6%	3.0%	3.4%	8.0%	2.0%	8.7%	100.0%
Arena - weekday (outbound)	1.0%	41.7%	27.8%	3.1%	3.5%	10.4%	2.1%	10.4%	100.0%
Arena - weekend	1.0%	40.4%	26.9%	6.1%	3.4%	10.1%	2.0%	10.1%	100.0%

Notes:
[1] Source: 2000 Census data.

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0 1000 2000 FEET
SCALE

Project Site

Intersections Analyzed (Signalized)

Intersections Analyzed (Unsignalized)

Source: AKRF, Inc.

Traffic Study Area

Figure 3

Diverted Traffic

In addition to the project's generating new travel demand by autos, taxis and trucks, permanent roadway closures and changes in street direction associated with the proposed project would alter traffic flows in the vicinity of the project site in the 2010 and 2016 analysis years. These would include the permanent closure of Pacific Street between Flatbush and Sixth Avenues, and between Carlton and Vanderbilt Avenues; and the permanent closure of Fifth Avenue between Flatbush and Atlantic Avenues. Sixth Avenue would be converted from one-way southbound to two-way operation between Atlantic and Flatbush Avenues both to facilitate access to and from the project site and to provide an alternative route for some of the traffic diverted off of Fifth Avenue. Carlton Avenue would be converted from one-way northbound to two-way operation between Atlantic Avenue and Pacific Street, also to provide for local circulation. The analysis of 2010 and 2016 Build traffic conditions will assume that No Build traffic diverted off of Fifth Avenue would be distributed among parallel north-south corridors, including Fourth Avenue, Flatbush Avenue and Sixth Avenue. As the segments of Pacific Street to be closed primarily provide access to adjacent land uses, diversions as a result of these closures are expected to be localized.

Transit/Pedestrian

The distribution of project-generated subway trips for each project component by borough/county or region is shown in Table 9. As was the case for auto and taxi trips, these assignment patterns were based on Census data and data from the Downtown Brooklyn Development project and the arena demand distribution. They differ from the assignment of auto trips primarily with respect to the project's arena component. As shown in Table 9, from 36 to 43 percent of subway trips generated by the arena are expected to be en route to or from Manhattan, 24 to 26 percent en route to or from Brooklyn and 10 to 12 percent en route to or from Queens. Arena spectators en route to or from New Jersey via PATH or NJ Transit trains and buses would account for approximately 14 to 18 percent of subway trips.

Project-generated bus and walk trips are assumed to be local within Brooklyn. Trips by commuter rail (i.e., Long Island Rail Road) are assumed to have origins or destinations primarily in Nassau or Suffolk counties.

TRAFFIC STUDY AREA

As shown in Figure 3, the traffic study area, which extends upwards of 1.2 miles from the project site, is bounded on the north by Tillary Street/Park Avenue, on the south by Eastern Parkway/Union Street, on the east by Grand Avenue, and on the west by Hicks Street. The study area encompasses a total of 93 intersections along local streets proximate to the project site or that would likely be affected by project-related changes to the street network, as well as along arterials that would provide access to or from the site. Given the numerous corridors providing access to the project site, including Atlantic, Flatbush, Carlton, Vanderbilt, Washington, Third, Fourth, Fifth and Sixth avenues, project-generated traffic is expected to be widely dispersed to the north, south, east and west, and is expected to become rapidly

Table 9
Project Increment Subway Trip Assignment Patterns

Land Use	Bronx	Brooklyn	Manhattan	Queens	Staten Isl.	Long Island	West/Put/Duc Rock/Orange Connecticut	New Jersey	Total
Office[1]	5.0%	53.0%	5.0%	17.0%	5.0%	8.0%	2.0%	5.0%	100.0%
Residential/Hotel[1]	1.0%	33.0%	60.0%	2.5%	0.5%	1.0%	0.5%	1.5%	100.0%
Local Retail	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Arena - weekday (inbound)	2.1%	24.2%	42.3%	10.9%	2.5%	1.2%	2.4%	14.4%	100.0%
Arena - weekday (outbound)	2.2%	25.7%	36.0%	11.6%	2.7%	1.5%	2.6%	17.7%	100.0%

Notes:
[1]Source: 2000 Census data.

less concentrated with increasing distance from the project site. The traffic study area therefore focuses on locations where new traffic is expected to be most concentrated, and does not include more distant locations along regional access corridors such as the BQE, Brooklyn-Battery Tunnel or across the East River Bridges to Manhattan. The study area does, however, include key intersections along corridors connecting these regional access routes and the project site (including all intersections along Flatbush Avenue Extension as far north as Tillary Street).

SUBWAY STATIONS SELECTED FOR ANALYSIS

As part of the proposed project, improvements to the Atlantic Avenue/Pacific Street subway station complex would provide direct access between the project site and the subway routes serving this facility (the B, D, M, N, Q, R and Nos. 2, 3, 4 and 5 trains). The large majority of project-generated subway trips are therefore expected to utilize this station complex. However, some trips are also expected to occur at other stations that are either served by trains not accessible at Atlantic Avenue/Pacific Street or that would also provide reasonably convenient access to the project site. For example, some trips by Nos. (2) and (3) trains would likely use the Bergen Street station given its proximity to the proposed buildings along Sixth Avenue and on blocks to the east. The Fulton Street (G) station, the Lafayette Avenue (C) station, and the Washington-Clinton Avenues (C) station would also be used by project-generated trips as neither (C) train nor (G) train service is available at Atlantic Avenue/Pacific Street.

Table 10 shows the numbers of new entering and exiting subway trips that would be generated by the commercial mixed-use variation at each of these stations in the three peak hours analyzed for subway station impacts (weekday AM, PM and 7-8 PM pre-game). The *CEQR Technical Manual* typically requires a detailed analysis of a subway station when the incremental increase in peak hour trips totals 200 persons per hour or more. As shown in Table 10, new subway trips generated by the commercial mixed-use variation would exceed this threshold in one or more analyzed peak hours at the Atlantic Avenue/Pacific Street station complex (upwards of 9,549 new trips in each peak hour), Bergen Street station (upwards of 346 new trips in each analyzed peak hour), the Lafayette Avenue station (upwards of 467 new trips in each peak hour), and the Fulton Street station (246 and 254 new trips in the 5-6 PM and 7-8 PM peak hours, respectively). These stations were therefore selected for quantitative analysis in the EIS.

The analysis of subway station conditions will examine key station elements, including stairways, escalators, walkways and fare arrays, under peak 15-minute flow conditions. As subway demand generated by the arena is expected to be heavily surged, especially at the conclusion of an event such as a Nets basketball game, the analysis will incorporate peaking factors of 1.36 for arena subway trips during the 7-8 PM pre-game period and 1.84 for trips during the 10-11 PM post-game period. These factors were derived from data in the *Madison Square Garden Modal Split Analysis* study and MTA ridership data from stations serving Madison Square Garden.

Table 10
2016 Peak Hour Trips Generated by the
Commercial Mixed-Use Variation at Area Subway Stations

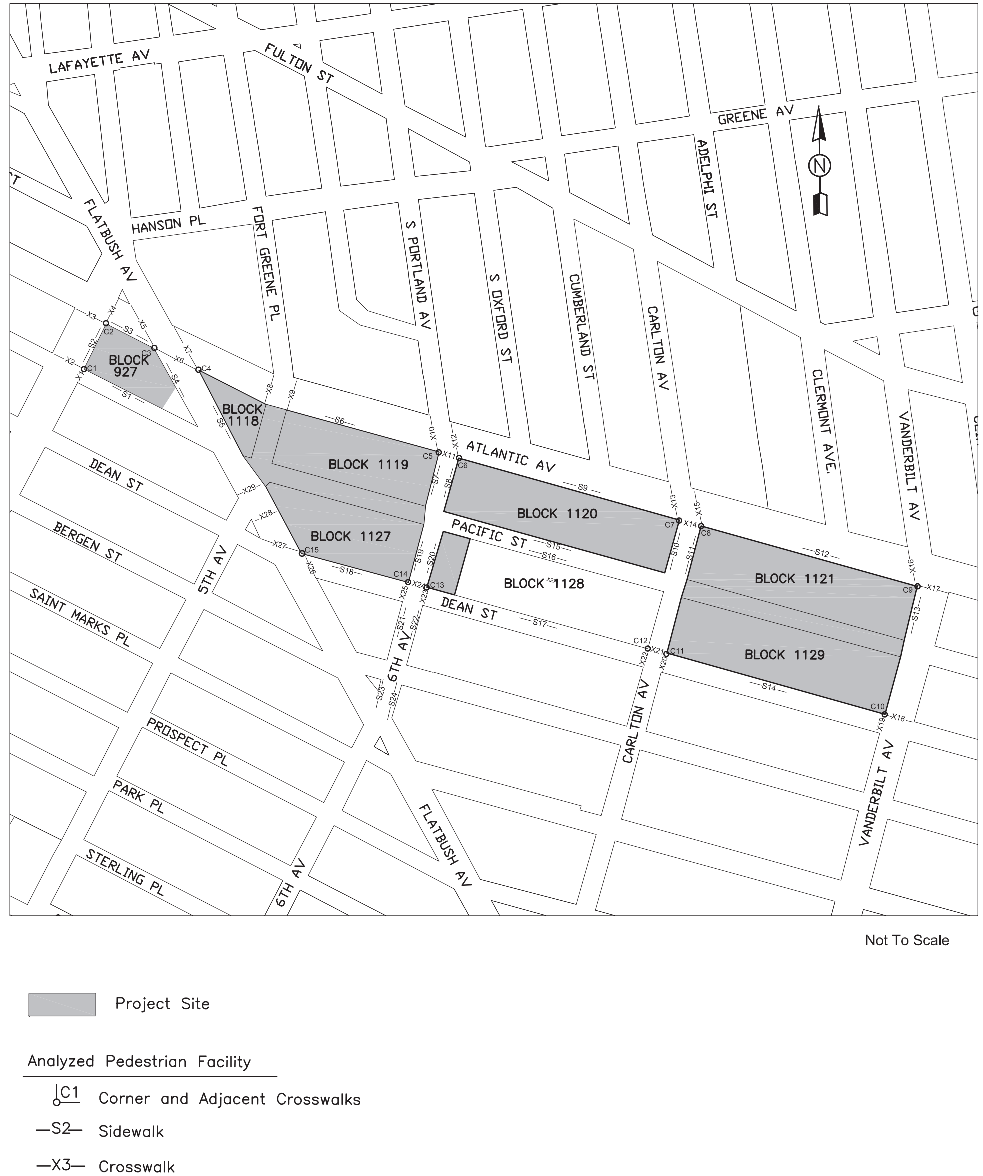
Subway Station	8-9 AM Peak Hour			5-6 PM Peak Hour			7-8 PM (Pre-Game) Peak Hour		
	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
Atlantic Ave (2,3,4,5)	1,241	1,334	2,575	1,794	1,671	3,465	716	4,737	5,453
Atlantic Ave (B,Q)	515	567	1,082	783	694	1,477	306	1,782	2,088
Pacific St (D,M,N,R)	501	915	1,416	1,202	698	1,900	402	1,606	2,008
Bergen St (2,3)	157	107	264	178	168	346	79	129	208
Lafayette Ave (C)	122	236	358	305	162	467	101	354	455
Clinton-Wash. Aves (C)	60	17	77	38	64	102	22	48	70
Fulton St (G)	56	126	182	163	83	246	52	202	254
Total	2,652	3,302	5,954	4,463	3,540	8,003	1,678	8,858	10,536

ASSIGNMENT OF PROJECT-GENERATED BUS TRIPS

Downtown Brooklyn is well served by numerous bus routes operated by MTA New York City Transit (NYC Transit), and many of these routes operate in close proximity to the project site along Atlantic, Flatbush, Third, Fifth and Vanderbilt Avenues, and Dean, Bergen and Fulton Streets. Bus patrons en route to and from the project site would therefore likely find it unnecessary to walk substantial distances to access a needed bus service. Consequently, the analysis of project-generated bus trips focuses on the 12 routes located within 1/4-mile of the site, as it is on these routes that project trips would be most heavily concentrated. These routes include the B25, B26, B37, B38, B41, B45, B52, B63, B65, B67, B69 and B103. Assignment of project increment bus trips to individual routes will be based on existing demand patterns and the relative proximity of each route to the proposed development blocks.

ASSIGNMENT OF PROJECT-GENERATED PEDESTRIAN TRIPS

Figure 4 shows the sidewalk, corner area and crosswalk locations selected for analysis of potential pedestrian impacts. These locations were selected as they serve as key links between the project site and the surrounding street system, and/or would be used by concentrations of project-generated pedestrian demand linked to other modes (i.e., en route to subway stations, bus stops or off-site parking garages). The majority of subway-linked



Atlantic Yards Arena & Redevelopment Project

Pedestrian Analysis Locations

Figure 4

pedestrian trips would be assigned to the proposed new on-site entrance to the Atlantic Avenue/Pacific Street station complex. Additional subway-linked pedestrian trips would be assigned to corridors connecting the site to other nearby stations. Pedestrians linked to the bus mode are expected to be most concentrated along Flatbush and Atlantic Avenues where stops for many of the routes are located. Some pedestrian trips are also expected to cross Atlantic Avenue to access bus routes operating along Fulton Street. Pedestrians walking between off-site parking facilities and the arena are expected to be most concentrated at the crosswalks at the intersection of Flatbush and Atlantic Avenues as the majority of off-site parking facilities are located to the north and west of the project site. Parking demand from the project's commercial and residential components would be fully accommodated at on-site facilities, and are not expected to generate substantial walk trips outside of the project site. Walk-only trips (i.e., walk trips not associated with other modes) would be widely dispersed among links between the project site and the surrounding street system.

APPENDIX A

TRIP ORIGIN AND MODAL SPLIT ASSUMPTIONS FOR WEEKDAY AND WEEKEND SPORTING EVENTS AT THE PROPOSED ATLANTIC YARDS ARENA

Atlantic Yards Arena and Redevelopment Project

Atlantic Yards Arena Trip Origin/Destination and Modal Split Assumptions
Weekday Sporting Event (Arriving)

Madison Square Garden (MSG) Trip Origins [1]		Atlantic Yards Arena Estimated Range	Trip O/D Assumed for Atlantic Yards Arena
Manhattan	36%	15%-25%	25%
Bronx	4%	2%-4%	3%
Brooklyn	7%	25%-35%	30%
Queens	6%	8%-10%	9%
Staten Island	3%	4%-6%	5%
Nassau/Suffolk	12%	12%-18%	12%
Westchester	5%	2%-4%	3%
New Jersey	21%	10%-20%	13%
Other	6%	0%	0%
Total	100%		100%

MSG: Modal Split by Origin [1]

Origin	Auto	Taxi	Subway	Bus	Walk	LIRR	Other [3]	Total
Manhattan	9%	18%	41%	3%	29%	0%	0%	100%
Bronx	58%	0%	37%	4%	0%	0%	1%	100%
Brooklyn	51%	3%	42%	1%	3%	0%	0%	100%
Queens	37%	0%	45%	5%	0%	13%	0%	100%
Staten Island	72%	2%	16%	10%	0%	0%	0%	100%
Nassau/Suffolk	21%	0%	2%	0%	0%	77%	0%	100%
Westchester	56%	2%	4%	0%	0%	0%	38%	100%
New Jersey	38%	2%	1%	0%	0%	0%	59%	100%
Other	48%	3%	9%	3%	3%	15%	19%	100%

MSG: Trip Distribution by Origin and Mode

Auto	Taxi	Subway	Bus	Walk	LIRR	Other [3]	Total
3.2%	6.5%	14.8%	1.1%	10.4%	0.0%	0.0%	36%
2.3%	0.0%	1.5%	0.2%	0.0%	0.0%	0.0%	4%
3.6%	0.2%	2.9%	0.1%	0.2%	0.0%	0.0%	7%
2.2%	0.0%	2.7%	0.3%	0.0%	0.8%	0.0%	6%
2.2%	0.1%	0.5%	0.3%	0.0%	0.0%	0.0%	3%
2.5%	0.0%	0.2%	0.0%	0.0%	9.2%	0.0%	12%
2.8%	0.1%	0.2%	0.0%	0.0%	0.0%	1.9%	5%
8.0%	0.4%	0.2%	0.0%	0.0%	0.0%	12.4%	21%
2.9%	0.2%	0.5%	0.2%	0.2%	0.9%	1.1%	6%
29.7%	**7.5%**	**23.6%**	**2.1%**	**10.8%**	**10.9%**	**15.5%**	**100.0%**

Atlantic Yards Arena: Modal Split by Origin/Destination [2]

Origin/Destination	Auto	Taxi	Subway	Bus	Walk	LIRR	Other [3]	Total
Manhattan	12%	4%	84%	0%	0%	0%	0%	100%
Bronx	64%	1%	35%	0%	0%	0%	0%	100%
Brooklyn	40%	4%	40%	7%	9%	0%	0%	100%
Queens	39%	1%	60%	0%	0%	0%	0%	100%
Staten Island	73%	2%	25%	0%	0%	0%	0%	100%
Nassau/Suffolk	28%	2%	5%	0%	0%	65%	0%	100%
Westchester	58%	2%	40%	0%	0%	0%	0%	100%
New Jersey	43%	2%	55%	0%	0%	0%	0%	100%

Atlantic Yards Arena: Distribution by Origin/Destination and Mode

Auto	Taxi	Subway	Bus	Walk	LIRR	Other [3]	Total
3.0%	1.0%	21.0%	0.0%	0.0%	0.0%	0.0%	25.0%
1.9%	0.0%	1.1%	0.0%	0.0%	0.0%	0.0%	3.0%
12.0%	1.2%	12.0%	2.1%	2.7%	0.0%	0.0%	30.0%
3.5%	0.1%	5.4%	0.0%	0.0%	0.0%	0.0%	9.0%
3.7%	0.1%	1.3%	0.0%	0.0%	0.0%	0.0%	5.0%
3.4%	0.2%	0.6%	0.0%	0.0%	7.8%	0.0%	12.0%
1.7%	0.1%	1.2%	0.0%	0.0%	0.0%	0.0%	3.0%
5.6%	0.3%	7.2%	0.0%	0.0%	0.0%	0.0%	13.0%
34.8%	**3.0%**	**49.7%**	**2.1%**	**2.7%**	**7.8%**	**0.0%**	**100.0%**

MSG: Total Modal Split

Auto	**29.7%**
Taxi	**7.5%**
Subway	**23.6%**
Bus	**2.1%**
Walk	**10.8%**
LIRR	**10.9%**
Other [3]	**15.5%**
Total	**100.0%**

Atlantic Yards Arena: Total Modal Split

Auto	**34.8%**
Taxi	**3.0%**
Subway	**49.7%**
Bus	**2.1%**
Walk	**2.7%**
LIRR	**7.8%**
Other [3]	**0.0%**
Total	**100.0%**

Atlantic Yards Arena: Trip Assignment by Mode

Origin/Destination	Auto	Taxi	Subway	Bus	Walk	LIRR
Manhattan	8.6%	33.6%	42.3%	0.0%	0.0%	0.0%
Bronx	5.5%	1.0%	2.1%	0.0%	0.0%	0.0%
Brooklyn	34.5%	40.3%	24.2%	100.0%	100.0%	0.0%
Queens	10.1%	3.0%	10.9%	0.0%	0.0%	0.0%
Staten Island	10.5%	3.4%	2.5%	0.0%	0.0%	0.0%
Nassau/Suffolk	9.7%	8.1%	1.2%	0.0%	0.0%	100.0%
Westchester	5.0%	2.0%	2.4%	0.0%	0.0%	0.0%
New Jersey	16.1%	8.7%	14.4%	0.0%	0.0%	0.0%
	100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Notes:
(1) Source: Madison Square Garden Modal Split Analysis, August 26, 2003.
(2) Based on data developed for the Downtown Brooklyn Development project.
(3) "Other" category for MSG includes: PATH, Metro-North, NJ Transit.
Patrons attending Atlantic Yards Arena events who use these "Other" transit modes are assumed to arrive/depart Downtown Brooklyn via subway.

Atlantic Yards Arena and Redevelopment Project

Atlantic Yards Arena Trip Origin/Destination and Modal Split Assumptions
Weekday Sporting Event (Departing)

Madison Square Garden (MSG) Trip Origins [1]		Atlantic Yards Arena Estimated Range	Trip O/D Assumed for Atlantic Yards Arena
Manhattan	36%	15%-25%	20%
Bronx	4%	2%-4%	3%
Brooklyn	7%	25%-35%	30%
Queens	6%	8%-10%	9%
Staten Island	3%	4%-6%	5%
Nassau/Suffolk	12%	12%-18%	15%
Westchester	5%	2%-4%	3%
New Jersey	21%	10%-20%	15%
Other	6%	0%	0%
Total	100%		100%

MSG: Modal Split by Origin [1]

Origin	Auto	Taxi	Subway	Bus	Walk	LIRR	Other [3]	Total
Manhattan	9%	18%	41%	3%	29%	0%	0%	100%
Bronx	58%	0%	37%	4%	0%	0%	1%	100%
Brooklyn	51%	3%	42%	1%	3%	0%	0%	100%
Queens	37%	0%	45%	5%	0%	13%	0%	100%
Staten Island	72%	2%	16%	10%	0%	0%	0%	100%
Nassau/Suffolk	21%	0%	2%	0%	0%	77%	0%	100%
Westchester	56%	2%	4%	0%	0%	0%	38%	100%
New Jersey	38%	2%	1%	0%	0%	0%	59%	100%
Other	48%	3%	9%	3%	3%	15%	19%	100%

MSG: Trip Distribution by Origin and Mode

Auto	Taxi	Subway	Bus	Walk	LIRR	Other [3]	Total
3.2%	6.5%	14.8%	1.1%	10.4%	0.0%	0.0%	36%
2.3%	0.0%	1.5%	0.2%	0.0%	0.0%	0.0%	4%
3.6%	0.2%	2.9%	0.1%	0.2%	0.0%	0.0%	7%
2.2%	0.0%	2.7%	0.3%	0.0%	0.8%	0.0%	6%
2.2%	0.1%	0.5%	0.3%	0.0%	0.0%	0.0%	3%
2.5%	0.0%	0.2%	0.0%	0.0%	9.2%	0.0%	12%
2.8%	0.1%	0.2%	0.0%	0.0%	0.0%	1.9%	5%
8.0%	0.4%	0.2%	0.0%	0.0%	0.0%	12.4%	21%
2.9%	0.2%	0.5%	0.2%	0.2%	0.9%	1.1%	6%
29.7%	**7.5%**	**23.6%**	**2.1%**	**10.8%**	**10.9%**	**15.5%**	**100.0%**

Atlantic Yards Arena: Modal Split by Origin/Destination [2]

Origin/Destination	Auto	Taxi	Subway	Bus	Walk	LIRR	Other [3]	Total
Manhattan	12%	4%	84%	0%	0%	0%	0%	100%
Bronx	64%	1%	35%	0%	0%	0%	0%	100%
Brooklyn	40%	4%	40%	7%	9%	0%	0%	100%
Queens	39%	1%	60%	0%	0%	0%	0%	100%
Staten Island	73%	2%	25%	0%	0%	0%	0%	100%
Nassau/Suffolk	28%	2%	5%	0%	0%	65%	0%	100%
Westchester	58%	2%	40%	0%	0%	0%	0%	100%
New Jersey	43%	2%	55%	0%	0%	0%	0%	100%

Atlantic Yards Arena: Distribution by Origin/Destination and Mode

Auto	Taxi	Subway	Bus	Walk	LIRR	Other [3]	Total
2.4%	0.8%	16.8%	0.0%	0.0%	0.0%	0.0%	20.0%
1.9%	0.0%	1.1%	0.0%	0.0%	0.0%	0.0%	3.0%
12.0%	1.2%	12.0%	2.1%	2.7%	0.0%	0.0%	30.0%
3.5%	0.1%	5.4%	0.0%	0.0%	0.0%	0.0%	9.0%
3.7%	0.1%	1.3%	0.0%	0.0%	0.0%	0.0%	5.0%
4.2%	0.3%	0.8%	0.0%	0.0%	9.8%	0.0%	15.0%
1.7%	0.1%	1.2%	0.0%	0.0%	0.0%	0.0%	3.0%
6.5%	0.3%	8.3%	0.0%	0.0%	0.0%	0.0%	15.0%
35.9%	**2.9%**	**46.7%**	**2.1%**	**2.7%**	**9.8%**	**0.0%**	**100.0%**

MSG: Total Modal Split

Auto	**29.7%**
Taxi	**7.5%**
Subway	**23.6%**
Bus	**2.1%**
Walk	**10.8%**
LIRR	**10.9%**
Other [3]	**15.5%**
Total	**100.0%**

Atlantic Yards Arena: Total Modal Split

Auto	**35.9%**
Taxi	**2.9%**
Subway	**46.7%**
Bus	**2.1%**
Walk	**2.7%**
LIRR	**9.8%**
Other [3]	**0.0%**
Total	**100.0%**

Atlantic Yards Arena: Trip Assignment by Mode

Origin/Destination	Auto	Taxi	Subway	Bus	Walk	LIRR
Manhattan	6.7%	27.8%	36.0%	0.0%	0.0%	0.0%
Bronx	5.4%	1.0%	2.2%	0.0%	0.0%	0.0%
Brooklyn	33.5%	41.7%	25.7%	100.0%	100.0%	0.0%
Queens	9.8%	3.1%	11.6%	0.0%	0.0%	0.0%
Staten Island	10.2%	3.5%	2.7%	0.0%	0.0%	0.0%
Nassau/Suffolk	11.7%	10.4%	1.6%	0.0%	0.0%	100.0%
Westchester	4.9%	2.1%	2.6%	0.0%	0.0%	0.0%
New Jersey	18.0%	10.4%	17.7%	0.0%	0.0%	0.0%
	100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Notes:
(1) Source: Madison Square Garden Modal Split Analysis, August 26, 2003.
(2) Based on data developed for the Downtown Brooklyn Development project.
(3) "Other" category for MSG includes: PATH, Metro-North, NJ Transit.
Patrons attending Atlantic Yards Arena events who use these "Other" transit modes are assumed to arrive/depart Downtown Brooklyn via subway.

Atlantic Yards Arena Trip Origin/Destination and Modal Split Assumptions
Weekend Sporting Event (Arriving and Departing)

Madison Square Garden (MSG) Trip Origins [1]		Atlantic Yards Arena Estimated Range	Trip O/D Assumed for Atlantic Yards Arena
Manhattan	30%	**15%-25%**	**20%**
Bronx	3%	**2%-4%**	**3%**
Brooklyn	9%	**25%-35%**	**30%**
Queens	7%	**8%-10%**	**9%**
Staten Island	1%	**4%-6%**	**5%**
Nassau/Suffolk	14%	**12%-18%**	**15%**
Westchester	7%	**2%-4%**	**3%**
New Jersey	23%	**10%-20%**	**15%**
Other	6%	**0%**	**0%**
Total	100%		**100%**

MSG: Modal Split by Origin [1]

Origin	Auto	Taxi	Subway	Bus	Walk	LIRR	Other [3]	Total
Manhattan	14%	23%	28%	2%	33%	0%	0%	100%
Bronx	50%	0%	41%	8%	0%	0%	1%	100%
Brooklyn	51%	3%	46%	0%	0%	0%	0%	100%
Queens	54%	4%	28%	0%	0%	14%	0%	100%
Staten Island	83%	0%	17%	0%	0%	0%	0%	100%
Nassau/Suffolk	33%	2%	0%	0%	0%	65%	0%	100%
Westchester	92%	0%	0%	0%	0%	0%	8%	100%
New Jersey	54%	0%	0%	0%	0%	0%	46%	100%
Other	61%	6%	8%	0%	0%	6%	19%	100%

MSG: Trip Distribution by Origin and Mode

Auto	Taxi	Subway	Bus	Walk	LIRR	Other [3]	Total
4.2%	6.9%	8.4%	0.6%	9.9%	0.0%	0.0%	30%
1.5%	0.0%	1.2%	0.2%	0.0%	0.0%	0.0%	3%
4.6%	0.3%	4.1%	0.0%	0.0%	0.0%	0.0%	9%
3.8%	0.3%	2.0%	0.0%	0.0%	1.0%	0.0%	7%
0.8%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	1%
4.6%	0.3%	0.0%	0.0%	0.0%	9.1%	0.0%	14%
6.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	7%
12.4%	0.0%	0.0%	0.0%	0.0%	0.0%	10.6%	23%
3.7%	0.4%	0.5%	0.0%	0.0%	0.4%	1.1%	6%
42.0%	**8.1%**	**16.4%**	**0.8%**	**9.9%**	**10.4%**	**12.3%**	**100.0%**

Atlantic Yards Arena: Modal Split by Origin [2]

Origin/Destination	Auto	Taxi	Subway	Bus	Walk	LIRR	Other [3]	Total
Manhattan	12%	4%	84%	0%	0%	0%	0%	100%
Bronx	55%	1%	44%	0%	0%	0%	0%	100%
Brooklyn	40%	4%	40%	6%	10%	0%	0%	100%
Queens	38%	2%	58%	2%	0%	0%	0%	100%
Staten Island	80%	2%	18%	0%	0%	0%	0%	100%
Nassau/Suffolk	40%	2%	4%	0%	0%	54%	0%	100%
Westchester	80%	2%	18%	0%	0%	0%	0%	100%
New Jersey	55%	2%	43%	0%	0%	0%	0%	100%

Atlantic Yards Arena: Distribution by Origin/Destination and Mode

Auto	Taxi	Subway	Bus	Walk	LIRR	Other [3]	Total
2.4%	0.8%	16.8%	0.0%	0.0%	0.0%	0.0%	20.0%
1.7%	0.0%	1.3%	0.0%	0.0%	0.0%	0.0%	3.0%
12.0%	1.2%	12.0%	1.8%	3.0%	0.0%	0.0%	30.0%
3.4%	0.2%	5.2%	0.2%	0.0%	0.0%	0.0%	9.0%
4.0%	0.1%	0.9%	0.0%	0.0%	0.0%	0.0%	5.0%
6.0%	0.3%	0.6%	0.0%	0.0%	8.1%	0.0%	15.0%
2.4%	0.1%	0.5%	0.0%	0.0%	0.0%	0.0%	3.0%
8.2%	0.3%	6.5%	0.0%	0.0%	0.0%	0.0%	15.0%
40.1%	**3.0%**	**43.8%**	**2.0%**	**3.0%**	**8.1%**	**0.0%**	**100.0%**

MSG: Total Modal Split

Auto	**42.0%**
Taxi	**8.1%**
Subway	**16.4%**
Bus	**0.8%**
Walk	**9.9%**
LIRR	**10.4%**
Other [3]	**12.3%**
Total	**100.0%**

Atlantic Yards Arena: Total Modal Split

Auto	**40.1%**
Taxi	**3.0%**
Subway	**43.8%**
Bus	**2.0%**
Walk	**3.0%**
LIRR	**8.1%**
Other [3]	**0.0%**
Total	**100.0%**

Atlantic Yards Arena: Trip Assignment by Mode

Origin/Destination	Auto	Taxi	Subway	Bus	Walk	LIRR
Manhattan	6.0%	26.9%	38.3%	0.0%	0.0%	0.0%
Bronx	4.1%	1.0%	3.0%	0.0%	0.0%	0.0%
Brooklyn	29.9%	40.4%	27.4%	90.9%	100.0%	0.0%
Queens	8.5%	6.1%	11.9%	9.1%	0.0%	0.0%
Staten Island	10.0%	3.4%	2.1%	0.0%	0.0%	0.0%
Nassau/Suffolk	15.0%	10.1%	1.4%	0.0%	0.0%	100.0%
Westchester	6.0%	2.0%	1.2%	0.0%	0.0%	0.0%
New Jersey	20.5%	10.1%	14.7%	0.0%	0.0%	0.0%
	100.0%	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Notes:

(1) Source: Madison Square Garden Modal Split Analysis, August 26, 2003.

(2) Based on data developed for the Downtown Brooklyn Development project.

(3) "Other" category for MSG includes: PATH, Metro-North, NJ Transit.
Patrons attending Atlantic Yards Arena events who use these "Other" transit modes are assumed to arrive/depart Downtown Brooklyn via subway.

TRANSPORTATION PLANNING ASSUMPTIONS FOR THE
MADISON SQUARE GARDEN RELOCATION AND EXPANSION

PB Team

NYCT – Number 7 Extension Project
2 Broadway-5th Floor, Mailbox 519
New York, NY 10004
Fax: 646-252-2063

FINAL **MEMORANDUM**

TO: G. Price, NYC Department of City Planning
M. Amjadi, NYC Department of City Planning

FROM: E. Metzger

DATE: November 11, 2003

RE: CM-1189R/C-26501– Preparation of a Draft and Final Environmental Impact Statement and Provision of Transit Engineering Services for the Proposed No. 7 Subway Extension-Far West Midtown Manhattan Rezoning

SUBJECT: Madison Square Garden Relocation and Expansion Transportation Planning Assumptions

CIN: MTA-NYC Transit/CM 1189R-C26501-00-C-1.00-DCP-03F-1689

This technical memorandum provides a summary of the transportation planning assumptions proposed to be utilized for a potential relocation and expansion of Madison Square Garden (MSG) in the traffic, parking, transit, and pedestrian analyses of the DGEIS. Under the proposed action, MSG – currently located on the western portion of the block bounded by West 31st Street, West 33rd Street, Seventh Avenue, and Eighth Avenue – would move approximately one and a half blocks to the west (to the eastern portion of the block bounded by West 31st Street, West 33rd Street, Ninth Avenue, and Tenth Avenue). Regardless of its future location[1], the DGEIS will also assume that the overall seating capacity of MSG would be increased.[2]

Background

MSG is the home of three sports franchises: the New York Rangers (NHL hockey), New York Knicks (NBA basketball), and New York Liberty (WNBA basketball). Its 19,500-seat[3] arena serves as a venue for a number of other events including concerts, college basketball games, and the circus. MSG also includes a theater that can accommodate up to 5,600 spectators, which currently hosts concerts, boxing, family shows, and annual events such as the NBA and NFL drafts. A 36,000 square foot expo center is located adjacent to the arena and is used for trade shows, consumer fairs, and also provides additional storage space for certain events held on the arena floor.

A comprehensive list of all events held at MSG in 2002 (including events held in the arena, theater, and expo center) is provided in Table 1. For clarity, dark days (days when no events were scheduled), including days reserved for loading, unloading, and storage activities are designated by shading. As shown in Table 1, MSG's peak period throughout the year generally coincides with the New York Rangers' and New York Knicks' seasons during the late fall, winter, and early spring. In 2002, a total of 266 arena events were held on 224 days (there were 30 days on which multiple events were held; nearly half of these days involved circus

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[1] An alternative to the proposed action includes MSG remaining at its present location.
[2] The NYCDCP Hudson Yards Development Scenarios indicate that the arena seating capacity of MSG would increase from 19,500 to 23,000.
[3] Actual attendance capacity varies by event (see Table 5).

Table 1: 2002 Madison Square Garden Events

Date	Day of Week	ARENA Event	ARENA Start Time	THEATER (includes lobby) Event	THEATER Start Time	EXPO CENTER Event	EXPO CENTER Start Time
1/1/02	Tuesday						
1/2/02	Wednesday			Load-Out			
1/3/02	Thursday	NBA Basketball: Knicks vs. Dallas	7:30 PM	Load-Out			
1/4/02	Friday			Load-Out			
1/5/02	Saturday	College Basketball: St. John's vs. West Virginia NBA Basketball: Knicks vs. Boston	2:00 PM 7:30 PM	Load-Out			
1/6/02	Sunday	Load-In					
1/7/02	Monday	Wrestling: WWF RAW	7:45 PM	Restoration			
1/8/02	Tuesday	Wrestling: WWF Smackdown	7:30 PM	Restoration			
1/9/02	Wednesday	NHL Hockey: Rangers vs. Los Angeles	8:00 PM	Restoration			
1/10/02	Thursday			Restoration			
1/11/02	Friday			Restoration			
1/12/02	Saturday	NBA Basketball: Knicks vs. Milwaukee	7:30 PM				
1/13/02	Sunday						
1/14/02	Monday	NHL Hockey: Rangers vs. Columbus	7:00 PM				
1/15/02	Tuesday						
1/16/02	Wednesday			Comedy: David Brenner (lobby)	8:00 PM	Load-In	
1/17/02	Thursday			Comedy: David Brenner (lobby)	8:00 PM	Load-In	
1/18/02	Friday			Comedy: David Brenner (lobby) Comedy: David Brenner (lobby)	8:00 PM 10:30 PM	Burlington Coat Sale	9:00 AM
1/19/02	Saturday	Ice Show: Super Skate	7:00 PM	Comedy: David Brenner (lobby) Comedy: David Brenner (lobby)	8:00 PM 10:30 PM	Burlington Coat Sale	9:00 AM
1/20/02	Sunday	College Basketball: St. John's vs. Villanova	2:00 PM	Comedy You Can't Refuse (lobby) Comedy You Can't Refuse (lobby)	7:00 PM 10:00 PM	Burlington Coat Sale	11:00 AM
1/21/02	Monday	NBA Basketball: Knicks vs. Charlotte	1:00 PM			Burlington Coat Sale	9:00 AM
1/22/02	Tuesday					Load-Out	
1/23/02	Wednesday	NHL Hockey: Rangers vs. Boston	7:00 PM				
1/24/02	Thursday	NBA Basketball: Knicks vs. Phoenix	7:30 PM				
1/25/02	Friday	Rangers Skating Party	9:00 AM	Load-In		Rangers Skating Party	9:00 AM
1/26/02	Saturday	NHL Hockey: Rangers vs. Washington College Basketball: St. John's vs. Providence	1:00 PM 9:00 PM	Boxing: Mosley vs. Forrest	7:00 PM		
1/27/02	Sunday	Rangers Skating Party	9:00 AM			Rangers Skating Party	9:00 AM
1/28/02	Monday	NHL Hockey: Rangers vs. Tampa Bay	7:00 PM			Track Storage	
1/29/02	Tuesday	NBA Basketball: Knicks vs. Philadelphia	7:30 PM	Awards: Archer	6:30 PM	Track Storage	
1/30/02	Wednesday	NHL Hockey: Rangers vs. NY Islanders	7:00 PM			Track Storage	
1/31/02	Thursday	Load-In				Track Storage	
2/1/02	Friday	Millrose Games	5:00 PM	Comedy: Class Clowns (lobby) Comedy: Class Clowns (lobby)	8:00 PM 11:00 PM	Warmup Area	N/A
2/2/02	Saturday	Colgate Track	11:00 AM			Warmup Area & Carnival	N/A
2/3/02	Sunday	NBA Basketball: Knicks vs. Miami	12:00 PM				
2/4/02	Monday	Ice Maintenance					
2/5/02	Tuesday	NBA Basketball: Knicks vs. LA Clippers	7:30 PM	Load-In		Load-In	
2/6/02	Wednesday					Dog Show Setup	
2/7/02	Thursday	NBA Basketball: Knicks vs. Atlanta	7:30 PM	Family Show: Sesame Street	10:30 AM	Dog Show Setup	
2/8/02	Friday	Dream Game Harlem Globetrotters	12:00 PM 7:00 PM	Family Show: Sesame Street Family Show: Sesame Street	10:30 AM 2:00 PM	Dog Show Benching	
2/9/02	Saturday	College Basketball: St. John's vs. Connecticut	7:00 PM	Family Show: Sesame Street Family Show: Sesame Street Family Show: Sesame Street	10:30 AM 2:00 PM 5:30 PM	Dog Show Benching	
2/10/02	Sunday	NHL Hockey: Rangers vs. Pittsburgh	1:00 PM	Family Show: Sesame Street Family Show: Sesame Street Family Show: Sesame Street	10:30 AM 2:00 PM 5:30 PM	Dog Show Benching	
2/11/02	Monday	Dog Show	8:00 AM	Family Show: Sesame Street Family Show: Sesame Street	10:00 AM 2:00 PM	Dog Show Benching	
2/12/02	Tuesday	Dog Show	8:00 AM	Storage		Dog Show Benching	
2/13/02	Wednesday	NBA Basketball: Knicks vs. Toronto	7:30 PM	Family Show: Sesame Street	10:30 AM	Load-Out	
2/14/02	Thursday	Concert: Luis Miguel	8:00 PM	Family Show: Sesame Street	10:30 AM		
2/15/02	Friday	NBA Basketball: Knicks vs. Detroit	7:30 PM	Family Show: Sesame Street	10:30 AM		
2/16/02	Saturday	Concert: Concierto Del Amor	8:00 PM	Family Show: Sesame Street Family Show: Sesame Street Family Show: Sesame Street	10:30 AM 2:00 PM 5:30 PM		
2/17/02	Sunday	NBA Basketball: Knicks vs. Utah	7:00 PM	Family Show: Sesame Street Family Show: Sesame Street Family Show: Sesame Street	10:30 AM 2:00 PM 5:30 PM		
2/18/02	Monday	College Basketball: St. John's vs. Boston College	7:00 PM	Family Show: Sesame Street Family Show: Sesame Street	10:30 AM 2:00 PM		
2/19/02	Tuesday	Maintenance					
2/20/02	Wednesday	Maintenance					
2/21/02	Thursday	Maintenance					
2/22/02	Friday	Concert: Crosby, Stills, Nash & Young	8:00 PM				
2/23/02	Saturday	Concert: Crosby, Stills, Nash & Young	8:00 PM				
2/24/02	Sunday	NBA Basketball: Knicks vs. LA Lakers	12:00 PM				
2/25/02	Monday	Ice Maintenance				Load-In	
2/26/02	Tuesday	NHL Hockey: Rangers vs. New Jersey	7:00 PM			NYS Bar Exam	9:00 AM
2/27/02	Wednesday	College Basketball: St. John's vs. Notre Dame	7:30 PM			NYS Bar Exam	9:00 AM
2/28/02	Thursday	NHL Hockey: Rangers vs. Ottawa	7:00 PM				
3/1/02	Friday	NBA Basketball: Knicks vs. Seattle	7:30 PM			Load-In	
3/2/02	Saturday	NHL Hockey: Rangers vs. Philadelphia NYPD vs. FDNY	3:00 PM 8:00 PM			Teachers' Exam	8:30 AM
3/3/02	Sunday	NBA Basketball: Knicks vs. San Antonio	3:00 PM			Knicks Kids' Day	1:00 PM
3/4/02	Monday	NHL Hockey: Rangers vs. Calgary	7:00 PM			Load-In	
3/5/02	Tuesday	NBA Basketball: Knicks vs. Milwaukee	7:30 PM			Press	
3/6/02	Wednesday	College Basketball: Big East Doubleheader College Basketball: Big East Doubleheader	12:00 PM 7:00 PM			Press	
3/7/02	Thursday	College Basketball: Big East Doubleheader College Basketball: Big East Doubleheader	12:00 PM 7:00 PM			Press	
3/8/02	Friday	College Basketball: Big East Doubleheader	7:00 PM	Concert: Beres Hammond	8:00 PM	Press	
3/9/02	Saturday	College Basketball: Big East Championship	8:00 PM			Press	
3/10/02	Sunday						
3/11/02	Monday	NHL Hockey: Rangers vs. Montreal	7:30 PM				
3/12/02	Tuesday	NBA Basketball: Knicks vs. Philadelphia	7:30 PM				
3/13/02	Wednesday	NHL Hockey: Rangers vs. Boston	8:00 PM				
3/14/02	Thursday	NBA Basketball: Knicks vs. Sacramento	7:30 PM				
3/15/02	Friday	Concert: Billy Joel & Elton John	7:30 PM				
3/16/02	Saturday	PSAL PSAL NBA Basketball: Knicks vs. Cleveland	11:00 AM 1:00 PM 7:30 PM				
3/17/02	Sunday	NHL Hockey: Rangers vs. Detroit	3:00 PM				

Table 1: 2002 Madison Square Garden Events

		ARENA		THEATER (includes lobby)		EXPO CENTER	
Date	Day of Week	Event	Start Time	Event	Start Time	Event	Start Time
3/18/02	Monday					Circus Stabling	
3/19/02	Tuesday	NHL Hockey: Rangers vs. Vancouver	7:00 PM			Circus Stabling	
3/20/02	Wednesday					Circus Stabling	
3/21/02	Thursday	Circus: Ringling Brothers and Barnum & Bailey	7:30 PM			Circus Stabling	
3/22/02	Friday	Circus: Ringling Brothers and Barnum & Bailey NHL Hockey: Rangers vs. Atlanta	10:30 AM 7:00 PM	AFT Mayor's Circus	N/A	Circus Stabling	
3/23/02	Saturday	Circus: Ringling Brothers and Barnum & Bailey Circus: Ringling Brothers and Barnum & Bailey Circus: Ringling Brothers and Barnum & Bailey	11:00 AM 3:00 PM 7:30 PM	Concert: El Vacilon	8:00 PM	Circus Stabling	
3/24/02	Sunday	Circus: Ringling Brothers and Barnum & Bailey Circus: Ringling Brothers and Barnum & Bailey Circus: Ringling Brothers and Barnum & Bailey	11:00 AM 3:00 PM 7:30 PM			Circus Stabling	
3/25/02	Monday	Circus: Ringling Brothers and Barnum & Bailey NBA Basketball: Knicks vs. Denver	10:30 AM 7:30 PM			Circus Stabling	
3/26/02	Tuesday	College Basketball: NIT Doubleheader	7:00 PM			Circus Stabling	
3/27/02	Wednesday	Graduation: NYPD NHL Hockey: Rangers vs. Philadelpia	11:00 AM 8:00 PM			Circus Stabling	
3/28/02	Thursday	College Basketball: NIT Doubleheader	6:30 PM			Circus Stabling	
3/29/02	Friday	Circus: Ringling Brothers and Barnum & Bailey NBA Basketball: Knicks vs. Minnesota	12:00 PM 7:30 PM			Circus Stabling	
3/30/02	Saturday	Circus: Ringling Brothers and Barnum & Bailey Circus: Ringling Brothers and Barnum & Bailey Circus: Ringling Brothers and Barnum & Bailey	11:00 AM 3:00 PM 7:30 PM	Comedy: Garden Competition (lobby) Comedy: Garden Competition (lobby)	8:00 PM 10:30 PM	Circus Stabling	
3/31/02	Sunday	Circus: Ringling Brothers and Barnum & Bailey Circus: Ringling Brothers and Barnum & Bailey Circus: Ringling Brothers and Barnum & Bailey	11:00 AM 3:00 PM 7:30 PM			Circus Stabling	
4/1/02	Monday	Circus: Ringling Brothers and Barnum & Bailey Circus: Ringling Brothers and Barnum & Bailey Circus: Ringling Brothers and Barnum & Bailey	11:00 AM 3:00 PM 7:30 PM	Concert: Hot 97	8:00 PM	Circus Stabling	
4/2/02	Tuesday	Circus: Ringling Brothers and Barnum & Bailey NBA Basketball: Knicks vs. Charlotte	12:00 PM 8:00 PM	Load-In		Circus Stabling	
4/3/02	Wednesday	Circus: Ringling Brothers and Barnum & Bailey Circus: Ringling Brothers and Barnum & Bailey	12:00 PM 7:30 PM	Press Conference	12:00 PM	Circus Stabling	
4/4/02	Thursday	Basketball: McDonald's Games Basketball: McDonald's Games	5:00 PM 8:00 PM			Circus Stabling	
4/5/02	Friday	Circus: Ringling Brothers and Barnum & Bailey Circus: Ringling Brothers and Barnum & Bailey Circus: Ringling Brothers and Barnum & Bailey	11:00 AM 3:00 PM 7:30 PM			Circus Stabling	
4/6/02	Saturday	Circus: Ringling Brothers and Barnum & Bailey Circus: Ringling Brothers and Barnum & Bailey Circus: Ringling Brothers and Barnum & Bailey	11:00 AM 3:00 PM 7:30 PM			Circus Stabling	
4/7/02	Sunday	Circus: Ringling Brothers and Barnum & Bailey Circus: Ringling Brothers and Barnum & Bailey Circus: Ringling Brothers and Barnum & Bailey	11:00 AM 3:00 PM 7:30 PM			Circus Stabling	
4/8/02	Monday	NHL Hockey: Rangers vs. Pittsburgh	7:00 PM			Clean	
4/9/02	Tuesday	Dream Game NBA Basketball: Knicks vs. Orlando	1:00 PM 7:30 PM	Comedy: KISS-FM (lobby)	8:00 PM	Clean	
4/10/02	Wednesday	NHL Hockey: Rangers vs. Toronto	7:00 PM	Load-In		Clean	
4/11/02	Thursday	NBA Basketball: Knicks vs. Chicago	7:30 PM	Boxing: Golden Gloves	7:30 PM	Clean	
4/12/02	Friday	Concert: Luis Miguel	8:00 PM	Boxing: Golden Gloves	7:30 PM		
4/13/02	Saturday	Ice Show: Target Stars on Ice	8:00 PM	Load-In			
4/14/02	Sunday			Load-In			
4/15/02	Monday			Load-In			
4/16/02	Tuesday			Load-In			
4/17/02	Wednesday	NBA Basketball: Knicks vs. New Jersey	7:30 PM	Meeting: Coca-Cola Shareholders	9:30 AM		
4/18/02	Thursday			Load-In			
4/19/02	Friday			Load-In			
4/20/02	Saturday	Concert: Hola New York	8:00 PM	NFL Draft	12:00 PM		
4/21/02	Sunday			NFL Draft	12:00 PM		
4/22/02	Monday					Load-In	
4/23/02	Tuesday			Comedy: KISS-FM (lobby)	8:00 PM	Job Fair	11:00 AM
4/24/02	Wednesday					Load-In	
4/25/02	Thursday					Destinations Showcase	12:00 PM
4/26/02	Friday	Concert: Paul McCartney	8:00 PM	Load-In			
4/27/02	Saturday	Concert: Paul McCartney	8:00 PM	CPR Seminar (lobby) Boxing: McCline vs. Briggs	9:00 AM 6:30 PM		
4/28/02	Sunday						
4/29/02	Monday			Liberty Media Day	10:00 AM		
4/30/02	Tuesday						
5/1/02	Wednesday			Religious: Bountiful Blessings	7:00 PM		
5/2/02	Thursday			Religious: Bountiful Blessings Religious: Bountiful Blessings	11:00 AM 7:00 PM	Load-In	
5/3/02	Friday			Religious: Bountiful Blessings Religious: Bountiful Blessings	11:00 AM 7:00 PM	Load-In	
5/4/02	Saturday					Storage	
5/5/02	Sunday					Off-Price Sale	9:00 AM
5/6/02	Monday					Off-Price Sale	9:00 AM
5/7/02	Tuesday			Comedy: KISS-FM (lobby)	8:00 PM	Off-Price Sale	9:00 AM
5/8/02	Wednesday			Load-In		Load-Out	
5/9/02	Thursday			Meeting: Regional Coke	10:00 AM		
5/10/02	Friday	Concert: Kid Rock	8:00 PM	Load-In		Set-Up	
5/11/02	Saturday			Load-In		Teachers' Exam	8:30 AM
5/12/02	Sunday			Load-In			
5/13/02	Monday			Load-In			
5/14/02	Tuesday			Load-In			
5/15/02	Wednesday			Load-In			
5/16/02	Thursday	Set-Up		UPN Event	10:30 AM	Set-Up	
5/17/02	Friday	Emmys Dinner	5:30 PM	Awards: Daytime Emmys	9:00 PM	Emmys Dinner	5:30 PM
5/18/02	Saturday	WNBA Basketball: Liberty vs. Houston (preseason)	4:00 PM	Load-Out		Local 3 Elections	6:00 AM
5/19/02	Sunday						
5/20/02	Monday	Liberty Open Practice	7:00 PM	Graduation: NYU Law	10:30 AM	Court Repair	
5/21/02	Tuesday			Comedy: KISS-FM (lobby)	8:00 PM	Court Repair	
5/22/02	Wednesday			Graduation: New School	3:00 PM	Court Repair	
5/23/02	Thursday			Graduation: Yeshiva	11:00 AM	Court Repair	
5/24/02	Friday			Graduation: College of Dentistry	10:30 AM	Court Repair	
5/25/02	Saturday	Concert: Latin Show	8:00 PM	Comedy: Eddie Griffin	8:00 PM	Court Repair	
5/26/02	Sunday	Religious: Yogeshwar	3:00 PM	Religious: Yogeshwar	N/A	Court Repair	
5/27/02	Monday					Court Repair	

Table 1: 2002 Madison Square Garden Events

		ARENA		THEATER (includes lobby)		EXPO CENTER	
Date	Day of Week	Event	Start Time	Event	Start Time	Event	Start Time
5/28/02	Tuesday	Concert: Dave Mathews	7:30 PM			Court Repair	
5/29/02	Wednesday	Concert: Dave Mathews	7:30 PM	Graduation: Baruch Graduation: Baruch	11:00 AM 3:30 PM	Court Repair	
5/30/02	Thursday	Graduation: John Jay	10:30 AM			Court Repair	
5/31/02	Friday	Concert: Blink 182 & Green Day	7:30 PM	Graduation: BMCC	11:30 AM	Court Repair	
6/1/02	Saturday					Court Repair	
6/2/02	Sunday	WNBA Basketball: Liberty vs. Miami	12:00 PM			Court Repair	
6/3/02	Monday			Graduation: NYC Tech	1:00 PM	Court Repair	
6/4/02	Tuesday			Meeting (lobby)	10:00 AM	Court Repair	
6/5/02	Wednesday	WNBA Basketball: Liberty vs. Detroit	7:30 PM			Court Repair	
6/6/02	Thursday					Court Repair	
6/7/02	Friday					Court Repair	
6/8/02	Saturday			Comedy: Chuck Nice Comedy: Chuck Nice	8:00 PM 10:30 PM	Court Repair	
6/9/02	Sunday					Court Repair	
6/10/02	Monday					Court Repair	
6/11/02	Tuesday			Meeting: Port Authority	10:00 AM	Court Repair	
6/12/02	Wednesday					Court Repair	
6/13/02	Thursday	Concert: Andrea Bocelli	8:00 PM	Comedy: Grrl Genius Night (lobby)	8:00 PM	Court Repair	
6/14/02	Friday			Comedy Forum (lobby)	N/A	Court Repair	
6/15/02	Saturday					Court Repair	
6/16/02	Sunday	WNBA Basketball: Liberty vs. Charlotte	2:00 PM			Court Repair	
6/17/02	Monday	Dream Game	5:00 PM			Court Repair	
6/18/02	Tuesday	WNBA Basketball: Liberty vs. Orlando	7:30 PM			Court Repair	
6/19/02	Wednesday			Dinner (lobby)	5:30 PM	Court Repair	
6/20/02	Thursday			Graduation: Edward R. Murrow	6:30 PM	Court Repair	
6/21/02	Friday	Concert: Incubus	8:00 PM			Court Repair	
6/22/02	Saturday	Concert: Latin Concert	8:00 PM			Court Repair	
6/23/02	Sunday					Court Repair	
6/24/02	Monday	Concert: Korn	8:00 PM	Load-In		Court Repair	
6/25/02	Tuesday	WNBA Basketball: Liberty vs. Indiana	7:30 PM	Load-In		Court Repair	
6/26/02	Wednesday	Concert: Cher	8:00 PM	NBA Draft	7:00 PM	Court Repair	
6/27/02	Thursday	Concert: Cher	8:00 PM	Graduation (lobby)	11:00 AM	Load-In	
6/28/02	Friday	WNBA Basketball: Liberty vs. Cleveland	7:30 PM			Comic & Fantasy Expo	3:00 PM
6/29/02	Saturday	Wrestling: WWE RAW	8:00 PM			Comic & Fantasy Expo	10:00 AM
6/30/02	Sunday	WNBA Basketball: Liberty vs. Portland	4:00 PM			Comic & Fantasy Expo	10:00 AM
7/1/02	Monday	Film Shoot	12:00 PM	Film Shoot	8:00 AM	Load-Out	
7/2/02	Tuesday						
7/3/02	Wednesday						
7/4/02	Thursday						
7/5/02	Friday						
7/6/02	Saturday						
7/7/02	Sunday						
7/8/02	Monday	WNBA Basketball: Liberty vs. Phoenix	7:30 PM	Load-In			
7/9/02	Tuesday			Load-In			
7/10/02	Wednesday			Load-In			
7/11/02	Thursday			N/A	9:45 AM		
7/12/02	Friday	Concert: Marc Anthony	7:30 PM			Load-In	
7/13/02	Saturday			Tampax Tour	1:00 PM	Tour Exhibit	3:00 PM
7/14/02	Sunday			Concert: Chayanne	8:00 PM		
7/15/02	Monday						
7/16/02	Tuesday						
7/17/02	Wednesday						
7/18/02	Thursday	WNBA Basketball: Liberty vs. Los Angeles	8:00 PM	Blood Drive (lobby)	9:00 AM		
7/19/02	Friday						
7/20/02	Saturday	Concert: PA Colombia	7:30 PM			Teachers' Exam	8:30 AM
7/21/02	Sunday						
7/22/02	Monday	Dream Game WNBA Basketball: Liberty vs. Cleveland	1:00 PM 7:30 PM				
7/23/02	Tuesday	Load-In				Load-In	
7/24/02	Wednesday	Load-In				Load-In	
7/25/02	Thursday	Religious: Creflo Dollar Religious: Creflo Dollar Religious: Creflo Dollar	9:30 AM 2:00 PM 7:00 PM			Religious: Creflo Dollar	N/A
7/26/02	Friday	Religious: Creflo Dollar Religious: Creflo Dollar Religious: Creflo Dollar	9:30 AM 2:00 PM 7:00 PM			Religious: Creflo Dollar	N/A
7/27/02	Saturday	Religious: Creflo Dollar Religious: Creflo Dollar Religious: Creflo Dollar	9:30 AM 2:00 PM 7:00 PM			Religious: Creflo Dollar	N/A
7/28/02	Sunday	WNBA Basketball: Liberty vs. Houston	2:00 PM				
7/29/02	Monday	Dream Games Dream Games Dream Games	1:00 PM 6:00 PM 8:00 PM				
7/30/02	Tuesday	Liberty Open Practice	7:00 PM			Storage	
7/31/02	Wednesday	Concert: The Who	7:30 PM	Comedy: Garden Competition (lobby)	8:00 PM	Storage	
8/1/02	Thursday	Concert: The Who	7:30 PM			Storage	
8/2/02	Friday	WNBA Basketball: Liberty vs. Miami	7:30 PM	Comedy: Garden Competition (lobby)	8:00 PM	Storage	
8/3/02	Saturday	Concert: The Who	7:30 PM			Storage	
8/4/02	Sunday	Concert: The Who	7:30 PM			Storage	
8/5/02	Monday						
8/6/02	Tuesday	WNBA Basketball: Liberty vs. Minnesota	7:30 PM				
8/7/02	Wednesday	Concert: Lil Bow Wow	7:30 PM				
8/8/02	Thursday	WNBA Basketball: Liberty vs. Washington	7:30 PM				
8/9/02	Friday						
8/10/02	Saturday			Wedding Expo	11:00 AM		
8/11/02	Sunday	WNBA Basketball: Liberty vs. Charlotte	4:00 PM				
8/12/02	Monday	Concert: Bruce Springsteen	7:30 PM			Storage	
8/13/02	Tuesday	Knicks City Dancer Auditions	N/A	Comedy: Garden Competition (lobby)	8:00 PM		
8/14/02	Wednesday	Knicks City Dancer Auditions	N/A	Comedy: Garden Competition (lobby)	8:00 PM		
8/15/02	Thursday						
8/16/02	Friday					Avon Launch	N/A
8/17/02	Saturday						
8/18/02	Sunday	WNBA Basketball: Liberty vs. Indiana (playoffs)	12:00 PM				
8/19/02	Monday						
8/20/02	Tuesday	WNBA Basketball: Liberty vs. Indiana (playoffs)	8:00 PM				
8/21/02	Wednesday						
8/22/02	Thursday			Teacher's Seminar	9:00 AM	Teacher's Exhibits	12:00 PM

Table 1: 2002 Madison Square Garden Events

		ARENA		THEATER (includes lobby)		EXPO CENTER	
Date	Day of Week	Event	Start Time	Event	Start Time	Event	Start Time
8/23/02	Friday						
8/24/02	Saturday	WNBA Basketball: Liberty vs. Washington (playoffs)	8:00 PM				
8/25/02	Sunday	WNBA Basketball: Liberty vs. Washington (playoffs)	7:00 PM				
8/26/02	Monday	Wrestling: WWE RAW	7:45 PM				
8/27/02	Tuesday						
8/28/02	Wednesday						
8/29/02	Thursday	WNBA Basketball: Liberty vs. Los Angeles (playoffs)	7:30 PM				
8/30/02	Friday			Concert: Carribean Concert	7:00 PM		
8/31/02	Saturday						
9/1/02	Sunday						
9/2/02	Monday						
9/3/02	Tuesday						
9/4/02	Wednesday						
9/5/02	Thursday						
9/6/02	Friday						
9/7/02	Saturday	Concert: Salsa Fest	8:00 PM				
9/8/02	Sunday						
9/9/02	Monday					Load-In	
9/10/02	Tuesday	Load-In				Job Fair	11:00 AM
9/11/02	Wednesday	Day of Hope and Healing	7:00 PM			Holding Area	
9/12/02	Thursday						
9/13/02	Friday			Load-In		Set-up	
9/14/02	Saturday			Religious: 7th Day Adventists	9:30 AM	Religious: Adventists' Luncheon	1:30 PM
9/15/02	Sunday	Ice Maintenance					
9/16/02	Monday	Ice Maintenance					
9/17/02	Tuesday	Basketball: Wheelchair Basketball Classic	7:00 PM				
9/18/02	Wednesday	Ice Maintenance					
9/19/02	Thursday	Load-In		Season Opener (lobby)	5:30 PM		
9/20/02	Friday	Ice Show: Stars, Stripes & Skates	8:00 PM			Load-In	
9/21/02	Saturday	Concert: Viva Mexico	7:30 PM			Fannie Mae Home Fair	10:00 AM
9/22/02	Sunday	NHL Hockey: Rangers vs. Philadelphia (preseason)	5:00 PM				
9/23/02	Monday	Concert: Billy Joel & Elton John	7:30 PM				
9/24/02	Tuesday	NHL Hockey: Rangers vs. New Jersey (preseason)	7:00 PM	Graduation: LaGuardia	10:30 AM		
9/25/02	Wednesday	Load-In				Storage	
9/26/02	Thursday	Concert: Rolling Stones	8:00 PM			Storage	
9/27/02	Friday	Concert: Enrique Iglesias	8:00 PM			Load-In	
9/28/02	Saturday			Comedy: Vacilon 69	8:00 PM		
9/29/02	Sunday	NHL Hockey: Rangers vs. Boston (preseason)	5:00 PM				
9/30/02	Monday			Load-In			
10/1/02	Tuesday			Concert: One Night With Light	8:00 PM		
10/2/02	Wednesday						
10/3/02	Thursday						
10/4/02	Friday						
10/5/02	Saturday	Concert: Marc Anthony & Carlos Vives	8:00 PM				
10/6/02	Sunday	Concert: Radio Jesus	3:00 PM				
10/7/02	Monday	Set-Up					
10/8/02	Tuesday	Concert: Music to My Ears	7:30 PM			Storage	
10/9/02	Wednesday	Set-Up		Employee Dinner (lobby)	5:30 PM		
10/10/02	Thursday	NBA Basketball: Knicks vs. San Antonio (preseason)	7:30 PM			Load-In	
10/11/02	Friday	NHL Hockey: Rangers vs. Montreal	7:00 PM			Load-In	
10/12/02	Saturday	FDNY Memorial NBA Basketball: Knicks vs. Phoenix (preseason)	10:00 AM 7:30 PM	Bar Mitzvah (lobby)	8:00 PM	Load-In	
10/13/02	Sunday	Girl Scouts' Anniversary	2:00 PM			Off-Price Sale	9:00 AM
10/14/02	Monday					Off-Price Sale	9:00 AM
10/15/02	Tuesday	NHL Hockey: Rangers vs. Toronto	7:00 PM			Off-Price Sale	9:00 AM
10/16/02	Wednesday			Comedy: Garden Competition (lobby)	8:00 PM	Load-Out	
10/17/02	Thursday	Concert: Cher	8:00 PM	Comedy: Garden Competition (lobby)	8:00 PM	Storage	
10/18/02	Friday	Concert: Cher	8:00 PM	Comedy: Dave Chappelle	8:00 PM	Storage	
10/19/02	Saturday	NHL Hockey: Rangers vs. Nashville	7:00 PM	Concert: Rock & Roll Revival	7:30 PM		
10/20/02	Sunday	Concert: Vicente & Alejandro Fernandez	7:00 PM	Bar Mitzvah (lobby)	12:00 PM		
10/21/02	Monday	NHL Hockey: Rangers vs. Tampa Bay	7:00 PM				
10/22/02	Tuesday	NBA Basketball: Knicks vs. Utah (preseason)	7:30 PM	Learning Annex	6:30 PM		
10/23/02	Wednesday	NHL Hockey: Rangers vs. Washington	7:00 PM	Big East Media Day (lobby)	9:30 AM		
10/24/02	Thursday	Concert: Rush	8:00 PM	Awards: AFB (lobby)	5:30 PM		
10/25/02	Friday	NHL Hockey: Rangers vs. Los Angeles	7:00 PM	Religious: Church of Christ	7:00 PM		
10/26/02	Saturday			Religious: Church of Christ Religious: Church of Christ Religious: Church of Christ	9:00 AM 2:00 PM 7:00 PM		
10/27/02	Sunday	Religious: Church of Christ	3:00 PM				
10/28/02	Monday	NHL Hockey: Rangers vs. Phoenix	7:00 PM	Concert: Mana	8:00 PM		
10/29/02	Tuesday						
10/30/02	Wednesday						
10/31/02	Thursday						
11/1/02	Friday			Concert: Hopeville Tour	8:00 PM		
11/2/02	Saturday	NBA Basketball: Knicks vs. Boston	7:30 PM	Comedy: J. Anthony Brown	7:30 PM		
11/3/02	Sunday	NHL Hockey: Rangers vs. St. Louis	5:00 PM				
11/4/02	Monday	NBA Basketball: Knicks vs. Milwaukee	7:30 PM				
11/5/02	Tuesday	NHL Hockey: Rangers vs. Edmonton	7:00 PM				
11/6/02	Wednesday	NBA Basketball: Knicks vs. Sacramento	7:00 PM	Comedy: Garden Competition (lobby)	8:00 PM		
11/7/02	Thursday	NHL Hockey: Rangers vs. Calgary	7:00 PM	Load-In			
11/8/02	Friday	Basketball: St. John's vs. Harlem Globetrotters	7:30 PM	Comedy: Garden Competition (lobby)	8:00 PM		
11/9/02	Saturday	Concert: Hispanos Unidos	8:00 PM	Comedy: Garden Competition (lobby)	8:00 PM		
11/10/02	Sunday	NBA Basketball: Knicks vs. New Orleans	4:00 PM	Load-In			
11/11/02	Monday	Concert: Bob Dylan	8:00 PM	Load-In		Storage	
11/12/02	Tuesday	NBA Basketball: Knicks vs. Utah	7:30 PM	Load-In		Storage	
11/13/02	Wednesday	Concert: Bob Dylan	8:00 PM	Load-In		Storage	
11/14/02	Thursday	College Basketball: AT&T Doubleheader	7:00 PM	Load-In			
11/15/02	Friday	College Basketball: AT&T Doubleheader	6:30 PM	Load-In			
11/16/02	Saturday	NBA Basketball: Knicks vs. Philadelphia	1:00 PM	Comedy: Garden Competition (lobby)	9:00 PM	Storage	
11/17/02	Sunday	Wrestling: WWE Survivor Series	7:45 PM	Load-In		Storage	
11/18/02	Monday	NBA Basketball: Knicks vs. Detroit	7:30 PM	Load-In			
11/19/02	Tuesday	NHL Hockey: Rangers vs. Anaheim	7:00 PM	Load-In			
11/20/02	Wednesday	Concert: Shakira	9:00 PM	Load-In		Storage	
11/21/02	Thursday	Concert: Peter Gabriel	8:00 PM	Comedy: Garden Competition (lobby)	8:00 PM	Storage	
11/22/02	Friday			Load-In			
11/23/02	Saturday	NHL Hockey: Rangers vs. NY Islanders	1:00 PM	Rehearsal			
11/24/02	Sunday	NBA Basketball: Knicks vs. Minnesota	7:00 PM	Rehearsal			
11/25/02	Monday	NHL Hockey: Rangers vs. Carolina	7:00 PM	Rehearsal			
11/26/02	Tuesday	Concert: The Other Ones	7:30 PM	Rehearsal		Storage	
11/27/02	Wednesday	College Basketball: NIT Doubleheader	7:00 PM	Rehearsal			
11/28/02	Thursday						
11/29/02	Friday	College Basketball: NIT Doubleheader	6:30 PM	Musical: A Christmas Carol Musical: A Christmas Carol Musical: A Christmas Carol	1:00 PM 5:00 PM 8:00 PM		
11/30/02	Saturday	NBA Basketball: Knicks vs. New Orleans	1:00 PM	Musical: A Christmas Carol Musical: A Christmas Carol Musical: A Christmas Carol Musical: A Christmas Carol	11:00 AM 2:00 PM 5:00 PM 8:00 PM		
12/1/02	Sunday	NHL Hockey: Rangers vs. Tampa Bay	1:00 PM	Musical: A Christmas Carol Musical: A Christmas Carol Musical: A Christmas Carol	11:00 AM 2:00 PM 5:00 PM		
12/2/02	Monday	NBA Basketball: Knicks vs. Cleveland	7:30 PM				
12/3/02	Tuesday	NHL Hockey: Rangers vs. Columbus	7:00 PM				
12/4/02	Wednesday	NBA Basketball: Knicks vs. Orlando	7:30 PM	Musical: A Christmas Carol Musical: A Christmas Carol	2:00 PM 7:30 PM		
12/5/02	Thursday	Concert: Guns & Roses	7:30 PM	Musical: A Christmas Carol Musical: A Christmas Carol	11:00 AM 7:30 PM	Storage	
12/6/02	Friday	NHL Hockey: Rangers vs. Buffalo	7:00 PM	Musical: A Christmas Carol Musical: A Christmas Carol Musical: A Christmas Carol	11:00 AM 5:00 PM 8:00 PM	Load-In	
12/7/02	Saturday	College Basketball Tripleheader	12:00 PM	Musical: A Christmas Carol Musical: A Christmas Carol Musical: A Christmas Carol Musical: A Christmas Carol	11:00 AM 2:00 PM 5:00 PM 8:00 PM	Teachers' Exam	8:30 AM
12/8/02	Sunday	NHL Hockey: Rangers vs. Boston	1:00 PM	Musical: A Christmas Carol Musical: A Christmas Carol Musical: A Christmas Carol	11:00 AM 2:00 PM 5:00 PM		
12/9/02	Monday	Concert: KISS-FM R&B Jam	7:00 PM			Storage	
12/10/02	Tuesday	NBA Basketball: Knicks vs. Seattle	7:30 PM				
12/11/02	Wednesday	NHL Hockey: Rangers vs. Chicago	8:00 PM	Musical: A Christmas Carol Musical: A Christmas Carol	2:00 PM 7:30 PM	Storage	
12/12/02	Thursday	Concert: Z-100 Jingle Ball	7:00 PM	Musical: A Christmas Carol Musical: A Christmas Carol	11:00 AM 7:30 PM	Storage	
12/13/02	Friday	Concert: Tom Petty	7:30 PM	Musical: A Christmas Carol Musical: A Christmas Carol Musical: A Christmas Carol	11:00 AM 5:00 PM 8:00 PM	Storage	
12/14/02	Saturday	College Basketball Doubleheader NBA Basketball: Knicks vs. Boston	12:00 PM 7:30 PM	Musical: A Christmas Carol Musical: A Christmas Carol Musical: A Christmas Carol Musical: A Christmas Carol	11:00 AM 2:00 PM 5:00 PM 8:00 PM		
12/15/02	Sunday			Musical: A Christmas Carol Musical: A Christmas Carol Musical: A Christmas Carol	11:00 AM 2:00 PM 5:00 PM		
12/16/02	Monday	NHL Hockey: Rangers vs. San Jose	7:00 PM				
12/17/02	Tuesday	NBA Basketball: Knicks vs. New Jersey	7:30 PM				
12/18/02	Wednesday	Concert: WKTU's Miracle on 34th Street	7:30 PM	Musical: A Christmas Carol Musical: A Christmas Carol Musical: A Christmas Carol	11:00 AM 2:00 PM 7:30 PM	Storage	
12/19/02	Thursday	NHL Hockey: Rangers vs. Montreal	7:00 PM	Musical: A Christmas Carol Musical: A Christmas Carol	11:00 AM 7:30 PM		
12/20/02	Friday	Concert: Dave Mathews	7:30 PM	Musical: A Christmas Carol Musical: A Christmas Carol Musical: A Christmas Carol	11:00 AM 5:00 PM 8:00 PM	Storage	
12/21/02	Saturday	Concert: Dave Mathews	7:30 PM	Musical: A Christmas Carol Musical: A Christmas Carol Musical: A Christmas Carol Musical: A Christmas Carol	11:00 AM 2:00 PM 5:00 PM 8:00 PM	Storage	
12/22/02	Sunday	NBA Basketball: Knicks vs. Miami	7:00 PM	Musical: A Christmas Carol Musical: A Christmas Carol Musical: A Christmas Carol	11:00 AM 2:00 PM 5:00 PM		
12/23/02	Monday	NHL Hockey: Rangers vs. New Jersey	7:00 PM			Set-Up	
12/24/02	Tuesday					Set-Up	
12/25/02	Wednesday			Musical: A Christmas Carol	2:00 PM	Day of Giving Dinner	2:00 PM
12/26/02	Thursday	NHL Hockey: Rangers vs. Pittsburgh	7:00 PM	Musical: A Christmas Carol Musical: A Christmas Carol	2:00 PM 5:00 PM		
12/27/02	Friday	College Basketball: Holiday Festival Doubleheader	6:30 PM	Musical: A Christmas Carol Musical: A Christmas Carol Musical: A Christmas Carol	11:00 AM 2:00 PM 5:00 PM		
12/28/02	Saturday	College Basketball: Holiday Festival Doubleheader	3:00 PM	Musical: A Christmas Carol Musical: A Christmas Carol Musical: A Christmas Carol	2:00 PM 5:00 PM 8:00 PM		
12/29/02	Sunday			Musical: A Christmas Carol Musical: A Christmas Carol Musical: A Christmas Carol	11:00 AM 2:00 PM 5:00 PM		
12/30/02	Monday	NBA Basketball: Knicks vs. San Antonio	7:30 PM				
12/31/02	Tuesday	Concert: Phish	8:00 PM			Storage	

Table 1: 2002 Madison Square Garden Events

Source: Madison Square Garden, 2003.

Color Key:

Dark Day (includes loading, unloading, and/or storage activities) performances). Over the course of the year, 141 dark days occurred at the arena (109 on weekdays, 13 on Saturdays, and 19 on Sundays).

Table 1 also illustrates the pattern in the scheduling of events held at the theater and expo center. Out of the 177 events held at the theater in 2002, 83 involved performances of "Sesame Street Live" and "A Christmas Carol", two productions that primarily occurred during the months of February and December, respectively. Multiple performances of these shows (typically three) were usually held on the same day. For this reason, there were only 120 days on which events where scheduled (there were 39 days on which multiple events were held – 22 of these involved performances of "A Christmas Carol"). Over the course of the year, there were 245 days on which there was no event at the theater (178 of the dark days were on weekdays, 27 were on Saturdays, and 40 were on Sundays). As shown in Table 1, when compared to the arena and theater, there were relatively few public events held at the expo center over the course of the entire year (there were only 38 days with events).

Arena events in 2002 were tabulated by event type based on the schedule shown in Table 1 and additionally sorted by weekdays, Saturdays, and Sundays. Table 2 shows that the majority of weekday events involve basketball games, hockey games, concerts, and circus performances; the pattern of events on Sundays is more pronounced and primarily involves basketball and hockey games. Most of the weekend concerts tended to occur on Saturdays.[4]

Table 2: Distribution of 2002 MSG Arena Events

Event Type	Weekday	Saturday	Sunday	Total
Basketball (College)	13	7	1	**21**
Basketball (NBA)	29	8	7	**44**
Basketball (Other)	5	0	0	**5**
Basketball (WNBA)	12	2	7	**21**
Circus	14	9	9	**32**
Concert	38	13	3	**54**
Dog Show	2	0	0	**2**
Graduation	2	0	0	**2**
Ice Show	1	2	0	**3**
Hockey (NHL)	32	4	7	**43**
Other	15	4	2	**21**
Religious	6	3	2	**11**
Track	1	1	0	**2**
Wrestling	3	1	1	**5**
Totals	**173**	**54**	**39**	**266**

Source: Madison Square Garden, 2003.

Table 3 provides a similar tabulation of 2002 events held in the theater, which is also sorted by weekdays, Saturdays, and Sundays. This table indicates that nearly half of all theater events involved performances of "Sesame Street Live" (categorized as a family show) or "A Christmas Carol" (categorized as a musical). Although there were a significant amount of comedy events (34), many of these were competitions that took place in the theater lobby (which has a smaller seating capacity of approximately 500-600). A review of Table 3 shows that there were substantially fewer events at the theater on Sundays (26) compared to Saturdays (49) and that approximately 80% of the Sunday events involved performances of the family show or musical.

[4] Although there were a total of 9 Sunday circus performances, these occurred over a period of 3 Sundays (multiple shows were held on each date).

Table 3: Distribution of 2002 MSG Theater Events

Event Type	Weekday	Saturday	Sunday	Total
Awards	3	0	0	**3**
Boxing	2	2	0	**4**
Comedy	22	10	2	**34**
Concert	5	3	1	**9**
Draft	1	1	1	**3**
Family Show	10	6	6	**22**
Graduation	11	0	0	**11**
Meeting	4	0	0	**4**
Musical	27	19	15	**61**
Other	12	4	0	**16**
Religious	5	4	1	**10**
Totals	**102**	**49**	**26**	**177**

Source: Madison Square Garden, 2003.

Table 4 shows the distribution of arena and theater events that were held on the same day at MSG in 2002 and compares their differences in start times. Events with overlapping arrival periods were assumed to include all events with differences in start times of less than one hour. As shown in Table 4, there were overlaps on slightly less than half of the weekdays when events were held at the two venues. A review of these events indicates that approximately half of these overlaps involve events in the theater lobby. As shown in Table 4, there were no overlapping events on Sundays since all events had differences in start times of one hour or greater.

Table 4: Relationship between 2002 Arena and Theater Events Held On Same Day

Day of Week	Difference in Start Times				Total Events
	Same	½ Hour	1 Hour	> 1 Hour	
Weekday	10	10	7	25	**52**
Saturday	3	6	5	6	**20**
Sunday	0	0	3	4	**7**
Totals	**13**	**16**	**15**	**35**	**79**

Source: Madison Square Garden, 2003.

Existing Attendance Patterns

Table 5 presents detailed data about the major types of arena events (concerts, NBA basketball, WNBA basketball, college basketball, NHL hockey, and the circus). This table includes typical event durations, attendance capacities, and existing 85th percentile attendances.[5] Although both the New York Knicks and New York Rangers currently tend to sell out many of their games, the Knicks games have the highest 85th percentile attendance out of all events. As shown in Table 5, the 85th percentile attendances at WNBA basketball games and circus performances are significantly lower compared to the other major events; for this reason a WNBA basketball game or circus performance would not be expected to constitute the reasonable worst-case scenario for the analysis of transportation-related impacts. According to Madison Square Garden management, although concert attendance varies, a significant

[5] 85th percentile attendances will be used to develop a reasonable worst-case scenario that would occur with enough frequency to warrant consideration for analysis.

number of concerts sell out every year.
Therefore, the events that have the highest 85th percentile attendances involve NBA basketball games, concerts, and NHL hockey games.

Table 5: Existing Arena Capacity and Approximate Duration of Events

Event Type	Typical Duration[1]	Attendance Capacity[2]	85th Percentile Attendances		
			Overall	Weekday	Weekend
Concert	3+ hours	20,629	17,977	18,301	16,476
NBA Basketball	2 ½ hours	20,024	19,023[3]		
WNBA Basketball	2 hours	20,024	11,605	11,221	12,126
College Basketball	2 hours	20,024	16,012	14,389	16,167
NHL Hockey	2 ¾ hours	18,295	17,380[3]		
Circus	2 ½ hours	18,295	13,687	13,686	13,062

Sources: Madison Square Garden and Sam Schwartz LLC, 2003.
Notes: (1) Listed durations are minimum times and do not include overtime or unexpected delays. (2) Includes seats and suites. (3) Most of these events are sold out; Sam Schwartz LLC estimates indicate that actual attendances range between 95% and 100% of capacity.

Travel Surveys

To establish the existing travel patterns of MSG attendees, travel surveys conducted by Vollmer Associates in the fall of 1987 were utilized.[6] These surveys included interviews to determine modes of travel specific to the origins of attendees at the following three weeknight events:

- Cars Concert (Thursday, October 29, 1987 @ 8:00 pm);
- New York Knicks vs. Boston Celtics (Monday, November 9, 1987 @ 7:30 pm); and
- New York Rangers vs. New Jersey Devils (Tuesday, November 10, 1987 @ 7:30 pm).

Additional surveys at MSG were conducted by Sam Schwartz LLC in the spring of 2003.[7] These surveys were used to determine temporal distributions, vehicle occupancies, and to approximate variations in travel patterns between a weekday and a Sunday sports event. Events that were surveyed included:

- New York Knicks vs. Milwaukee Bucks (Sunday, March 16, 2003 @ 7:00 pm);
- New York Knicks vs. Toronto Raptors (Monday, March 24, 2003 @ 7:30 pm);
- New York Knicks vs. New Jersey Nets (Friday, March 28, 2003 @ 8:00 pm);
- New York Rangers vs. Pittsburgh Penguins (Wednesday, March 26, 2003 @ 7:30 pm);
- New York Rangers vs. New Jersey Devils (Friday, April 4, 2003 @ 7:30 pm); and
- Red Hot Chili Peppers Concert (Tuesday, May 20, 2003 @ 8:00 pm).

Trip Origins

A comparison of trip origins from the three weeknight events surveyed (concert, Rangers game, and Knicks game) is presented in Table 6. The table also includes an average distribution of origins for the weeknight sports events and a projected distribution of origins for Sunday sports events. As shown in the table, the percentage of Manhattan origins is highest for the weeknight sports events; this variation is likely attributed to the large percentage of attendees that go to these types of MSG events directly from work in Manhattan.

[6]*Technical Memorandum A-4*, Madison Square Garden Attendance Profile, Vollmer Associates, 1987.
[7]*Madison Square Garden Modal Split Analysis*, Sam Schwartz LLC, August 26, 2003.

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Table 6: Trip Origins of MSG Attendees

Region	Weeknight Concert	Weeknight Rangers Game	Weeknight Knicks Game	Weeknight Sports Average	Sunday Sports Event[1]
Staten Island	2.7%	1.7%	1.6%	1.6%	0.5%
Manhattan	20.8%	34.8%	38.8%	36.8%	30.3%
Brooklyn	11.6%	7.2%	8.2%	7.7%	9.8%
Bronx	4.6%	2.6%	3.7%	3.2%	2.3%
Queens	14.0%	8.3%	11.8%	10.1%	11.6%
Long Island	15.4%	13.2%	9.0%	11.1%	12.7%
Westchester	14.2%	5.7%	4.6%	5.1%	7.1%
Rockland	0.8%	1.1%	7.4%	4.3%	4.3%
New Jersey	13.9%	22.1%	9.6%	15.7%	17.0%
Connecticut	1.9%	3.2%	5.4%	4.3%	4.3%

Sources: Vollmer Associates, 1987.
Notes: (1) Estimated based on weeknight sports average using Sam Schwartz LLC surveys. (2) Sum of origins do not total 100% due to rounding.

Existing and Projected Modal Splits

In order to develop trip assignments specific for each mode of travel, modal splits expanded to a regional basis will be utilized. Table 7 shows modal splits by region for a weeknight concert, a weeknight sports event, and a Sunday sports event. The table also includes the weighted average modal splits, which were calculated by applying the respective trip origins (listed in Table 6) to the regional modal splits. The results show that overall auto usage is consistent for weeknight events (31.7% for the concert and 33.7% for the sports events) and is higher (48.4%) for a Sunday sports event. In contrast, overall transit usage is highest for a weeknight concert (51.8%) and lowest for a Sunday sports event (34.8%).

In order to account for a potential relocation of Madison Square Garden to a location one and a half blocks west of its existing location, auto and taxi modal splits were increased by 7.5% and 5%, respectively, to account for a reduced access to transit services. This is similar to the methodology that was used to develop modal split assumptions for sports events at the proposed nearby multi-use facility based the existing MSG travel surveys[8]. The resulting modal splits are shown in Table 8. It is anticipated that given the existing and projected location of MSG, the existing and projected modal splits would be affected by neither the No. 7 subway extension nor the LIRR East Side Access project.

Temporal Distributions

Table 9 shows the results of the temporal distributions obtained from the MSG door counts. Based on the results of these surveys, it will be assumed that approximately 75% percent of arrivals to sports events[9] and 50% of arrivals to concerts would occur during the peak hour. Compared to sports events, the temporal distributions of concert events tend to exhibit less pronounced peaking characteristics because there are usually opening acts before the headliner band and a significant amount of attendees typically arrive after the concert begins.

[8] It was assumed that arena events at the proposed multi-use facility location would have increases in auto and taxi splits of 15% and 10%, respectively. Since MSG would be relocated to a site approximately halfway between Penn Station and the proposed multi-use facility, the increases in auto/taxi modal splits were assumed to 50% of what was assumed for the proposed multi-use facility.
[9] To provide for a conservative analysis, data from the March 16, 2003 and March 28, 2003 New York Knicks games were excluded due to their lower peak hour temporal distributions.

Table 7: Existing Arrival Modal Splits By Region (Without MSG Relocation)

WEEKNIGHT CONCERT

Region	Auto	Taxi	Limo	Walk	Bus	Subway	LIRR (Penn Station)	NJ Transit Rail	PATH	TOTAL BY REGION
Staten Island	72%	10%	0%	0%	0%	18%	0%	0%	0%	100%
Manhattan	12%	28%	1%	21%	4%	34%	0%	0%	0%	100%
Brooklyn	44%	3%	1%	0%	0%	52%	0%	0%	0%	100%
Bronx	46%	9%	0%	3%	3%	39%	0%	0%	0%	100%
Queens	49%	1%	2%	1%	0%	37%	10%	0%	0%	100%
Long Island	22%	2%	2%	0%	0%	2%	72%	0%	0%	100%
Westchester	18%	8%	0%	8%	60%	6%	0%	0%	0%	100%
Rockland	83%	0%	0%	0%	17%	0%	0%	0%	0%	100%
New Jersey	42%	1%	1%	2%	1%	2%	0%	35%	16%	100%
Connecticut	39%	5%	0%	34%	0%	22%	0%	0%	0%	100%
Weighted Average	**31.7%**	**8.7%**	**1.1%**	**6.7%**	**9.8%**	**22.4%**	**12.5%**	**4.9%**	**2.2%**	**100.0%**

WEEKNIGHT SPORTS EVENT

Region	Auto	Taxi	Limo	Walk	Bus	Subway	LIRR (Penn Station)	NJ Transit Rail	PATH	TOTAL BY REGION
Staten Island	80%	4%	6%	0%	2%	10%	0%	0%	0%	100%
Manhattan	13%	17%	4%	24%	2%	42%	0%	0%	0%	100%
Brooklyn	58%	1%	0%	0%	1%	41%	0%	0%	0%	100%
Bronx	48%	2%	0%	0%	4%	47%	0%	0%	0%	100%
Queens	42%	3%	1%	1%	1%	45%	9%	0%	0%	100%
Long Island	25%	0%	1%	1%	0%	4%	70%	0%	0%	100%
Westchester	52%	7%	0%	9%	19%	14%	0%	0%	0%	100%
Rockland	46%	0%	0%	5%	50%	0%	0%	0%	0%	100%
New Jersey	54%	3%	0%	2%	5%	2%	1%	25%	9%	100%
Connecticut	44%	9%	4%	8%	20%	17%	0%	0%	0%	100%
Weighted Average	**33.7%**	**7.9%**	**1.7%**	**10.2%**	**5.6%**	**26.9%**	**8.7%**	**3.9%**	**1.4%**	**100.0%**

SUNDAY SPORTS EVENT

Region	Auto	Taxi	Limo	Walk	Bus	Subway	LIRR (Penn Station)	NJ Transit Rail	PATH	TOTAL BY REGION
Staten Island	92%	1%	1%	0%	1%	5%	0%	0%	0%	100%
Manhattan	19%	22%	4%	19%	1%	34%	0%	0%	0%	100%
Brooklyn	56%	1%	0%	0%	1%	42%	0%	0%	0%	100%
Bronx	41%	2%	0%	0%	4%	53%	0%	0%	0%	100%
Queens	61%	3%	1%	1%	1%	29%	6%	0%	0%	100%
Long Island	38%	0%	1%	0%	0%	3%	57%	0%	0%	100%
Westchester	83%	7%	0%	2%	5%	3%	0%	0%	0%	100%
Rockland	58%	0%	0%	4%	38%	0%	0%	0%	0%	100%
New Jersey	76%	3%	0%	1%	2%	1%	0%	12%	4%	100%
Connecticut	55%	9%	4%	6%	14%	12%	0%	0%	0%	100%
Weighted Average	**48.4%**	**8.4%**	**1.7%**	**6.6%**	**3.6%**	**20.5%**	**8.0%**	**2.0%**	**0.7%**	**100.0%**

Source: Vollmer Associates, 1987.

Note: Sunday modal splits estimated based on weeknight sports average using Sam Schwartz LLC surveys (2003).

Table 8: Projected Arrival Modal Splits By Region (With MSG Relocation)

WEEKNIGHT CONCERT

Region	Auto	Taxi	Limo	Walk	Bus	Subway	LIRR (Penn Station)	NJ Transit Rail	PATH	TOTAL BY REGION
Staten Island	77%	11%	0%	0%	0%	12%	0%	0%	0%	100%
Manhattan	13%	29%	1%	20%	4%	33%	0%	0%	0%	100%
Brooklyn	47%	3%	1%	0%	0%	49%	0%	0%	0%	100%
Bronx	49%	9%	0%	3%	3%	36%	0%	0%	0%	100%
Queens	53%	1%	2%	1%	0%	34%	9%	0%	0%	100%
Long Island	24%	2%	2%	0%	0%	2%	70%	0%	0%	100%
Westchester	19%	8%	0%	8%	59%	6%	0%	0%	0%	100%
Rockland	89%	0%	0%	0%	11%	0%	0%	0%	0%	100%
New Jersey	45%	1%	1%	2%	1%	2%	0%	33%	15%	100%
Connecticut	42%	5%	0%	32%	0%	21%	0%	0%	0%	100%
Weighted Average	**34.1%**	**9.1%**	**1.1%**	**6.4%**	**9.5%**	**21.0%**	**12.1%**	**4.6%**	**2.1%**	**100.0%**

WEEKNIGHT SPORTS EVENT

Region	Auto	Taxi	Limo	Walk	Bus	Subway	LIRR (Penn Station)	NJ Transit Rail	PATH	TOTAL BY REGION
Staten Island	85%	4%	6%	0%	1%	4%	0%	0%	0%	100%
Manhattan	13%	18%	4%	23%	1%	41%	0%	0%	0%	100%
Brooklyn	62%	1%	0%	0%	0%	37%	0%	0%	0%	100%
Bronx	52%	2%	0%	0%	3%	43%	0%	0%	0%	100%
Queens	45%	3%	1%	1%	1%	42%	8%	0%	0%	100%
Long Island	27%	0%	1%	0%	0%	4%	68%	0%	0%	100%
Westchester	55%	7%	0%	8%	17%	12%	0%	0%	0%	100%
Rockland	49%	0%	0%	5%	46%	0%	0%	0%	0%	100%
New Jersey	58%	3%	0%	2%	5%	2%	0%	23%	8%	100%
Connecticut	47%	9%	4%	7%	18%	15%	0%	0%	0%	100%
Weighted Average	**36.2%**	**8.3%**	**1.8%**	**9.8%**	**5.1%**	**25.5%**	**8.4%**	**3.6%**	**1.3%**	**100.0%**

SUNDAY SPORTS EVENT

Region	Auto	Taxi	Limo	Walk	Bus	Subway	LIRR (Penn Station)	NJ Transit Rail	PATH	TOTAL BY REGION
Staten Island	95%	1%	1%	0%	0%	2%	0%	0%	0%	100%
Manhattan	21%	23%	5%	18%	1%	32%	0%	0%	0%	100%
Brooklyn	61%	1%	0%	0%	0%	38%	0%	0%	0%	100%
Bronx	44%	2%	0%	0%	4%	50%	0%	0%	0%	100%
Queens	65%	3%	1%	1%	1%	25%	5%	0%	0%	100%
Long Island	41%	0%	1%	0%	0%	3%	54%	0%	0%	100%
Westchester	89%	7%	0%	1%	2%	1%	0%	0%	0%	100%
Rockland	62%	0%	0%	3%	34%	0%	0%	0%	0%	100%
New Jersey	82%	3%	0%	1%	2%	1%	0%	9%	3%	100%
Connecticut	59%	9%	4%	5%	12%	10%	0%	0%	0%	100%
Weighted Average	**52.0%**	**8.8%**	**1.8%**	**6.1%**	**3.0%**	**18.7%**	**7.6%**	**1.5%**	**0.5%**	**100.0%**

Source: Vollmer Associates, 1987.

Table 9: Temporal Distribution of MSG Attendees

New York Rangers
Wednesday, March 26, 2003

Time Period			Arrivals	Percent
6:00 PM	-	6:15 PM		
6:15 PM	-	6:30 PM	1	0%
6:30 PM	-	6:45 PM	326	2%
6:45 PM	-	7:00 PM	2,200	16%
7:00 PM	-	7:15 PM	1,685	12%
7:15 PM	-	7:30 PM	2,646	19%
7:30 PM	-	7:45 PM	3,320	24%
7:45 PM	-	8:00 PM	2,194	16%
8:00 PM	-	8:15 PM	873	6%
8:15 PM	-	8:30 PM	319	2%
8:30 PM	-	8:45 PM	178	1%
8:45 PM	-	9:00 PM		
9:00 PM	-	9:15 PM		
9:15 PM	-	9:30 PM		
9:30 PM	-	9:45 PM		
		Totals	**13,742**	**100%**
Peak Hour (7:00-8:00 PM)			**9,845**	**72%**

New York Rangers
Friday, April 4, 2003

Time Period			Arrivals	Percent
6:00 PM	-	6:15 PM		
6:15 PM	-	6:30 PM		
6:30 PM	-	6:45 PM	61	0%
6:45 PM	-	7:00 PM	2,234	13%
7:00 PM	-	7:15 PM	1,911	11%
7:15 PM	-	7:30 PM	3,403	20%
7:30 PM	-	7:45 PM	4,258	25%
7:45 PM	-	8:00 PM	2,753	16%
8:00 PM	-	8:15 PM	1,501	9%
8:15 PM	-	8:30 PM	611	4%
8:30 PM	-	8:45 PM	321	2%
8:45 PM	-	9:00 PM		
9:00 PM	-	9:15 PM		
9:15 PM	-	9:30 PM		
9:30 PM	-	9:45 PM		
		Totals	**17,053**	**100%**
Peak Hour (7:00-8:00 PM)			**12,325**	**72%**

New York Knicks
Monday, March 24, 2003

Time Period			Arrivals	Percent
6:00 PM	-	6:15 PM	1	0%
6:15 PM	-	6:30 PM	1	0%
6:30 PM	-	6:45 PM	178	1%
6:45 PM	-	7:00 PM	1,152	9%
7:00 PM	-	7:15 PM	1,362	10%
7:15 PM	-	7:30 PM	2,471	19%
7:30 PM	-	7:45 PM	2,985	23%
7:45 PM	-	8:00 PM	2,634	20%
8:00 PM	-	8:15 PM	1,204	9%
8:15 PM	-	8:30 PM	606	5%
8:30 PM	-	8:45 PM	324	2%
8:45 PM	-	9:00 PM	132	1%
9:00 PM	-	9:15 PM	63	0%
9:15 PM	-	9:30 PM		
9:30 PM	-	9:45 PM		
		Totals	**13,113**	**100%**
Peak Hour (7:00-8:00 PM)			**9,452**	**72%**

New York Knicks
Friday, March 28, 2003

Time Period			Arrivals	Percent
6:00 PM	-	6:15 PM		
6:15 PM	-	6:30 PM		
6:30 PM	-	6:45 PM	6,106	28%
6:45 PM	-	7:00 PM	86	0%
7:00 PM	-	7:15 PM	327	1%
7:15 PM	-	7:30 PM	1,910	9%
7:30 PM	-	7:45 PM	2,092	9%
7:45 PM	-	8:00 PM	3,016	14%
8:00 PM	-	8:15 PM	3,791	17%
8:15 PM	-	8:30 PM	2,703	12%
8:30 PM	-	8:45 PM	1,147	5%
8:45 PM	-	9:00 PM	558	3%
9:00 PM	-	9:15 PM	208	1%
9:15 PM	-	9:30 PM	121	1%
9:30 PM	-	9:45 PM		
		Totals	**22,065**	**100%**
Peak Hour (7:30-8:00 PM)			**11,602**	**53%**

New York Knicks
Sunday, March 16, 2003

Time Period			Arrivals	Percent
5:30 PM	-	5:45 PM	8,330	38%
5:45 PM	-	6:00 PM	75	0%
6:00 PM	-	6:15 PM	102	0%
6:15 PM	-	6:30 PM	1,288	6%
6:30 PM	-	6:45 PM	1,492	7%
6:45 PM	-	7:00 PM	2,706	12%
7:00 PM	-	7:15 PM	3,436	16%
7:15 PM	-	7:30 PM	2,445	11%
7:30 PM	-	7:45 PM	1,119	5%
7:45 PM	-	8:00 PM	562	3%
8:00 PM	-	8:15 PM	271	1%
8:15 PM	-	8:30 PM	163	1%
8:30 PM	-	8:45 PM	57	0%
8:45 PM	-	9:00 PM		
9:00 PM	-	9:15 PM		
		Totals	**22,046**	**100%**
Peak Hour (6:30-7:30 PM)			**10,079**	**46%**

Red Hot Chili Peppers
Tuesday, May 20, 2003

Time Period			Arrivals	Percent
6:00 PM	-	6:15 PM		
6:15 PM	-	6:30 PM		
6:30 PM	-	6:45 PM	16	0%
6:45 PM	-	7:00 PM	561	4%
7:00 PM	-	7:15 PM	446	3%
7:15 PM	-	7:30 PM	1,044	7%
7:30 PM	-	7:45 PM	1,639	11%
7:45 PM	-	8:00 PM	2,036	13%
8:00 PM	-	8:15 PM	1,850	12%
8:15 PM	-	8:30 PM	1,857	12%
8:30 PM	-	8:45 PM	1,929	13%
8:45 PM	-	9:00 PM	1,403	9%
9:00 PM	-	9:15 PM	1,149	7%
9:15 PM	-	9:30 PM	862	6%
9:30 PM	-	9:45 PM	599	4%
		Totals	**15,391**	**100%**
Peak Hour (7:45-8:45 PM)			**7,672**	**50%**

Source: Sam Schwartz LLC, 2003.
Note: Event start times are indicated by shading.

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Similar to the projections made for the proposed multi-use facility, all event staff would be expected to arrive 2-3 hours prior to an event at MSG and would be on post prior to the gate opening time. For this reason, event staff would not be expected to travel during the peak arrival period of attendees.

Vehicle Occupancy

Table 10 shows the vehicle occupancies that will be used for attendees at a weeknight concert, weeknight sports event, and Sunday sports event; these were based on the Sam Schwartz LLC surveys.[10]

Table 10: Vehicle Occupancies

	Auto	Taxi
Weeknight Concert	2.5	2.6
Weeknight Sports Event	2.2	2.5
Sunday Sports Event	2.8	2.8

Source: Sam Schwartz LLC, 2003.

Projected Attendance Increases

Regardless of a potential relocation, the DGEIS will also consider that the overall attendance capacity of MSG would increase by approximately 18% (from 19,500 to 23,000). Although it has not been determined how this change would affect the event-specific seating capacities listed in Table 5, it is assumed that each capacity would increase by the same proportion. Based on a review of the existing 85th percentile attendances shown in Table 5, it is anticipated that the increased seating capacity would have an effect on three types of events (concerts, NBA basketball, and NHL hockey) because many of these events currently sell out and would be expected to draw additional attendees. As shown in Table 11, it is assumed that the 85th percentile attendances at these events would also increase by 18%. Conversely, events which do not currently sell out would not be expected to be impacted by the availability of additional seating.

Truck Trip Generation and Distribution

Incremental truck trips associated with the expansion of MSG will be forecasted using the methodologies provided within the Multi-Use Facility Transportation Planning Assumptions Technical Memorandum (November 11, 2003). Because there would be an 18% increase in attendance capacity, the number of truck deliveries on an average weekday (food, beverage, and other merchandise) would be expected to increase by the same proportion.[11]

Table 11: Events with Projected Attendance Increases

Event Type	Existing Capacity	Projected Capacity	Existing 85th Percentile Attendances			Projected 85th Percentile Attendances		
			Overall	Weekday	Weekend	Overall	Weekday	Weekend
Concert	20,629	24,332	17,977	18,301	16,476	21,204	21,586	19,433
NBA Basketball	20,024	23,618	19,023			22,437		
NHL Hockey	18,295	21,579	17,380			20,499		

Source: Madison Square Garden, 2003.
Note: Projected capacities and attendances assume an 18% increase.

[10] Sam Schwartz LLC, *Madison Square Garden Modal Split Analysis*, August 2003.
[11] An increase in truck trips associated with equipment for concerts and other events is not expected.

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Selection of Weekday Evening Event for Analysis Purposes

The Multi-Use Facility Transportation Planning Assumptions Technical Memorandum (November 11, 2003) evaluated potential combinations of simultaneous weekday evening events that could take place at MSG (a sports event or a concert) and at the multi-use facility (a football game, a stadium concert, an arena concert, or an arena sports event). The results of this analysis showed that the largest number of total vehicle trips would result from the combination of arrivals to a concert at MSG and arrivals to a football game at the multi-use facility. This particular combination of events will be analyzed for future conditions with the proposed action during the weekday evening peak hour (8-9 PM). A subsequent review of the simultaneous events held at the arena and theater in 2002 indicates that 8 of the 38 weekday concerts occurred on nights with concurrent theater events (not including events held in the theater lobby). It is expected that the probability of a theater event occurring at the same time of both a weeknight football game and a concert is unlikely[12]; therefore a theater event is not recommended to be included as part of the combination of reasonable worst-case events selected for analysis.[13]

Selection of Sunday Afternoon Event for Analysis Purposes

The Convention Center Expansion Transportation Planning Assumptions Technical Memorandum (October 24, 2003) determined that the Sunday 4-5 PM period would be the worst-case scenario for trips on a weekend as it would coincide with the peak hour of activity at the Convention Center and departures associated with a 1 PM football game at the adjacent multi-use facility. As shown in Table 2, the primary events held on Sundays at MSG in 2002 involved NBA basketball games and NHL hockey games.[14] In order to determine how arrivals and departures to these events would interface with the selected 4-5 PM peak hour, the starting and ending times of these events were examined (using typical event durations provided by MSG); these are compared in Table 12. As shown in this table, departures associated with the 1 PM Rangers games and arrivals associated with the 5 PM Rangers games would have the potential to occur during the 4-5 PM peak hour. The pattern of starting times for Knicks games shown in Table 12 would not be expected to result in arrivals/departures occurring during the 4-5 PM peak hour.

Table 12: Start and End Times of Sunday Sports Events at MSG in 2002

New York Knicks			New York Rangers		
Date	Start Time	End Time	Date	Start Time	End Time
2/3/02	12:00 PM	2:30 PM	2/10/02	1:00 PM	3:45 PM
2/24/02	12:00 PM	2:30 PM	12/1/02	1:00 PM	3:45 PM
3/3/02	3:00 PM	5:30 PM	12/8/02	1:00 PM	3:45 PM
11/10/02	4:00 PM	6:30 PM	3/17/02	3:00 PM	5:45 PM
2/17/02	7:00 PM	9:30 PM	9/22/02	5:00 PM	7:45 PM
11/24/02	7:00 PM	9:30 PM	9/29/02	5:00 PM	7:45 PM
12/22/02	7:00 PM	9:30 PM	11/3/02	5:00 PM	7:45 PM

Source: Madison Square Garden, 2003.

[12] Including the 2003 season, the New York Jets have only hosted a total of 14 Monday Night Football games since 1970 (an average of less than one per year).
[13] According to Madison Square Garden management, there would not be a theater in the new arena if MSG is relocated.
[14] WNBA basketball games and circus performances were excluded because they had lower 85th percentile attendances.

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A review of the 2003-04 Knicks' and Rangers' schedules indicates that a comparable pattern will occur on Sundays this season: the Knicks have one game scheduled at 1 PM, three games scheduled for 7 PM, and one game scheduled for 7:30 PM; all four of the Rangers games on Sunday are scheduled for 5 PM. Therefore, it is assumed that travel associated with Rangers games would generally have the greatest potential to overlap with the 4-5 PM peak hour.

As previously described, it was assumed that 75% of arrivals to a sports event at MSG would occur during the peak arrival hour. Based on projections made by the New York Jets for the temporal distribution of departures from the multi-use facility in an arena configuration, it is assumed that 90-95% of fans would leave MSG in the hour immediately following the end of an event, and that these departures would be concentrated within a 20-minute period (the time it would take to clear the arena). Therefore, it is expected that the majority of departures associated with a 1 PM game would occur during the 3-4 PM period. For this reason, it is recommended that the travel demand associated with arrivals to a 5 PM Rangers game should be included as part of the Sunday afternoon peak hour (4-5 PM) as this combination of events would have the greatest potential for traffic implications.

It should be noted that although there were no overlapping arena and theater events on Sundays (as shown in Table 4), there were five Sunday afternoon performances of "A Christmas Carol" in December (during the NFL football season) that began at 5 PM, and arrivals associated with this event would have a potential to overlap with the 4-5 PM peak hour. On these five Sundays, there were two Rangers games scheduled for 1 PM, one Knicks game scheduled for 7 PM, and two dark days in the arena. Because the start times of these theater events were staggered in such a way were did not coincide with arena events, it is not realistic to combine travel demand associated with both events. The travel demand associated with a Rangers game (an attendance capacity of 18,295) would be expected to be more conservative than the travel demand associated with "A Christmas Carol" (an attendance capacity of 5,600). Although the travel demand associated with a theater event will not be included in the Sunday afternoon peak hour, its associated parking demand will be included to provide for a more conservative analysis.

cc: L. Lennon
D. Fields

PROPOSED PROJECT WITHOUT TSP
TRAVEL DEMAND ESTIMATES

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT w/out Event TSP - WEEKDAY DAILY AND PM PEAK HOUR BETWEEN 4 AND 6 PM

SUMMARY OF TRIPS WITH BASKETBALL GAME

Land Use	Intensity
Arena	18,064 attendees
	1,000 employees
Retail	62,500 gsf
Quick Service Rest.	11,000 gsf
Sit-down Restaurant	51,500 gsf
XXX	0 xxx
XXX	0 xxx
Office	605,000 gsf

Daily Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	23,670	2,024	1,256	1,961	0	0	4,997	33,908	58%
Transit	8,473	582	559	873	0	0	3,748	14,235	24%
Taxi/Coach (Event)	2,695							2,695	5%
Bike (Event)	900							900	2%
Walk	1,961	701	373	581	0	0	1,477	5,093	9%
Other	429	68	188	293	0	0	728	1,707	3%
Total	**38,128**	**3,375**	**2,376**	**3,708**	**0**	**0**	**10,951**	**58,538**	**100%**
	65%	**6%**	**4%**	**6%**	**0%**	**0%**	**19%**	**100%**	
Vehicle Trips	10,722	1,092	573	895	0	0	2,542	15,824	
	68%	7%	4%	6%	0%	0%	16%	100%	
Avg. veh. occupancy	*2.46*	*1.85*	*2.19*	*2.19*	*0.00*	*0.00*	*1.97*	*2.31*	

PM Peak Hour Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	810	182	170	265	0	0	298	1,724	45%
Transit	737	52	75	118	0	0	506	1,489	39%
Taxi/Coach (Event)	70							70	2%
Bike (Event)	23							23	1%
Walk	122	63	50	78	0	0	87	401	10%
Other	40	6	25	40	0	0	40	151	4%
Total	**1,803**	**304**	**321**	**501**	**0**	**0**	**931**	**3,859**	**100%**
	47%	**8%**	**8%**	**13%**	**0%**	**0%**	**24%**	**100%**	
Vehicle Trips	443	98	77	121	0	0	200	940	
	47%	10%	8%	13%	0%	0%	21%	100%	
Avg. veh. occupancy	*1.99*	*1.85*	*2.19*	*2.19*	*0.00*	*0.00*	*1.49*	*1.91*	

Percent of Daily during PM Peak Hour

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Auto	3.4%	9.0%	13.5%	13.5%	0.0%	0.0%	6.0%	5.1%
Transit	8.7%	9.0%	13.5%	13.5%	0.0%	0.0%	13.5%	10.5%
Taxi/Coach (Event)	2.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.6%
Bike (Event)	2.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.6%
Walk	6.2%	9.0%	13.5%	13.5%	0.0%	0.0%	5.9%	7.9%
Other	9.3%	9.0%	13.5%	13.5%	0.0%	0.0%	5.5%	8.8%
Total	**4.7%**	**9.0%**	**13.5%**	**13.5%**	**0.0%**	**0.0%**	**8.5%**	**6.6%**
Vehicle Trips	4.1%	9.0%	13.5%	13.5%	0.0%	0.0%	7.9%	5.9%

PM Peak Hour Person-Trips

Weekday Distribution	Total Daily Person-trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	7,006	203	19	40	62	0	0	80	404
Superdistrict 2	4,148	130	28	43	68	0	0	99	368
Superdistrict 3	10,602	251	172	133	208	0	0	242	1,006
Superdistrict 4	2,928	106	16	23	35	0	0	68	248
East Bay	14,730	531	17	36	55	0	0	228	867
North Bay	4,393	112	7	4	6	0	0	29	158
South Bay	12,587	411	31	32	51	0	0	161	686
Out of Region	2,143	59	14	9	15	0	0	24	121
Total	**58,538**	**1,803**	**304**	**321**	**501**	**0**	**0**	**931**	**3,859**

PM Peak Hour Transit-Trips

Weekday Distribution	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	81	6	9	14	0	0	42	151
Superdistrict 2	64	6	8	13	0	0	53	143
Superdistrict 3	106	19	31	48	0	0	101	306
Superdistrict 4	47	3	5	8	0	0	38	100
East Bay	269	8	15	24	0	0	171	487
North Bay	29	1	1	1	0	0	14	46
South Bay	118	5	4	7	0	0	73	207
Out of Region	24	3	2	4	0	0	15	48
Total	**737**	**52**	**75**	**118**	**0**	**0**	**506**	**1,489**

PM Peak Hour Vehicle-Trips

Weekday Distribution	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total		Avg. Veh. Occ.
Superdistrict 1	37	4	7	11	0	0	9	68	7%	1.89
Superdistrict 2	26	10	15	23	0	0	21	95	10%	1.73
Superdistrict 3	44	50	24	37	0	0	40	195	21%	1.94
Superdistrict 4	28	7	6	9	0	0	15	65	7%	1.97
East Bay	111	5	8	12	0	0	30	166	18%	2.16
North Bay	35	4	1	1	0	0	9	49	5%	2.23
South Bay	155	13	14	21	0	0	71	275	29%	1.71
Out of Region	7	5	4	6	0	0	5	27	3%	2.12
Total	**443**	**98**	**77**	**121**	**0**	**0**	**200**	**940**	**100%**	**1.91**

Assumptions for PM Peak Hour bet. 4 PM & 6 PM	Arena		Retail		Q.S. Rest.		Sit-down Rest.		XXX		XXX		Office	
	Empl.	Attend.	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work
Inbound	95%	100%	0%	50%	0%	50%	0%	50%	100%	100%	100%	55%	0%	50%
Outbound	5%	0%	100%	50%	100%	50%	100%	50%	0%	0%	0%	45%	100%	50%

Inbound

PM Peak Hour bet. 4 PM & 6 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	1,758	135	143	222	0	0	79	2,337
	98%	44%	44%	44%	0%	0%	9%	61%
Transit Trips	709	16	27	42	0	0	15	808
	96%	30%	35%	35%	0%	0%	3%	54%
Vehicle Trips	411	46	35	55	0	0	19	566
	93%	46%	45%	45%	0%	0%	10%	60%

Outbound

PM Peak Hour bet. 4 PM & 6 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	45	169	178	278	0	0	852	1,522
	2%	56%	56%	56%	0%	0%	92%	39%
Transit Trips	28	37	49	76	0	0	492	681
	4%	70%	65%	65%	0%	0%	97%	46%
Vehicle Trips	32	53	42	66	0	0	180	374
	7%	54%	55%	55%	0%	0%	90%	40%

Total

PM Peak Hour bet. 4 PM & 6 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	1,803	304	321	501	0	0	931	3,859
Transit Trips	737	52	75	118	0	0	506	1,489
Vehicle Trips	443	98	77	121	0	0	200	940

Inbound

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	52	4	7	10	0	0	4	77
Superdistrict 2	39	8	14	21	0	0	8	89
Superdistrict 3	64	50	27	43	0	0	15	199
Superdistrict 4	48	6	7	10	0	0	4	75
East Bay	231	3	9	14	0	0	5	261
North Bay	82	2	1	2	0	0	1	88
South Bay	269	10	12	19	0	0	7	317
Out of Region	15	4	3	5	0	0	2	29
Total	**798**	**87**	**80**	**125**	**0**	**0**	**44**	**1,134**

Outbound

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	4	7	11	0	0	11	34
Superdistrict 2	1	8	14	23	0	0	24	70
Superdistrict 3	2	51	29	45	0	0	50	177
Superdistrict 4	1	6	8	12	0	0	21	48
East Bay	3	5	11	17	0	0	48	83
North Bay	1	3	2	3	0	0	13	22
South Bay	4	14	16	24	0	0	80	138
Out of Region	0	4	3	5	0	0	6	19
Total	**12**	**96**	**90**	**140**	**0**	**0**	**253**	**590**

Total

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Taxi + Coach Arena
Superdistrict 1	53	8	14	21	0	0	15	110	19
Superdistrict 2	40	16	28	44	0	0	32	159	5
Superdistrict 3	66	101	56	88	0	0	65	376	3
Superdistrict 4	49	12	14	22	0	0	25	123	5
East Bay	233	8	20	30	0	0	53	344	16
North Bay	82	5	3	5	0	0	14	110	0
South Bay	273	24	28	43	0	0	87	455	14
Out of Region	15	8	6	10	0	0	8	48	9
Total	**810**	**182**	**170**	**265**	**0**	**0**	**298**	**1,724**	**70**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT w/out Event TSP - WEEKDAY DAILY AND PM PEAK HOUR BETWEEN 4 AND 6 PM

SUMMARY OF TRIPS WITH BASKETBALL GAME

PM Peak Hour bet. 4 PM & 6 PM Transit Trips	Inbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Outbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Total Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	78	2	4	6	0	0	2	92	2	4	5	8	0	0	40	59	81	6	9	14	0	0	42	151
Superdistrict 2	61	2	3	5	0	0	2	72	3	4	5	8	0	0	51	71	64	6	8	13	0	0	53	143
Superdistrict 3	101	8	13	21	0	0	7	151	5	12	17	27	0	0	94	155	106	19	31	48	0	0	101	306
Superdistrict 4	45	1	2	3	0	0	1	50	2	2	3	5	0	0	37	50	47	3	5	8	0	0	38	100
East Bay	259	1	4	6	0	0	2	271	10	8	12	18	0	0	169	216	269	8	15	24	0	0	171	487
North Bay	28	0	0	0	0	0	0	28	1	1	1	1	0	0	14	17	29	1	1	1	0	0	14	46
South Bay	114	1	0	1	0	0	0	117	4	4	4	6	0	0	72	90	118	5	4	7	0	0	73	207
Out of Region	23	1	1	1	0	0	1	27	1	2	2	2	0	0	14	21	24	3	2	4	0	0	15	48
Total	**709**	**16**	**27**	**42**	**0**	**0**	**15**	**808**	**28**	**37**	**49**	**76**	**0**	**0**	**492**	**681**	**737**	**52**	**75**	**118**	**0**	**0**	**506**	**1,489**

PM Peak Hour bet. 4 PM & 6 PM Bike (Event)	Inbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Outbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Total Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	7							7	0							0	7	0	0	0	0	0	0	7
Superdistrict 2	2							2	0							0	2	0	0	0	0	0	0	2
Superdistrict 3	1							1	0							0	1	0	0	0	0	0	0	1
Superdistrict 4	2							2	0							0	2	0	0	0	0	0	0	2
East Bay	8							8	0							0	8	0	0	0	0	0	0	8
North Bay	0							0	0							0	0	0	0	0	0	0	0	0
South Bay	4							4	0							0	4	0	0	0	0	0	0	4
Out of Region	0							0	0							0	0	0	0	0	0	0	0	0
Total	**23**	**0**	**0**	**0**	**0**	**0**	**0**	**23**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**23**	**0**	**0**	**0**	**0**	**0**	**0**	**23**

PM Peak Hour bet. 4 PM & 6 PM Taxi/Walk/Other	Inbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Outbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Total Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	62	2	8	13	0	0	5	90	1	3	9	14	0	0	19	46	63	5	17	27	0	0	24	136
Superdistrict 2	25	3	3	5	0	0	2	38	1	3	4	6	0	0	12	26	25	6	7	11	0	0	14	64
Superdistrict 3	75	25	22	34	0	0	12	168	3	27	24	38	0	0	63	155	78	52	46	72	0	0	76	323
Superdistrict 4	9	0	2	3	0	0	1	14	0	1	2	3	0	0	4	9	9	1	3	5	0	0	5	23
East Bay	21	1	0	0	0	0	0	22	0	1	0	1	0	0	4	6	21	1	1	1	0	0	4	28
North Bay	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	1	3
South Bay	15	1	0	0	0	0	0	17	0	1	0	0	0	0	1	3	16	1	1	1	0	0	1	19
Out of Region	19	2	0	0	0	0	0	22	0	2	0	0	0	0	1	4	19	3	1	1	0	0	1	26
Total	**227**	**33**	**36**	**56**	**0**	**0**	**20**	**372**	**5**	**37**	**40**	**62**	**0**	**0**	**107**	**251**	**232**	**69**	**76**	**118**	**0**	**0**	**127**	**622**

PM Peak Hour bet. 4 PM & 6 PM Total Person Trips	Inbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Outbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Total Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	200	8	19	29	0	0	10	265	3	11	21	33	0	0	70	139	203	19	40	62	0	0	80	404
Superdistrict 2	126	12	20	31	0	0	11	200	4	15	23	37	0	0	87	168	130	28	43	68	0	0	99	368
Superdistrict 3	241	82	63	98	0	0	35	518	10	90	71	110	0	0	207	488	251	172	133	208	0	0	242	1,006
Superdistrict 4	103	7	10	16	0	0	6	141	3	9	13	20	0	0	62	107	106	16	23	35	0	0	68	248
East Bay	518	4	13	20	0	0	7	562	12	13	23	35	0	0	221	305	531	17	36	55	0	0	228	867
North Bay	111	3	1	2	0	0	1	118	2	4	3	4	0	0	28	40	112	7	4	6	0	0	29	158
South Bay	403	12	13	20	0	0	7	455	9	19	20	31	0	0	154	231	411	31	32	51	0	0	161	686
Out of Region	58	7	4	7	0	0	2	78	1	8	5	8	0	0	22	44	59	14	9	15	0	0	24	121
Total	**1,758**	**135**	**143**	**222**	**0**	**0**	**79**	**2,337**	**45**	**169**	**178**	**278**	**0**	**0**	**852**	**1,522**	**1,803**	**304**	**321**	**501**	**0**	**0**	**931**	**3,859**

PM Peak Hour bet. 4 PM & 6 PM Vehicle-Trips	Inbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Outbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Total Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	30	2	3	5	0	0	2	42	7	2	4	6	0	0	8	26	37	4	7	11	0	0	9	68
Superdistrict 2	24	5	7	11	0	0	4	50	3	6	8	12	0	0	17	45	26	10	15	23	0	0	21	95
Superdistrict 3	41	24	11	18	0	0	6	101	3	26	13	20	0	0	34	94	44	50	24	37	0	0	40	195
Superdistrict 4	25	3	3	4	0	0	1	37	2	4	3	5	0	0	13	28	28	7	6	9	0	0	15	65
East Bay	103	2	3	5	0	0	2	115	7	3	5	7	0	0	29	51	111	5	8	12	0	0	30	166
North Bay	35	2	0	0	0	0	0	37	0	2	1	1	0	0	9	13	35	4	1	1	0	0	9	49
South Bay	146	5	5	8	0	0	3	168	9	8	8	13	0	0	68	106	155	13	14	21	0	0	71	275
Out of Region	7	2	2	3	0	0	1	15	0	2	2	3	0	0	4	12	7	5	4	6	0	0	5	27
Total	**411**	**46**	**35**	**55**	**0**	**0**	**19**	**566**	**32**	**53**	**42**	**66**	**0**	**0**	**180**	**374**	**443**	**98**	**77**	**121**	**0**	**0**	**200**	**940**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT w/out Event TSP - WEEKDAY DAILY AND EVENING PEAK HOUR BETWEEN 6 AND 8 PM
SUMMARY OF TRIPS WITH BASKETBALL GAME

Land Use	Intensity	
Arena	18,064	attendees
	1,000	employees
Retail	62,500	gsf
Quick Service Rest.	11,000	gsf
Sit-down Restaurant	51,500	gsf
XXX	0	xxx
XXX	0	xxx
Office	605,000	gsf

Person-trips by Mode: Daily Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	23,670	2,024	1,256	1,961	0	0	4,997	33,908	58%
Transit	8,473	582	559	873	0	0	3,748	14,235	24%
Taxi/Coach (Event)	2,695							2,695	5%
Bike (Event)	900							900	2%
Walk	1,961	701	373	581	0	0	1,477	5,093	9%
Other	429	68	188	293	0	0	728	1,707	3%
Total	**38,128**	**3,375**	**2,376**	**3,708**	**0**	**0**	**10,951**	**58,538**	**100%**
	65%	**6%**	**4%**	**6%**	**0%**	**0%**	**19%**	**100%**	
Vehicle Trips	10,722	1,092	573	895	0	0	2,542	15,824	
	68%	7%	4%	6%	0%	0%	16%	100%	
Avg. veh. occupancy	*2.46*	*1.85*	*2.19*	*2.19*	*0.00*	*0.00*	*1.97*	*2.31*	

Person-trips by Mode: Evening Peak Hour Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	7,374	26	50	79	0	0	50	7,579	62%
Transit	2,360	19	45	70	0	0	115	2,609	21%
Taxi/Coach (Event)	916							916	7%
Bike (Event)	305							305	2%
Walk	669	9	15	23	0	0	15	731	6%
Other	117	1	7	11	0	0	6	144	1%
Total	**11,742**	**56**	**118**	**184**	**0**	**0**	**186**	**12,285**	**100%**
	96%	**0%**	**1%**	**1%**	**0%**	**0%**	**2%**	**100%**	
Vehicle Trips	3,326	16	27	42	0	0	39	3,449	
	96%	0%	1%	1%	0%	0%	1%	100%	
Avg. veh. occupancy	*2.49*	*1.69*	*1.88*	*1.88*	*0.00*	*0.00*	*1.30*	*2.46*	

Person-trips by Mode: Percent of Daily during Evening Peak Hour

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Auto	31.2%	1.3%	4.0%	4.0%	0.0%	0.0%	1.0%	22.4%
Transit	27.9%	3.3%	8.1%	8.1%	0.0%	0.0%	3.1%	18.3%
Taxi/Coach (Event)	34.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	34.0%
Bike (Event)	33.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	33.9%
Walk	34.1%	1.3%	4.0%	4.0%	0.0%	0.0%	1.0%	14.3%
Other	27.3%	2.1%	3.9%	3.9%	0.0%	0.0%	0.9%	8.4%
Total	**30.8%**	**1.7%**	**5.0%**	**5.0%**	**0.0%**	**0.0%**	**1.7%**	**21.0%**
Vehicle Trips	31.0%	1.4%	4.7%	4.7%	0.0%	0.0%	1.5%	21.8%

Weekday Distribution: Evening Peak Hour Person-Trips

Weekday Distribution	Total Daily Person-trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	7,006	1,733	4	12	19	0	0	14	1,783
Superdistrict 2	4,148	538	5	14	22	0	0	18	598
Superdistrict 3	10,602	649	24	40	63	0	0	42	818
Superdistrict 4	2,928	517	3	8	13	0	0	14	556
East Bay	14,730	3,655	8	21	32	0	0	52	3,767
North Bay	4,393	1,049	1	3	4	0	0	7	1,064
South Bay	12,587	3,131	8	16	25	0	0	35	3,214
Out of Region	2,143	470	2	3	5	0	0	5	485
Total	**58,538**	**11,742**	**56**	**118**	**184**	**0**	**0**	**186**	**12,285**

Weekday Distribution: Evening Peak Hour Transit-Trips

Weekday Distribution	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	476	2	4	7	0	0	9	498
Superdistrict 2	84	2	5	7	0	0	12	110
Superdistrict 3	68	5	12	19	0	0	21	124
Superdistrict 4	54	1	3	5	0	0	9	73
East Bay	962	6	13	21	0	0	40	1,042
North Bay	163	1	1	2	0	0	3	170
South Bay	448	3	5	8	0	0	17	482
Out of Region	104	1	1	2	0	0	3	112
Total	**2,360**	**19**	**45**	**70**	**0**	**0**	**115**	**2,609**

Weekday Distribution: Evening Peak Hour Vehicle-Trips

Weekday Distribution	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total		Avg. Veh. Occ.
Superdistrict 1	396	1	2	3	0	0	1	403	12%	1.95
Superdistrict 2	145	2	4	6	0	0	3	160	5%	2.12
Superdistrict 3	151	6	7	11	0	0	7	182	5%	2.32
Superdistrict 4	180	1	2	3	0	0	3	189	5%	2.29
East Bay	1,034	1	3	5	0	0	6	1,050	30%	2.52
North Bay	328	1	1	1	0	0	2	333	10%	2.69
South Bay	1,040	3	7	11	0	0	16	1,077	31%	2.51
Out of Region	52	1	1	2	0	0	1	56	2%	4.74
Total	**3,326**	**16**	**27**	**42**	**0**	**0**	**39**	**3,449**	**100%**	**2.46**

Assumptions for Evening Peak Hour bet. 6 PM & 8 PM	Arena		Retail		Q.S. Rest.		Sit-down Rest.		XXX		XXX		Office	
	Empl.	Attend.	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work
Inbound	100%	100%	0%	50%	0%	50%	0%	50%	100%	100%	100%	50%	0%	50%
Outbound	0%	0%	100%	50%	100%	50%	100%	50%	0%	0%	0%	50%	100%	50%

Evening Peak Hour bet. 6 PM & 8 PM: Inbound

Evening Peak Hour bet. 6 PM & 8 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	11,742	15	32	50	0	0	0	11,839
	100%	27%	27%	27%	0%	0%	0%	96%
Transit Trips	2,360	2	6	9	0	0	0	2,377
	100%	9%	13%	13%	0%	0%	0%	91%
Vehicle Trips	3,346	5	8	12	0	0	0	3,371
	92%	33%	29%	29%	0%	0%	0%	90%

Evening Peak Hour bet. 6 PM & 8 PM: Outbound

Evening Peak Hour bet. 6 PM & 8 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	0	41	86	133	0	0	186	446
	0%	73%	73%	73%	0%	0%	100%	4%
Transit Trips	0	17	39	61	0	0	115	232
	0%	91%	87%	87%	0%	0%	100%	9%
Vehicle Trips	287	10	19	30	0	0	39	384
	8%	67%	71%	71%	0%	0%	100%	10%

Evening Peak Hour bet. 6 PM & 8 PM: Total

Evening Peak Hour bet. 6 PM & 8 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	11,742	56	118	184	0	0	186	12,285
Transit Trips	2,360	19	45	70	0	0	115	2,609
Vehicle Trips	3,632	16	27	42	0	0	39	3,755

Evening Peak Hour bet. 6 PM & 8 PM Auto Trips: Inbound

Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	573	0	2	2	0	0	0	577
Superdistrict 2	262	1	3	5	0	0	0	271
Superdistrict 3	333	6	6	10	0	0	0	354
Superdistrict 4	368	1	2	2	0	0	0	372
East Bay	2,380	0	2	3	0	0	0	2,385
North Bay	886	0	0	1	0	0	0	887
South Bay	2,442	1	3	4	0	0	0	2,450
Out of Region	131	0	1	1	0	0	0	133
Total	**7,374**	**10**	**18**	**28**	**0**	**0**	**0**	**7,430**

Evening Peak Hour bet. 6 PM & 8 PM Auto Trips: Outbound

Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	1	2	3	0	0	2	8
Superdistrict 2	0	1	4	7	0	0	4	16
Superdistrict 3	0	7	9	13	0	0	8	37
Superdistrict 4	0	1	3	4	0	0	4	12
East Bay	0	2	5	8	0	0	10	25
North Bay	0	1	1	2	0	0	3	7
South Bay	0	4	8	12	0	0	18	41
Out of Region	0	1	1	2	0	0	1	4
Total	**0**	**17**	**32**	**51**	**0**	**0**	**50**	**150**

Evening Peak Hour bet. 6 PM & 8 PM Auto Trips: Total

Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Taxi + Coach Arena
Superdistrict 1	573	1	4	5	0	0	2	584	201
Superdistrict 2	262	2	7	11	0	0	4	287	52
Superdistrict 3	333	12	15	23	0	0	8	391	30
Superdistrict 4	368	2	4	7	0	0	4	385	48
East Bay	2,380	2	7	11	0	0	10	2,410	235
North Bay	886	1	1	2	0	0	3	894	0
South Bay	2,442	5	11	16	0	0	18	2,491	208
Out of Region	131	1	2	3	0	0	1	137	126
Total	**7,374**	**26**	**50**	**79**	**0**	**0**	**50**	**7,579**	**900**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT w/out Event TSP - WEEKDAY DAILY AND EVENING PEAK HOUR BETWEEN 6 AND 8 PM
SUMMARY OF TRIPS WITH BASKETBALL GAME

Evening Peak Hour bet. 6 PM & 8 PM	Inbound								Outbound								Total							
Transit Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	476	0	1	1	0	0	0	478	0	1	3	5	0	0	9	19	476	2	4	7	0	0	9	498
Superdistrict 2	84	0	1	1	0	0	0	86	0	2	4	6	0	0	12	24	84	2	5	7	0	0	12	110
Superdistrict 3	68	1	3	5	0	0	0	76	0	4	9	14	0	0	21	48	68	5	12	19	0	0	21	124
Superdistrict 4	54	0	0	1	0	0	0	55	0	1	3	5	0	0	9	17	54	1	3	5	0	0	9	73
East Bay	962	0	1	1	0	0	0	964	0	6	12	19	0	0	40	78	962	6	13	21	0	0	40	1,042
North Bay	163	0	0	0	0	0	0	163	0	0	1	2	0	0	3	6	163	1	1	2	0	0	3	170
South Bay	448	0	0	0	0	0	0	449	0	2	5	8	0	0	17	33	448	3	5	8	0	0	17	482
Out of Region	104	0	0	0	0	0	0	105	0	1	1	2	0	0	3	7	104	1	1	2	0	0	3	112
Total	**2,360**	**2**	**6**	**9**	**0**	**0**	**0**	**2,377**	**0**	**17**	**39**	**61**	**0**	**0**	**115**	**232**	**2,360**	**19**	**45**	**70**	**0**	**0**	**115**	**2,609**

Evening Peak Hour bet. 6 PM & 8 PM	Inbound								Outbound								Total							
Bike (Event)	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	86							86	0							0	86	0	0	0	0	0	0	86
Superdistrict 2	22							22	0							0	22	0	0	0	0	0	0	22
Superdistrict 3	13							13	0							0	13	0	0	0	0	0	0	13
Superdistrict 4	20							20	0							0	20	0	0	0	0	0	0	20
East Bay	107							107	0							0	107	0	0	0	0	0	0	107
North Bay	0							0	0							0	0	0	0	0	0	0	0	0
South Bay	57							57	0							0	57	0	0	0	0	0	0	57
Out of Region	0							0	0							0	0	0	0	0	0	0	0	0
Total	**305**	**0**	**0**	**0**	**0**	**0**	**0**	**305**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**305**	**0**	**0**	**0**	**0**	**0**	**0**	**305**

Evening Peak Hour bet. 6 PM & 8 PM	Inbound								Outbound								Total							
Taxi/Walk/Other	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	599	0	2	3	0	0	0	604	0	1	3	5	0	0	4	12	599	1	5	7	0	0	4	615
Superdistrict 2	169	0	1	1	0	0	0	172	0	1	1	2	0	0	3	7	169	1	2	3	0	0	3	179
Superdistrict 3	236	3	5	8	0	0	0	251	0	4	8	13	0	0	12	39	236	7	13	21	0	0	12	290
Superdistrict 4	74	0	0	1	0	0	0	75	0	0	1	1	0	0	1	2	74	0	1	1	0	0	1	78
East Bay	206	0	0	0	0	0	0	206	0	0	0	1	0	0	1	2	206	0	0	1	0	0	1	208
North Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
South Bay	184	0	0	0	0	0	0	184	0	0	0	0	0	0	0	1	184	0	0	0	0	0	0	184
Out of Region	235	0	0	0	0	0	0	235	0	0	0	0	0	0	0	1	235	0	0	0	0	0	0	236
Total	**1,703**	**4**	**8**	**13**	**0**	**0**	**0**	**1,727**	**0**	**7**	**14**	**22**	**0**	**0**	**21**	**64**	**1,703**	**10**	**22**	**35**	**0**	**0**	**21**	**1,790**

Evening Peak Hour bet. 6 PM & 8 PM	Inbound								Outbound								Total							
Total Person Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	1,733	1	4	7	0	0	0	1,745	0	3	8	13	0	0	14	39	1,733	4	12	19	0	0	14	1,783
Superdistrict 2	538	1	4	7	0	0	0	550	0	4	10	15	0	0	18	47	538	5	14	22	0	0	18	598
Superdistrict 3	649	9	14	22	0	0	0	695	0	15	26	41	0	0	42	123	649	24	40	63	0	0	42	818
Superdistrict 4	517	1	2	4	0	0	0	524	0	3	6	10	0	0	14	32	517	3	8	13	0	0	14	556
East Bay	3,655	0	3	5	0	0	0	3,663	0	7	18	28	0	0	52	104	3,655	8	21	32	0	0	52	3,767
North Bay	1,049	0	0	1	0	0	0	1,051	0	1	2	3	0	0	7	13	1,049	1	3	4	0	0	7	1,064
South Bay	3,131	1	3	5	0	0	0	3,139	0	6	13	20	0	0	35	75	3,131	8	16	25	0	0	35	3,214
Out of Region	470	1	1	2	0	0	0	473	0	1	2	4	0	0	5	12	470	2	3	5	0	0	5	485
Total	**11,742**	**15**	**32**	**50**	**0**	**0**	**0**	**11,839**	**0**	**41**	**86**	**133**	**0**	**0**	**186**	**446**	**11,742**	**56**	**118**	**184**	**0**	**0**	**186**	**12,285**

Evening Peak Hour bet. 6 PM & 8 PM	Inbound								Outbound								Total							
Vehicle-Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	304	0	1	1	0	0	1	307	92	0	1	2	0	0	0	95	396	1	2	3	0	0	1	403
Superdistrict 2	121	1	2	2	0	0	3	129	24	1	2	4	0	0	0	31	145	2	4	6	0	0	3	160
Superdistrict 3	137	3	3	4	0	0	7	153	14	4	4	7	0	0	0	29	151	6	7	11	0	0	7	182
Superdistrict 4	158	0	1	1	0	0	3	163	22	1	1	2	0	0	0	26	180	1	2	3	0	0	3	189
East Bay	958	0	1	1	0	0	6	966	76	1	3	4	0	0	0	84	1,034	1	3	5	0	0	6	1,050
North Bay	328	0	0	0	0	0	2	331	0	0	1	1	0	0	0	2	328	1	1	1	0	0	2	333
South Bay	972	1	1	2	0	0	16	992	68	3	6	9	0	0	0	85	1,040	3	7	11	0	0	16	1,077
Out of Region	52	0	0	1	0	0	1	54	0	0	1	1	0	0	0	2	52	1	1	2	0	0	1	56
Total	**3,030**	**5**	**8**	**12**	**0**	**0**	**39**	**3,094**	**296**	**10**	**19**	**30**	**0**	**0**	**0**	**355**	**3,326**	**16**	**27**	**42**	**0**	**0**	**39**	**3,449**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT w/out Event TSP - WEEKDAY DAILY AND LATE PM PEAK HOUR BETWEEN 9 AND 11 PM
SUMMARY OF TRIPS WITH BASKETBALL GAME

Land Use	Intensity	
Arena	18,064	attendees
	1,000	employees
Retail	62,500	gsf
Quick Service Rest.	11,000	gsf
Sit-down Restaurant	51,500	gsf
XXX	0	xxx
XXX	0	xxx
Office	605,000	gsf

Daily Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	23,670	2,024	1,256	1,961	0	0	4,997	33,908	58%
Transit	8,473	582	559	873	0	0	3,748	14,235	24%
Taxi/Coach (Event)	2,695							2,695	5%
Bike (Event)	900							900	2%
Walk	1,961	701	373	581	0	0	1,477	5,093	9%
Other	429	68	188	293	0	0	728	1,707	3%
Total	**38,128**	**3,375**	**2,376**	**3,708**	**0**	**0**	**10,951**	**58,538**	**100%**
	65%	**6%**	**4%**	**6%**	**0%**	**0%**	**19%**	**100%**	
Vehicle Trips	10,722	1,092	573	895	0	0	2,542	15,824	
	68%	7%	4%	6%	0%	0%	16%	100%	
Avg. veh. occupancy	*2.46*	*1.85*	*2.19*	*2.19*	*0.00*	*0.00*	*1.97*	*2.31*	

Late PM Peak Hour Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	8,304	12	50	79	0	0	13	8,458	64%
Transit	2,649	9	45	70	0	0	29	2,802	21%
Taxi/Coach (Event)	900							900	7%
Bike (Event)	301							301	2%
Walk	557	4	15	23	0	0	4	603	5%
Other	133	1	7	11	0	0	2	154	1%
Total	**12,845**	**26**	**118**	**184**	**0**	**0**	**47**	**13,218**	**100%**
	97%	**0%**	**1%**	**1%**	**0%**	**0%**	**0%**	**100%**	
Vehicle Trips	3,674	7	27	42	0	0	10	3,760	
	98%	0%	1%	1%	0%	0%	0%	100%	
Avg. veh. occupancy	*2.51*	*1.69*	*1.88*	*1.88*	*0.00*	*0.00*	*1.30*	*2.49*	

Percent of Daily during Late PM Peak Hour

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Auto	35.1%	0.6%	4.0%	4.0%	0.0%	0.0%	0.3%	24.9%
Transit	31.3%	1.5%	8.1%	8.1%	0.0%	0.0%	0.8%	19.7%
Taxi/Coach (Event)	33.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	33.4%
Bike (Event)	33.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	33.5%
Walk	28.4%	0.6%	4.0%	4.0%	0.0%	0.0%	0.2%	11.8%
Other	31.0%	1.0%	3.9%	3.9%	0.0%	0.0%	0.2%	9.0%
Total	**33.7%**	**0.8%**	**5.0%**	**5.0%**	**0.0%**	**0.0%**	**0.4%**	**22.6%**
Vehicle Trips	34.3%	0.7%	4.7%	4.7%	0.0%	0.0%	0.4%	23.8%

Late PM Peak Hour Person-Trips

Weekday Distribution	Total Daily Person-trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	7,006	1,418	2	12	19	0	0	4	1,455
Superdistrict 2	4,148	455	2	14	22	0	0	5	498
Superdistrict 3	10,602	570	11	40	63	0	0	10	695
Superdistrict 4	2,928	433	2	8	13	0	0	3	460
East Bay	14,730	4,228	4	21	32	0	0	13	4,298
North Bay	4,393	1,651	1	3	4	0	0	2	1,660
South Bay	12,587	3,578	4	16	25	0	0	9	3,632
Out of Region	2,143	511	1	3	5	0	0	1	521
Total	**58,538**	**12,845**	**26**	**118**	**184**	**0**	**0**	**47**	**13,218**

Late PM Peak Hour Transit-Trips

Weekday Distribution	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	395	1	4	7	0	0	2	409
Superdistrict 2	81	1	5	7	0	0	3	97
Superdistrict 3	77	2	12	19	0	0	5	115
Superdistrict 4	53	1	3	5	0	0	2	65
East Bay	1,142	3	13	21	0	0	10	1,188
North Bay	259	0	1	2	0	0	1	263
South Bay	526	1	5	8	0	0	4	545
Out of Region	116	0	1	2	0	0	1	121
Total	**2,649**	**9**	**45**	**70**	**0**	**0**	**29**	**2,802**

Late PM Peak Hour Vehicle-Trips

Weekday Distribution	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total		Avg. Veh. Occ.
Superdistrict 1	322	0	2	3	0	0	0	327	9%	2.07
Superdistrict 2	120	1	4	6	0	0	1	132	4%	2.19
Superdistrict 3	129	3	7	11	0	0	2	152	4%	2.33
Superdistrict 4	149	1	2	3	0	0	1	155	4%	2.34
East Bay	1,187	1	3	5	0	0	2	1,198	32%	2.49
North Bay	516	0	1	1	0	0	1	519	14%	2.69
South Bay	1,193	2	7	11	0	0	4	1,216	32%	2.48
Out of Region	56	0	1	2	0	0	0	60	2%	4.59
Total	**3,674**	**7**	**27**	**42**	**0**	**0**	**10**	**3,760**	**100%**	**2.49**

Assumptions for Late PM Peak Hour bet. 9 PM & 11 PM	Arena		Retail		Q.S. Rest.		Sit-down Rest.		XXX		XXX		Office	
	Empl.	Attend.	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work
Inbound	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	45%	0%	0%
Outbound	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	55%	100%	100%

Inbound

Late PM Peak Hour bet. 9 PM & 11 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	0	0	0	0	0	0	0	0
	0%	0%	0%	0%	0%	0%	0%	0%
Transit Trips	0	0	0	0	0	0	0	0
	0%	0%	0%	0%	0%	0%	0%	0%
Vehicle Trips	287	0	0	0	0	0	0	287
	8%	0%	0%	0%	0%	0%	0%	8%

Outbound

Late PM Peak Hour bet. 9 PM & 11 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	12,845	26	118	184	0	0	47	13,218
	100%	100%	100%	100%	0%	0%	100%	100%
Transit Trips	2,649	9	45	70	0	0	29	2,802
	100%	100%	100%	100%	0%	0%	100%	100%
Vehicle Trips	3,387	7	27	42	0	0	10	3,473
	92%	100%	100%	100%	0%	0%	100%	92%

Total

Late PM Peak Hour bet. 9 PM & 11 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	12,845	26	118	184	0	0	47	13,218
Transit Trips	2,649	9	45	70	0	0	29	2,802
Vehicle Trips	3,674	7	27	42	0	0	10	3,760

Inbound

Late PM Peak Hour bet. 9 PM & 11 PM Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	0	0	0	0	0	0	0
Superdistrict 2	0	0	0	0	0	0	0	0
Superdistrict 3	0	0	0	0	0	0	0	0
Superdistrict 4	0	0	0	0	0	0	0	0
East Bay	0	0	0	0	0	0	0	0
North Bay	0	0	0	0	0	0	0	0
South Bay	0	0	0	0	0	0	0	0
Out of Region	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Outbound

Late PM Peak Hour bet. 9 PM & 11 PM Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	465	0	4	5	0	0	0	475
Superdistrict 2	217	1	7	11	0	0	1	237
Superdistrict 3	278	6	15	23	0	0	2	324
Superdistrict 4	302	1	4	7	0	0	1	315
East Bay	2,728	1	7	11	0	0	3	2,749
North Bay	1,391	0	1	2	0	0	1	1,396
South Bay	2,780	2	11	16	0	0	4	2,814
Out of Region	142	0	2	3	0	0	0	147
Total	**8,304**	**12**	**50**	**79**	**0**	**0**	**13**	**8,458**

Total

Late PM Peak Hour bet. 9 PM & 11 PM Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Taxi + Coach Arena
Superdistrict 1	465	0	4	5	0	0	0	475	201
Superdistrict 2	217	1	7	11	0	0	1	237	52
Superdistrict 3	278	6	15	23	0	0	2	324	30
Superdistrict 4	302	1	4	7	0	0	1	315	48
East Bay	2,728	1	7	11	0	0	3	2,749	235
North Bay	1,391	0	1	2	0	0	1	1,396	0
South Bay	2,780	2	11	16	0	0	4	2,814	208
Out of Region	142	0	2	3	0	0	0	147	126
Total	**8,304**	**12**	**50**	**79**	**0**	**0**	**13**	**8,458**	**900**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT w/out Event TSP - WEEKDAY DAILY AND LATE PM PEAK HOUR BETWEEN 9 AND 11 PM
SUMMARY OF TRIPS WITH BASKETBALL GAME

Late PM Peak Hour bet. 9 PM & 11 PM	Inbound								Outbound								Total							
Transit Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	0	0	0	0	0	0	0	395	1	4	7	0	0	2	409	395	1	4	7	0	0	2	409
Superdistrict 2	0	0	0	0	0	0	0	0	81	1	5	7	0	0	3	97	81	1	5	7	0	0	3	97
Superdistrict 3	0	0	0	0	0	0	0	0	77	2	12	19	0	0	5	115	77	2	12	19	0	0	5	115
Superdistrict 4	0	0	0	0	0	0	0	0	53	1	3	5	0	0	2	65	53	1	3	5	0	0	2	65
East Bay	0	0	0	0	0	0	0	0	1,142	3	13	21	0	0	10	1,188	1,142	3	13	21	0	0	10	1,188
North Bay	0	0	0	0	0	0	0	0	259	0	1	2	0	0	1	263	259	0	1	2	0	0	1	263
South Bay	0	0	0	0	0	0	0	0	526	1	5	8	0	0	4	545	526	1	5	8	0	0	4	545
Out of Region	0	0	0	0	0	0	0	0	116	0	1	2	0	0	1	121	116	0	1	2	0	0	1	121
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2,649**	**9**	**45**	**70**	**0**	**0**	**29**	**2,802**	**2,649**	**9**	**45**	**70**	**0**	**0**	**29**	**2,802**

Late PM Peak Hour bet. 9 PM & 11 PM	Inbound								Outbound								Total							
Bike (Event)	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0							0	69							69	69	0	0	0	0	0	0	69
Superdistrict 2	0							0	18							18	18	0	0	0	0	0	0	18
Superdistrict 3	0							0	11							11	11	0	0	0	0	0	0	11
Superdistrict 4	0							0	17							17	17	0	0	0	0	0	0	17
East Bay	0							0	122							122	122	0	0	0	0	0	0	122
North Bay	0							0	0							0	0	0	0	0	0	0	0	0
South Bay	0							0	65							65	65	0	0	0	0	0	0	65
Out of Region	0							0	0							0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**301**	**0**	**0**	**0**	**0**	**0**	**0**	**301**	**301**	**0**	**0**	**0**	**0**	**0**	**0**	**301**

Late PM Peak Hour bet. 9 PM & 11 PM	Inbound								Outbound								Total							
Taxi/Walk/Other	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	0	0	0	0	0	0	0	488	0	5	7	0	0	1	502	488	0	5	7	0	0	1	502
Superdistrict 2	0	0	0	0	0	0	0	0	140	0	2	3	0	0	1	147	140	0	2	3	0	0	1	147
Superdistrict 3	0	0	0	0	0	0	0	0	204	3	13	21	0	0	3	245	204	3	13	21	0	0	3	245
Superdistrict 4	0	0	0	0	0	0	0	0	61	0	1	1	0	0	0	64	61	0	1	1	0	0	0	64
East Bay	0	0	0	0	0	0	0	0	236	0	0	1	0	0	0	238	236	0	0	1	0	0	0	238
North Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
South Bay	0	0	0	0	0	0	0	0	208	0	0	0	0	0	0	208	208	0	0	0	0	0	0	208
Out of Region	0	0	0	0	0	0	0	0	253	0	0	0	0	0	0	254	253	0	0	0	0	0	0	254
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1,591**	**5**	**22**	**35**	**0**	**0**	**5**	**1,658**	**1,591**	**5**	**22**	**35**	**0**	**0**	**5**	**1,658**

Late PM Peak Hour bet. 9 PM & 11 PM	Inbound								Outbound								Total							
Total Person Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	0	0	0	0	0	0	0	1,418	2	12	19	0	0	4	1,455	1,418	2	12	19	0	0	4	1,455
Superdistrict 2	0	0	0	0	0	0	0	0	455	2	14	22	0	0	5	498	455	2	14	22	0	0	5	498
Superdistrict 3	0	0	0	0	0	0	0	0	570	11	40	63	0	0	10	695	570	11	40	63	0	0	10	695
Superdistrict 4	0	0	0	0	0	0	0	0	433	2	8	13	0	0	3	460	433	2	8	13	0	0	3	460
East Bay	0	0	0	0	0	0	0	0	4,228	4	21	32	0	0	13	4,298	4,228	4	21	32	0	0	13	4,298
North Bay	0	0	0	0	0	0	0	0	1,651	1	3	4	0	0	2	1,660	1,651	1	3	4	0	0	2	1,660
South Bay	0	0	0	0	0	0	0	0	3,578	4	16	25	0	0	9	3,632	3,578	4	16	25	0	0	9	3,632
Out of Region	0	0	0	0	0	0	0	0	511	1	3	5	0	0	1	521	511	1	3	5	0	0	1	521
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**12,845**	**26**	**118**	**184**	**0**	**0**	**47**	**13,218**	**12,845**	**26**	**118**	**184**	**0**	**0**	**47**	**13,218**

Late PM Peak Hour bet. 9 PM & 11 PM	Inbound								Outbound								Total							
Vehicle-Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	74	0	0	0	0	0	0	74	247	0	2	3	0	0	0	253	322	0	2	3	0	0	0	327
Superdistrict 2	19	0	0	0	0	0	0	19	101	1	4	6	0	0	1	113	120	1	4	6	0	0	1	132
Superdistrict 3	11	0	0	0	0	0	0	11	118	3	7	11	0	0	2	141	129	3	7	11	0	0	2	152
Superdistrict 4	18	0	0	0	0	0	0	18	131	1	2	3	0	0	1	138	149	1	2	3	0	0	1	155
East Bay	87	0	0	0	0	0	0	87	1,100	1	3	5	0	0	2	1,111	1,187	1	3	5	0	0	2	1,198
North Bay	0	0	0	0	0	0	0	0	516	0	1	1	0	0	1	519	516	0	1	1	0	0	1	519
South Bay	77	0	0	0	0	0	0	77	1,116	2	7	11	0	0	4	1,139	1,193	2	7	11	0	0	4	1,216
Out of Region	0	0	0	0	0	0	0	0	56	0	1	2	0	0	0	60	56	0	1	2	0	0	0	60
Total	**287**	**0**	**0**	**0**	**0**	**0**	**0**	**287**	**3,387**	**7**	**27**	**42**	**0**	**0**	**10**	**3,473**	**3,674**	**7**	**27**	**42**	**0**	**0**	**10**	**3,760**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT w/out Event TSP - SATURDAY DAILY AND EVENING PEAK HOUR BETWEEN 7 AND 9 PM

SUMMARY OF TRIPS WITH BASKETBALL GAME

Land Use	Intensity	
Arena	18,064	attendees
	1,000	employees
Retail	62,500	gsf
Quick Service Rest.	11,000	gsf
Sit-down Restaurant	51,500	gsf
XXX	0	xxx
XXX	0	xxx
Office	605,000	gsf

Person-trips by Mode	Daily Trips Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total		Evening Peak Hour Trips Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total		Percent of Daily during Late PM Peak Hour Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Auto	25,830	2,368	1,565	2,442	0	0	660	32,865	63%	8,219	18	74	116	0	0	7	8,435	69%	31.8%	0.8%	4.8%	4.8%	0.0%	0.0%	1.1%	25.7%
Transit	8,460	681	697	1,087	0	0	1,507	12,431	24%	2,348	13	66	104	0	0	17	2,548	21%	27.8%	2.0%	9.5%	9.5%	0.0%	0.0%	1.1%	20.5%
Taxi/Coach (Event)	1,626							1,626	3%	528							528	4%	32.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	32.5%
Bike (Event)	723							723	1%	235							235	2%	32.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	32.5%
Walk	1,241	821	464	724	0	0	192	3,442	7%	352	6	22	34	0	0	2	417	3%	28.4%	0.7%	4.7%	4.7%	0.0%	0.0%	1.1%	12.1%
Other	249	80	234	365	0	0	83	1,011	2%	59	1	11	17	0	0	1	88	1%	23.6%	1.2%	4.6%	4.6%	0.0%	0.0%	1.1%	8.7%
Total	**38,128**	**3,950**	**2,959**	**4,618**	**0**	**0**	**2,442**	**52,098**	**100%**	**11,742**	**39**	**174**	**271**	**0**	**0**	**27**	**12,252**	**100%**	**30.8%**	**1.0%**	**5.9%**	**5.9%**	**0.0%**	**0.0%**	**1.1%**	**23.5%**
	73%	**8%**	**6%**	**9%**	**0%**	**0%**	**5%**	**100%**		**96%**	**0%**	**1%**	**2%**	**0%**	**0%**	**0%**	**100%**									
Vehicle Trips	10,859	1,278	714	1,114	0	0	509	14,475		3,394	11	40	62	0	0	6	3,512		31.3%	0.8%	5.6%	5.6%	0.0%	0.0%	1.1%	24.3%
	75%	9%	5%	8%	0%	0%	4%	100%		97%	0%	1%	2%	0%	0%	0%	100%									
Avg. veh. occupancy	*2.53*	*1.85*	*2.19*	*2.19*	*0.00*	*0.00*	*1.30*	*2.38*		*2.58*	*1.69*	*1.88*	*1.88*	*0.00*	*0.00*	*1.30*	*2.55*									

Saturday Distribution	Total Daily Person-trips	Evening Peak Hour Person-Trips Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Evening Peak Hour Transit-Trips Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Evening Peak Hour Vehicle-Trips Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total		Avg. Veh. Occ.
Superdistrict 1	5,537	1,302	3	18	29	0	0	2	1,354	396	1	6	10	0	0	1	415	294	0	3	4	0	0	0	302	9%	2.23
Superdistrict 2	3,068	404	4	21	33	0	0	3	464	68	1	7	11	0	0	2	89	111	1	6	9	0	0	0	128	4%	2.32
Superdistrict 3	7,883	488	17	59	92	0	0	6	662	55	3	18	28	0	0	3	107	126	4	10	16	0	0	1	158	4%	2.44
Superdistrict 4	2,265	389	2	12	19	0	0	2	425	40	1	5	7	0	0	1	55	132	1	3	5	0	0	0	141	4%	2.46
East Bay	14,220	3,875	5	30	47	0	0	7	3,966	978	4	20	31	0	0	6	1,038	1,090	1	5	8	0	0	1	1,104	31%	2.57
North Bay	5,036	1,526	1	4	6	0	0	1	1,538	218	0	1	2	0	0	0	223	484	0	1	2	0	0	0	488	14%	2.70
South Bay	12,123	3,288	5	23	37	0	0	5	3,358	445	2	8	12	0	0	3	469	1,079	2	10	16	0	0	2	1,109	32%	2.56
Out of Region	1,966	470	1	5	8	0	0	1	484	148	0	2	3	0	0	0	154	77	0	2	2	0	0	0	82	2%	3.31
Total	**52,098**	**11,742**	**39**	**174**	**271**	**0**	**0**	**27**	**12,252**	**2,348**	**13**	**66**	**104**	**0**	**0**	**17**	**2,548**	**3,394**	**11**	**40**	**62**	**0**	**0**	**6**	**3,512**	**100%**	**2.55**

Assumptions for Evening Peak Hour bet. 7 PM & 9 PM	Arena Empl.	Arena Attend.	Retail Work	Retail Non-work	Q.S. Rest. Work	Q.S. Rest. Non-work	Sit-down Rest. Work	Sit-down Rest. Non-work	XXX Work	XXX Non-work	XXX Work	XXX Non-work	Office Work	Office Non-work
Inbound	95%	100%	0%	50%	0%	50%	0%	50%	100%	100%	100%	50%	0%	50%
Outbound	5%	0%	100%	50%	100%	50%	100%	50%	0%	0%	0%	50%	100%	50%

Evening Peak Hour bet. 7 PM & 9 PM	Inbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Outbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Total Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	11,742	11	47	74	0	0	0	11,873	0	28	126	197	0	0	27	378	11,742	39	174	271	0	0	27	12,252
	100%	27%	27%	27%	0%	0%	0%	97%	0%	73%	73%	73%	0%	0%	100%	3%								
Transit Trips	2,348	1	9	14	0	0	0	2,372	0	12	58	90	0	0	17	176	2,348	13	66	104	0	0	17	2,548
	100%	9%	13%	13%	0%	0%	0%	93%	0%	91%	87%	87%	0%	0%	100%	7%								
Vehicle Trips	3,220	4	12	18	0	0	0	3,253	174	7	28	44	0	0	6	259	3,394	11	40	62	0	0	6	3,512
	95%	33%	29%	29%	0%	0%	0%	93%	5%	67%	71%	71%	0%	0%	100%	7%								

Evening Peak Hour bet. 7 PM & 9 PM Auto Trips	Inbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Outbound Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Total Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Taxi + Coach Arena
Superdistrict 1	526	0	2	3	0	0	0	532	0	0	3	5	0	0	0	8	526	1	5	8	0	0	0	540	134
Superdistrict 2	234	1	5	7	0	0	0	246	0	1	6	10	0	0	1	18	234	2	11	17	0	0	1	263	34
Superdistrict 3	300	4	9	14	0	0	0	327	0	5	13	20	0	0	1	38	300	9	22	34	0	0	1	366	20
Superdistrict 4	300	0	2	3	0	0	0	306	0	1	4	6	0	0	1	12	300	1	6	10	0	0	1	318	28
East Bay	2,670	0	3	5	0	0	0	2,678	0	1	7	11	0	0	1	21	2,670	1	10	16	0	0	1	2,699	136
North Bay	1,308	0	0	1	0	0	0	1,309	0	0	2	3	0	0	0	5	1,308	1	2	3	0	0	0	1,315	0
South Bay	2,677	1	4	6	0	0	0	2,688	0	2	12	18	0	0	3	34	2,677	3	16	24	0	0	3	2,722	118
Out of Region	204	0	1	2	0	0	0	207	0	0	1	2	0	0	0	4	204	1	3	4	0	0	0	212	59
Total	**8,219**	**7**	**27**	**41**	**0**	**0**	**0**	**8,294**	**0**	**11**	**48**	**75**	**0**	**0**	**7**	**141**	**8,219**	**18**	**74**	**116**	**0**	**0**	**7**	**8,435**	**528**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PROJECT w/out Event TSP - SATURDAY DAILY AND EVENING PEAK HOUR BETWEEN 7 AND 9 PM
SUMMARY OF TRIPS WITH BASKETBALL GAME

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Transit Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	396	0	1	2	0	0	0	399	0	1	5	8	0	0	1	15	396	1	6	10	0	0	1	415
Superdistrict 2	68	0	1	1	0	0	0	70	0	1	6	9	0	0	2	18	68	1	7	11	0	0	2	89
Superdistrict 3	55	1	4	7	0	0	0	67	0	3	13	21	0	0	3	40	55	3	18	28	0	0	3	107
Superdistrict 4	40	0	1	1	0	0	0	42	0	1	4	7	0	0	1	13	40	1	5	7	0	0	1	55
East Bay	978	0	1	2	0	0	0	981	0	4	18	29	0	0	6	57	978	4	20	31	0	0	6	1,038
North Bay	218	0	0	0	0	0	0	218	0	0	1	2	0	0	0	4	218	0	1	2	0	0	0	223
South Bay	445	0	0	0	0	0	0	446	0	2	8	12	0	0	3	23	445	2	8	12	0	0	3	469
Out of Region	148	0	0	0	0	0	0	149	0	0	2	3	0	0	0	5	148	0	2	3	0	0	0	154
Total	**2,348**	**1**	**9**	**14**	**0**	**0**	**0**	**2,372**	**0**	**12**	**58**	**90**	**0**	**0**	**17**	**176**	**2,348**	**13**	**66**	**104**	**0**	**0**	**17**	**2,548**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Bike (Event)	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	60							60	0							0	60	0	0	0	0	0	0	60
Superdistrict 2	15							15	0							0	15	0	0	0	0	0	0	15
Superdistrict 3	9							9	0							0	9	0	0	0	0	0	0	9
Superdistrict 4	13							13	0							0	13	0	0	0	0	0	0	13
East Bay	91							91	0							0	91	0	0	0	0	0	0	91
North Bay	0							0	0							0	0	0	0	0	0	0	0	0
South Bay	48							48	0							0	48	0	0	0	0	0	0	48
Out of Region	0							0	0							0	0	0	0	0	0	0	0	0
Total	**235**	**0**	**0**	**0**	**0**	**0**	**0**	**235**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**235**	**0**	**0**	**0**	**0**	**0**	**0**	**235**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Taxi/Walk/Other	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	321	0	3	4	0	0	0	328	0	0	4	7	0	0	1	12	321	1	7	11	0	0	1	340
Superdistrict 2	88	0	1	2	0	0	0	91	0	0	2	3	0	0	0	6	88	1	3	5	0	0	0	97
Superdistrict 3	124	2	7	11	0	0	0	144	0	3	12	19	0	0	2	37	124	5	20	31	0	0	2	181
Superdistrict 4	36	0	1	1	0	0	0	37	0	0	1	1	0	0	0	2	36	0	1	2	0	0	0	39
East Bay	136	0	0	0	0	0	0	136	0	0	1	1	0	0	0	2	136	0	1	1	0	0	0	138
North Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Bay	118	0	0	0	0	0	0	118	0	0	0	0	0	0	0	1	118	0	0	0	0	0	0	119
Out of Region	117	0	0	0	0	0	0	118	0	0	0	0	0	0	0	1	117	0	0	0	0	0	0	118
Total	**939**	**3**	**12**	**19**	**0**	**0**	**0**	**972**	**0**	**5**	**21**	**32**	**0**	**0**	**3**	**61**	**939**	**7**	**33**	**51**	**0**	**0**	**3**	**1,033**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Total Person Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	1,302	1	6	10	0	0	0	1,319	0	2	12	19	0	0	2	35	1,302	3	18	29	0	0	2	1,354
Superdistrict 2	404	1	7	10	0	0	0	422	0	3	14	23	0	0	3	42	404	4	21	33	0	0	3	464
Superdistrict 3	488	6	21	33	0	0	0	548	0	10	38	60	0	0	6	115	488	17	59	92	0	0	6	662
Superdistrict 4	389	1	3	5	0	0	0	398	0	2	9	14	0	0	2	27	389	2	12	19	0	0	2	425
East Bay	3,875	0	4	7	0	0	0	3,886	0	5	26	41	0	0	7	80	3,875	5	30	47	0	0	7	3,966
North Bay	1,526	0	0	1	0	0	0	1,528	0	1	3	5	0	0	1	10	1,526	1	4	6	0	0	1	1,538
South Bay	3,288	1	4	7	0	0	0	3,300	0	4	19	30	0	0	5	59	3,288	5	23	37	0	0	5	3,358
Out of Region	470	1	1	2	0	0	0	474	0	1	3	5	0	0	1	10	470	1	5	8	0	0	1	484
Total	**11,742**	**11**	**47**	**74**	**0**	**0**	**0**	**11,873**	**0**	**28**	**126**	**197**	**0**	**0**	**27**	**378**	**11,742**	**39**	**174**	**271**	**0**	**0**	**27**	**12,252**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Vehicle-Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	244	0	1	2	0	0	0	247	50	0	2	3	0	0	0	54	294	0	3	4	0	0	0	302
Superdistrict 2	99	0	2	4	0	0	0	105	12	1	4	6	0	0	0	23	111	1	6	9	0	0	0	128
Superdistrict 3	119	2	4	6	0	0	0	130	7	3	7	10	0	0	1	28	126	4	10	16	0	0	1	158
Superdistrict 4	122	0	1	1	0	0	0	124	11	1	2	3	0	0	0	17	132	1	3	5	0	0	0	141
East Bay	1,039	0	1	2	0	0	0	1,042	50	1	4	6	0	0	1	62	1,090	1	5	8	0	0	1	1,104
North Bay	484	0	0	0	0	0	0	485	0	0	1	1	0	0	0	3	484	0	1	2	0	0	0	488
South Bay	1,035	0	2	3	0	0	0	1,040	44	2	8	13	0	0	2	69	1,079	2	10	16	0	0	2	1,109
Out of Region	77	0	1	1	0	0	0	79	0	0	1	1	0	0	0	3	77	0	2	2	0	0	0	82
Total	**3,220**	**4**	**12**	**18**	**0**	**0**	**0**	**3,253**	**174**	**7**	**28**	**44**	**0**	**0**	**6**	**259**	**3,394**	**11**	**40**	**62**	**0**	**0**	**6**	**3,512**

TR-3

TRAFFIC VOLUME FIGURES

EXISTING 2015 (NO PROJECT)
WEEKDAY PM PEAK

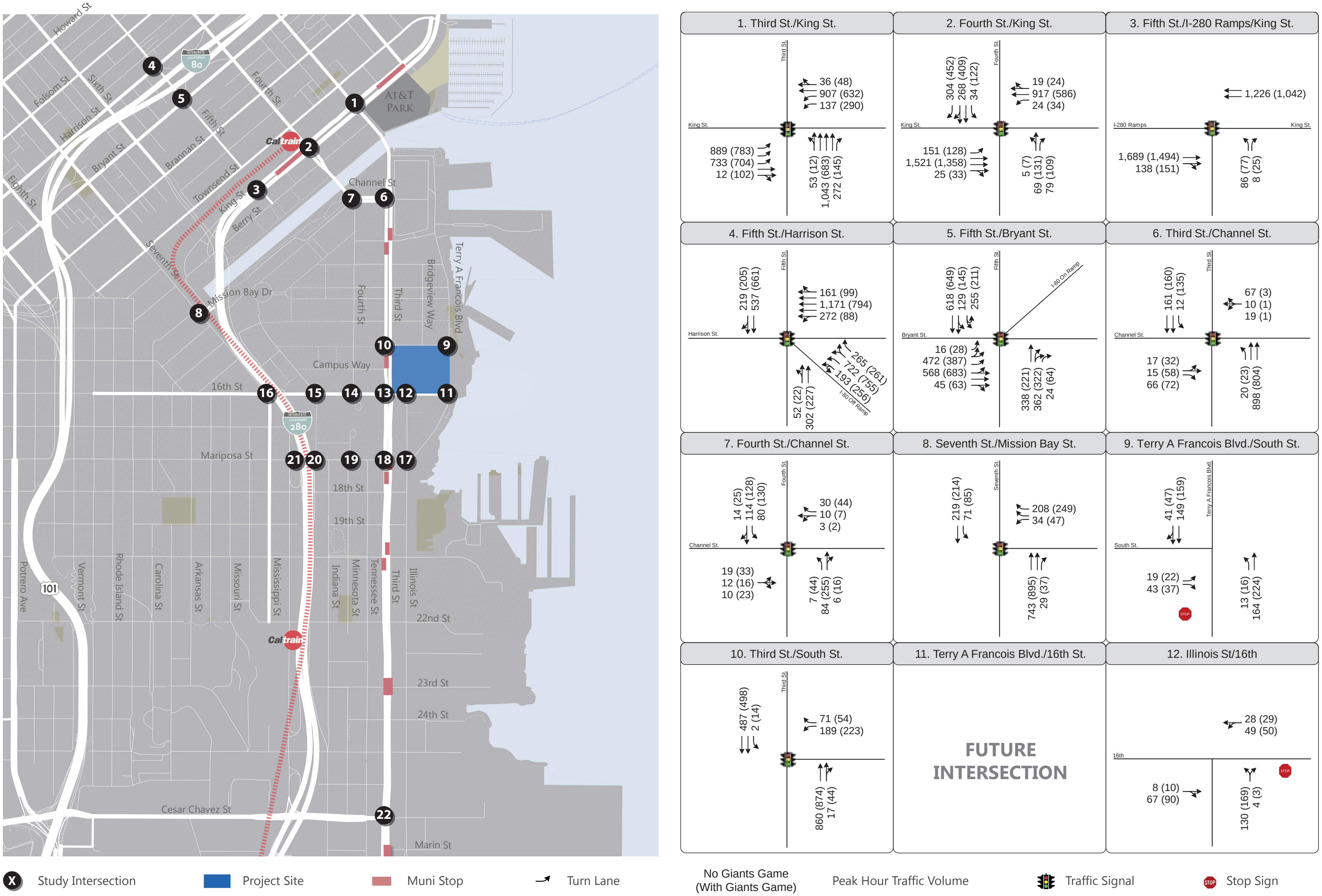
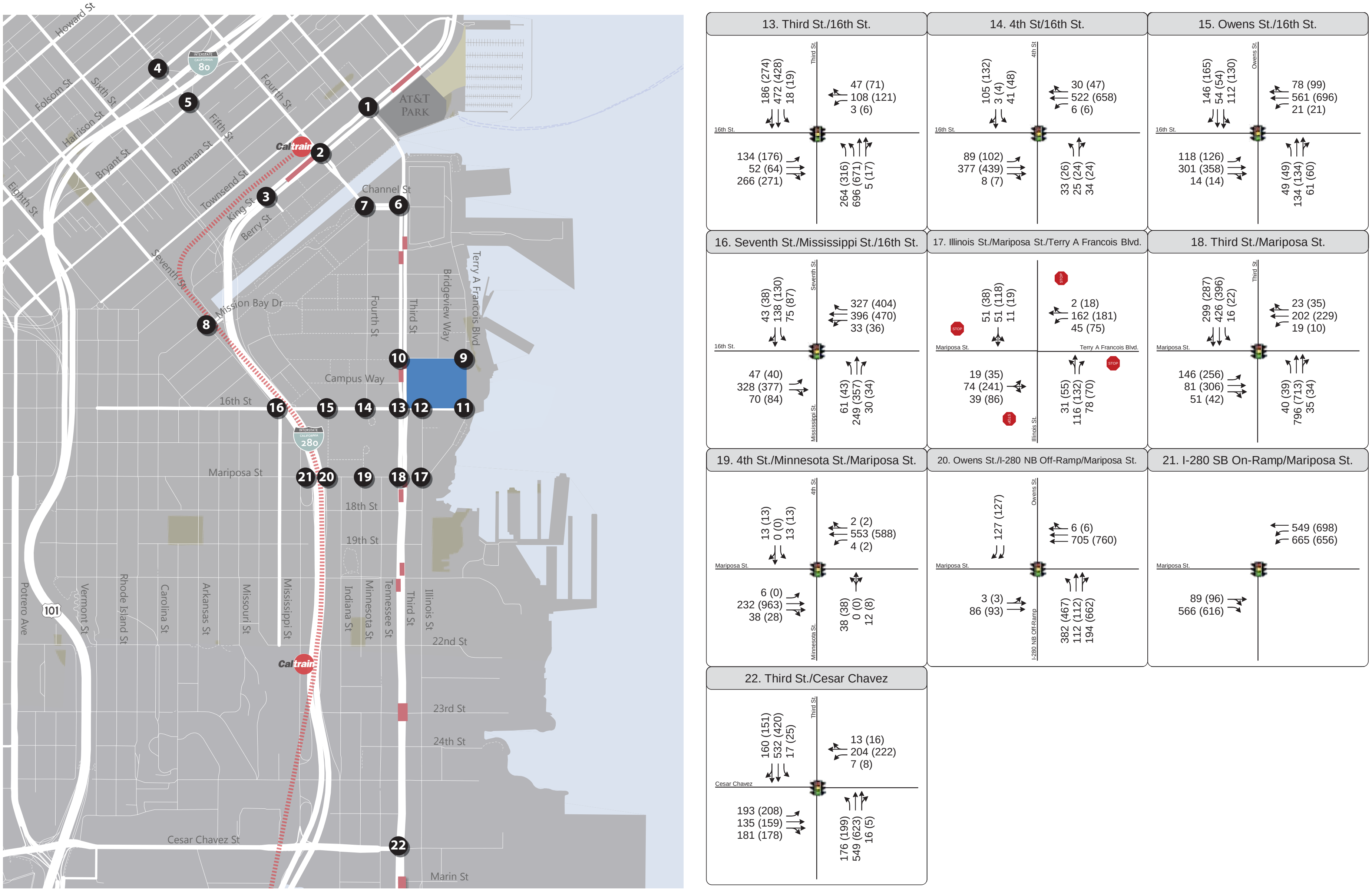


Figure 1a

Peak Hour Traffic Volumes and Lane Configurations
Existing (2015) Conditions - Weekday PM Peak

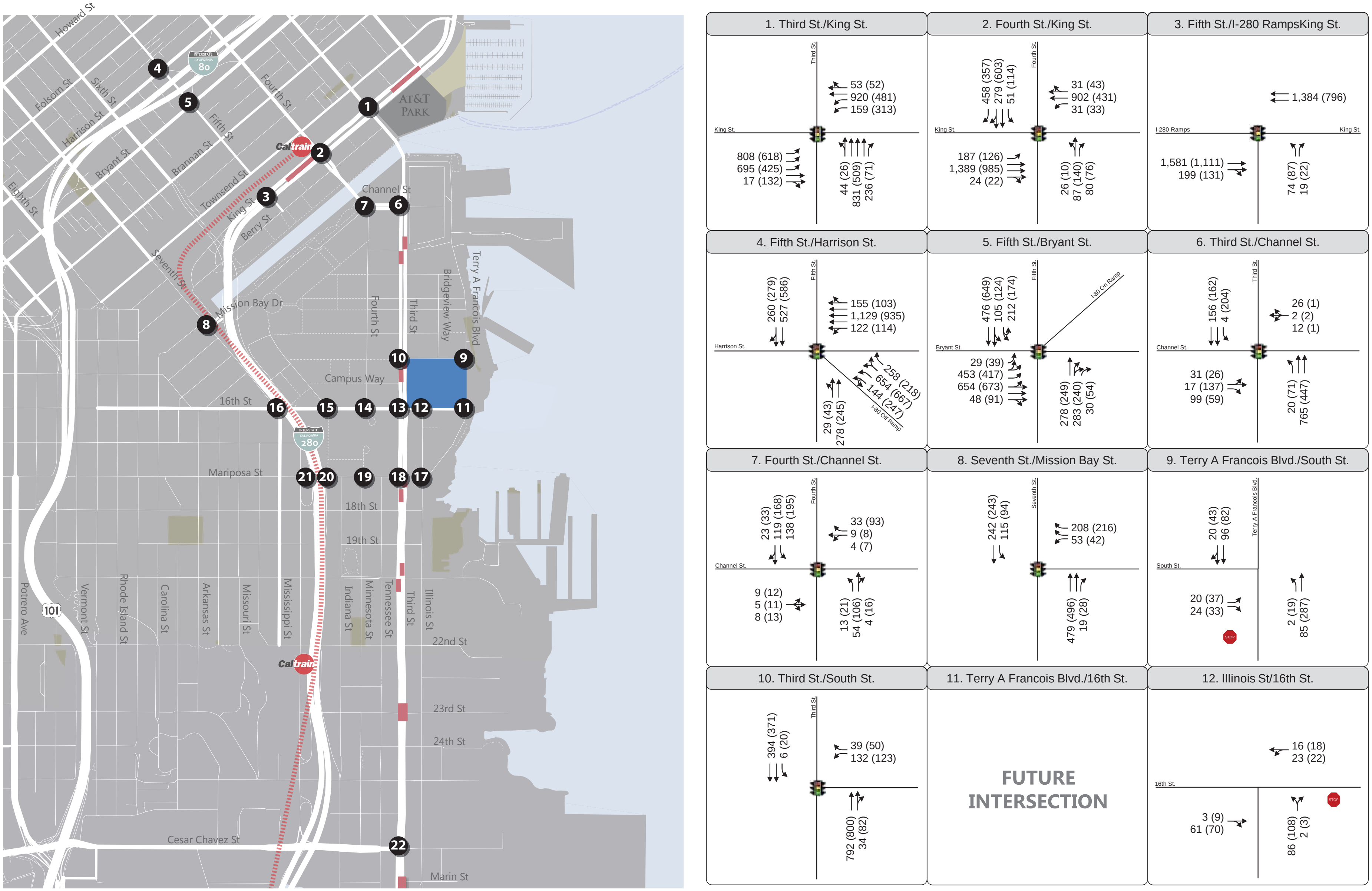


X Study Intersection | Project Site | Muni Stop | Turn Lane | No Giants Game (With Giants Game) Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 1b

Peak Hour Traffic Volumes and Lane Configurations
Existing (2015) Conditions - Weekday PM Peak

EXISTING 2015 (NO PROJECT)
WEEKDAY EVENING



Study Intersection | Project Site | Muni Stop | Turn Lane

No Giants Game (With Giants Game) | Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 2a

Peak Hour Traffic Volumes and Lane Configurations
Existing (2015) Conditions - Weekday Evening

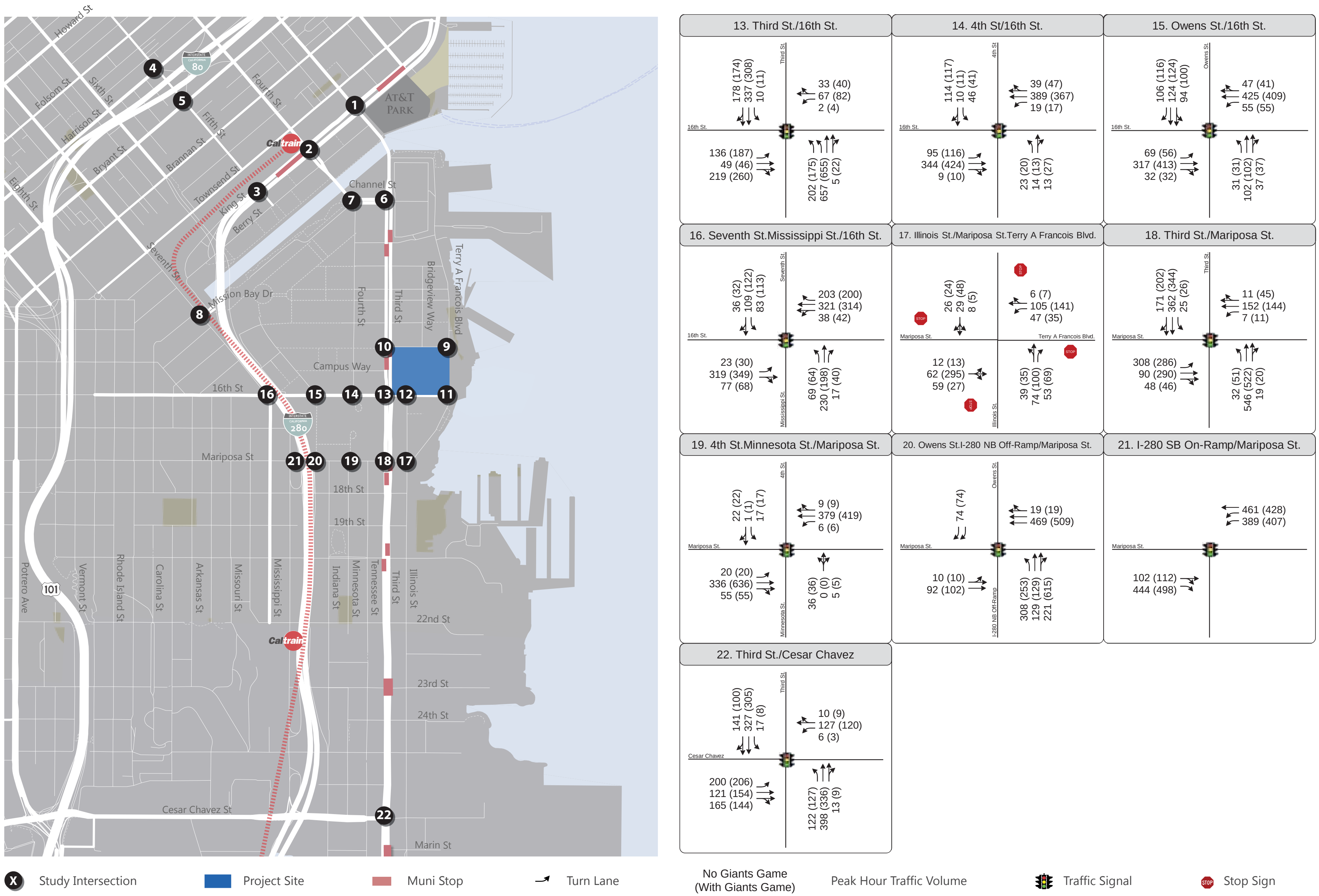
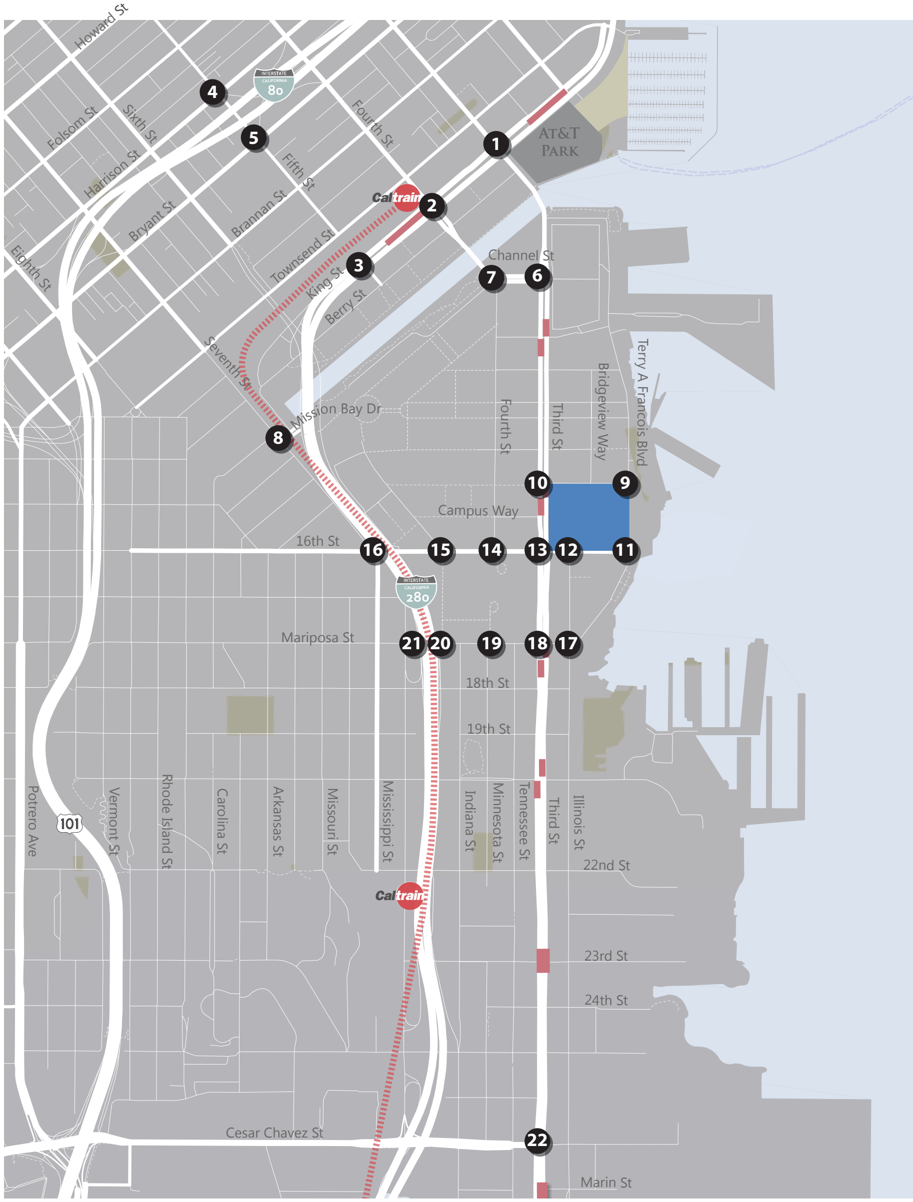
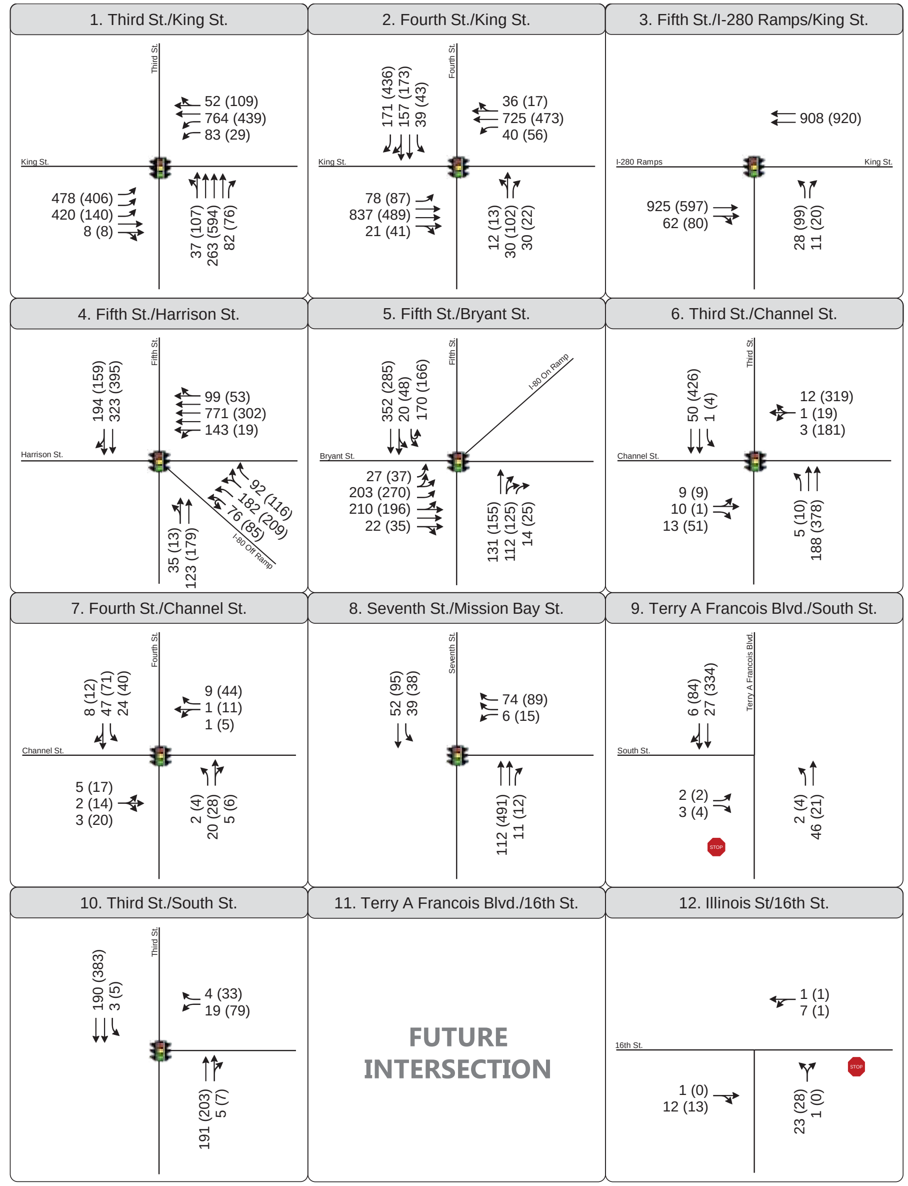


Figure 2b

Peak Hour Traffic Volumes and Lane Configurations
Existing (2015) Conditions - Weekday Evening

EXISTING 2015 (NO PROJECT)
WEEKDAY LATE EVENING



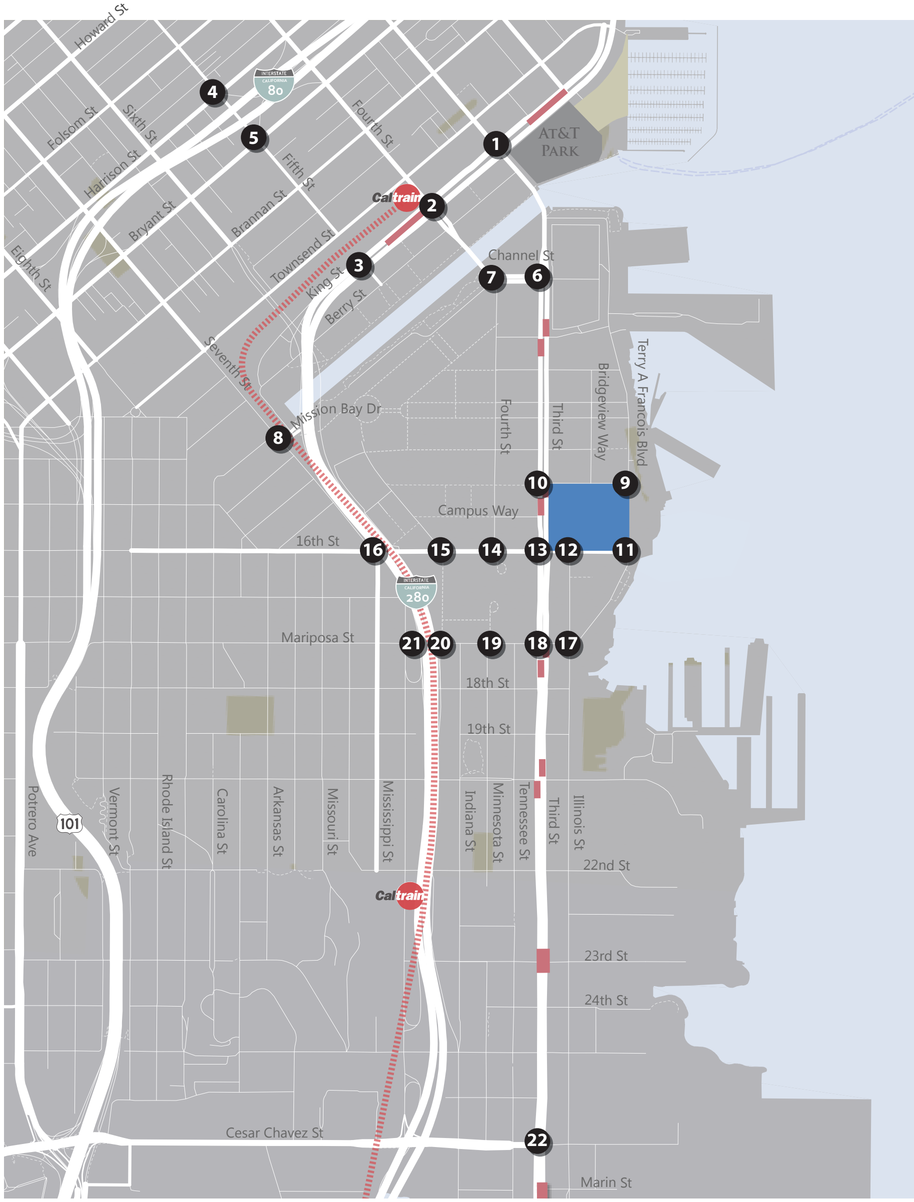


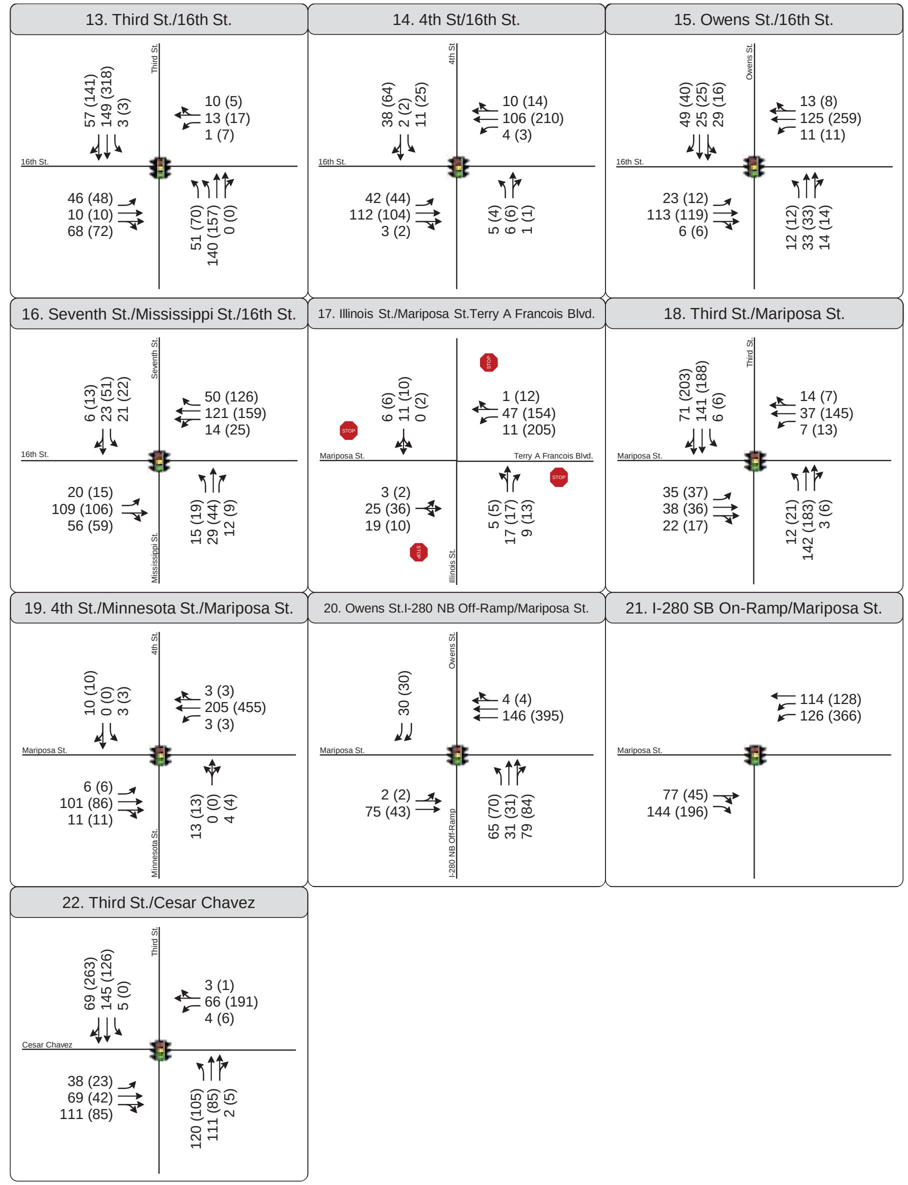
Study Intersection | Project Site | Muni Stop | Turn Lane

No Giants Game (With Giants Game) | Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 3a

Peak Hour Traffic Volumes and Lane Configurations
Existing (2015) Conditions - Weekday Late Night

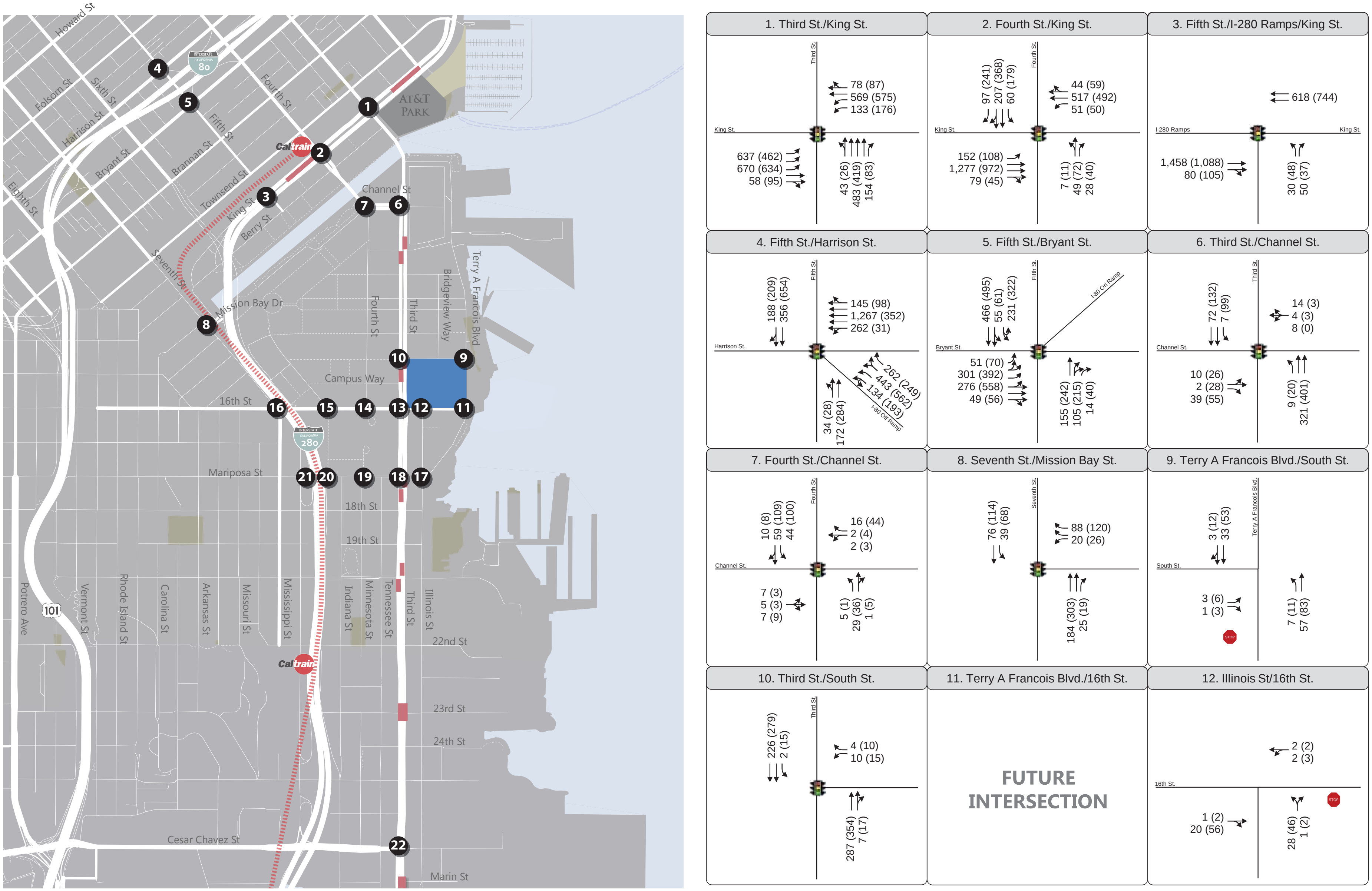




Study Intersection | Project Site | Muni Stop | Turn Lane | No Giants Game (With Giants Game) | Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 3b
Peak Hour Traffic Volumes and Lane Configurations
Existing (2015) Conditions - Weekday Late Night

EXISTING 2015 (NO PROJECT)
SATURDAY EVENING



X Study Intersection | Project Site | Muni Stop | Turn Lane

No Giants Game (With Giants Game) | Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 4a

Peak Hour Traffic Volumes and Lane Configurations
Existing (2015) Conditions - Saturday Evening

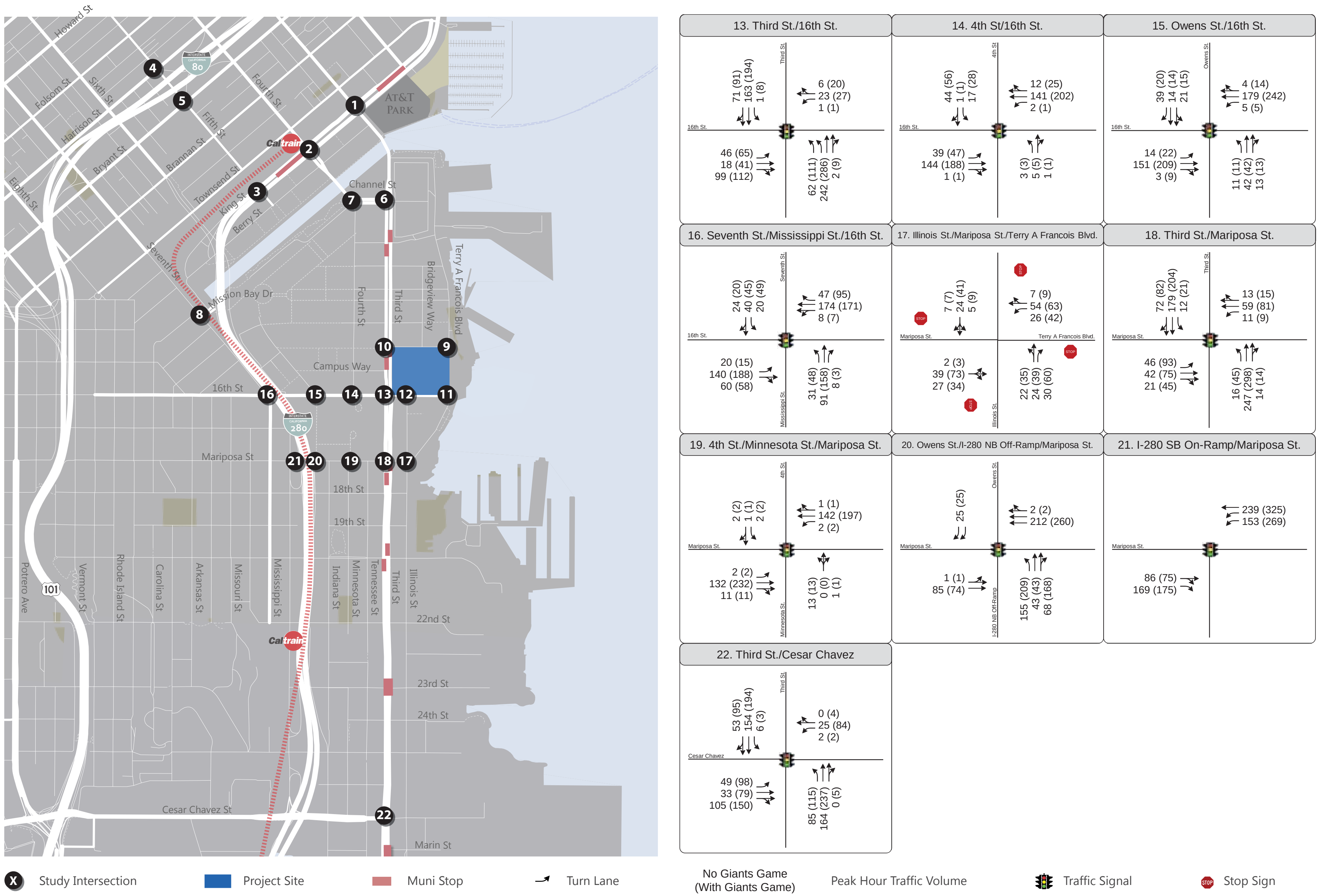
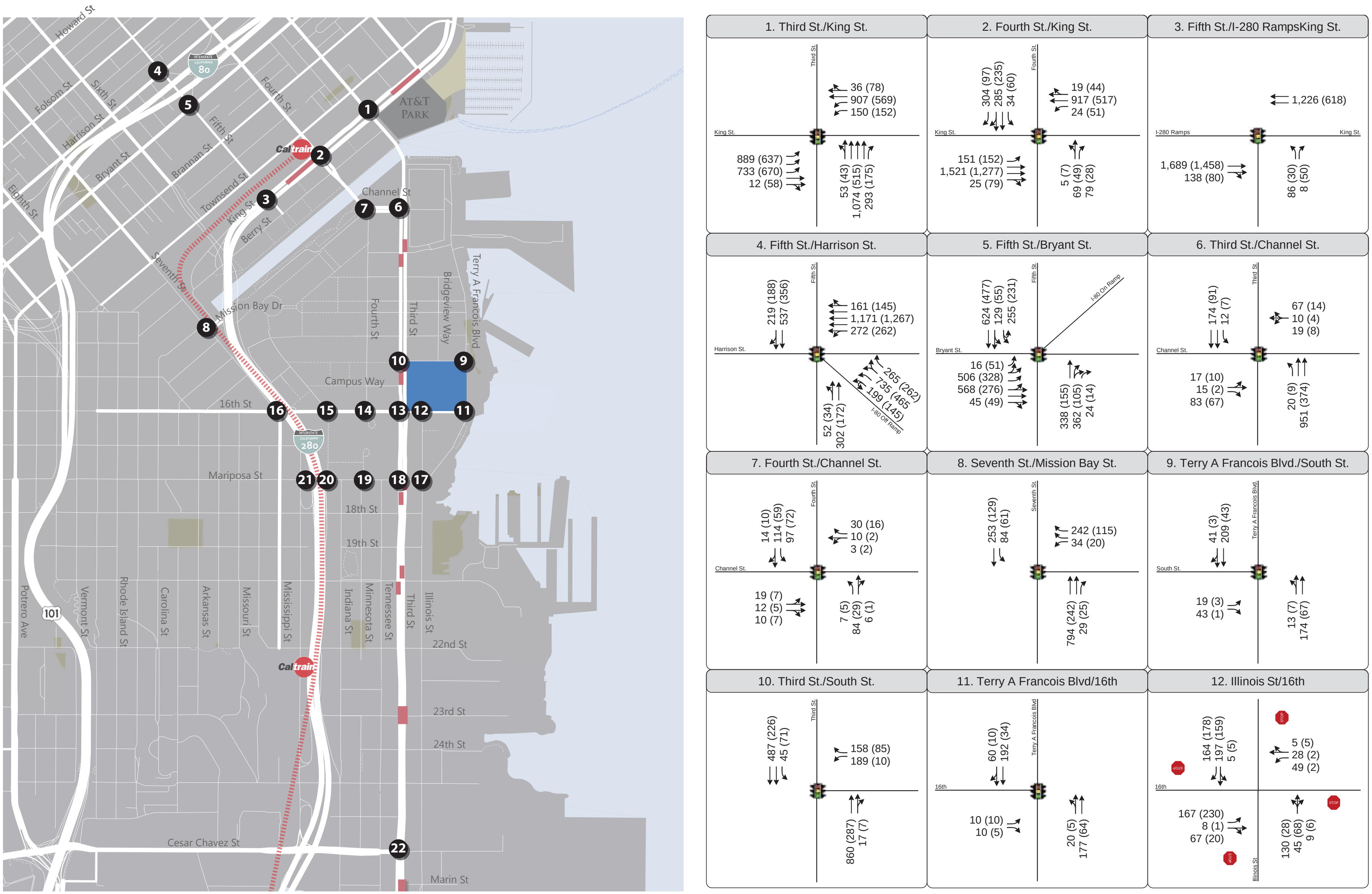


Figure 4b

Peak Hour Traffic Volumes and Lane Configurations
Existing (2015) Conditions - Saturday Evening

EXISTING 2015 PLUS PROJECT – NO EVENT
WEEKDAY PM PEAK / SATURDAY EVENING

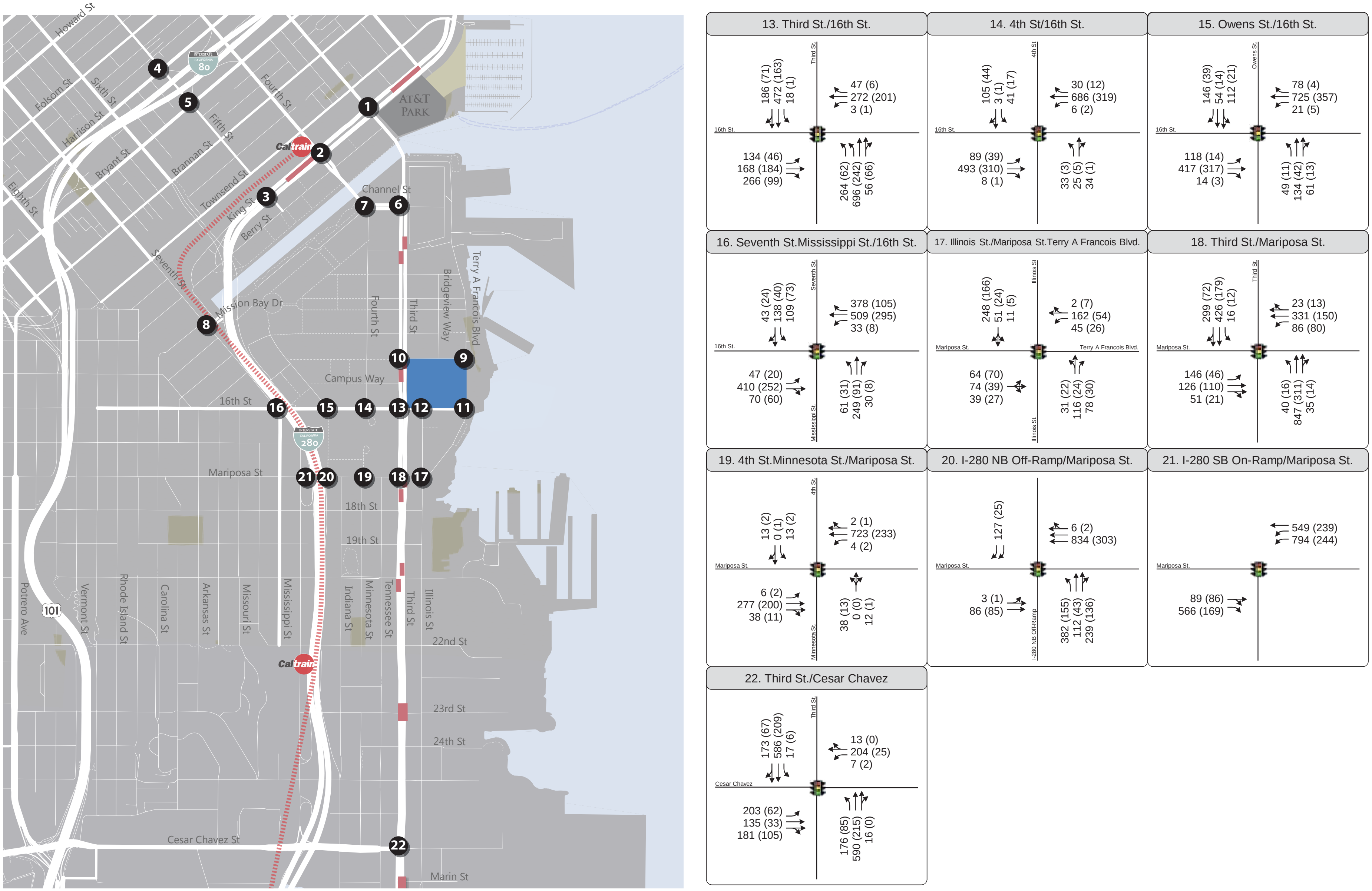


Study Intersection — Project Site — Muni Stop — Turn Lane

PM Peak (Saturday) — Peak Hour Traffic Volume — Traffic Signal — Stop Sign

Figure 5a

Peak Hour Traffic Volumes and Lane Configurations Existing Plus Project (2015) Conditions - No Event

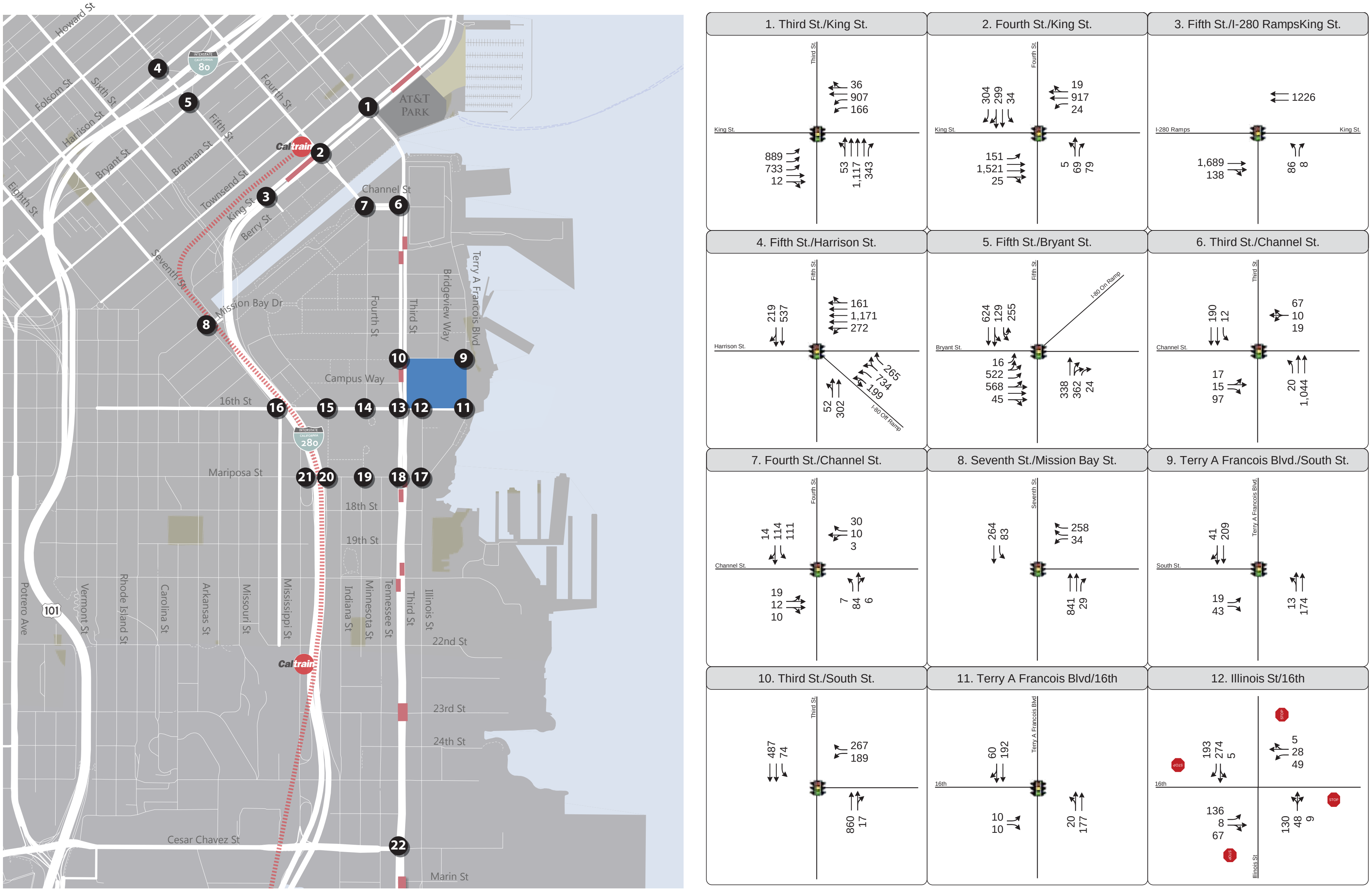


X Study Intersection | Project Site | Muni Stop | Turn Lane

PM Peak (Saturday) | Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 5b
Peak Hour Traffic Volumes and Lane Configurations
Existing Plus Project (2015) Conditions - No Event

EXISTING 2015 PLUS PROJECT – CONVENTION EVENT
WEEKDAY PM PEAK

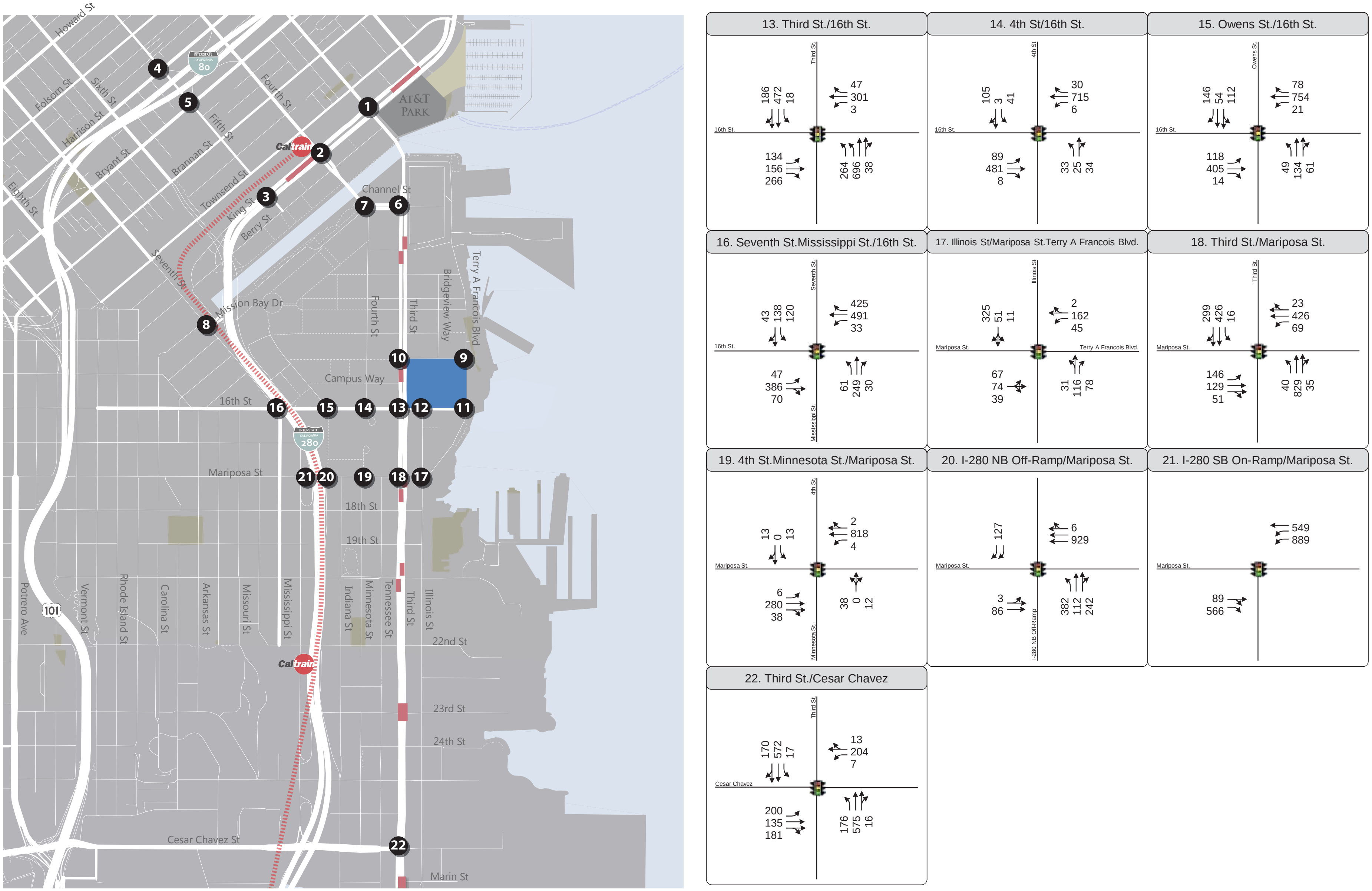


Study Intersection | Project Site | Muni Stop | Turn Lane | PM Peak | Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 6a

Peak Hour Traffic Volumes and Lane Configurations

Existing Plus Project (2015) Conditions - Weekday PM Peak with Convention



Study Intersection | Project Site | Muni Stop | Turn Lane | PM Peak | Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 6b

Peak Hour Traffic Volumes and Lane Configurations

Existing Plus Project (2015) Conditions - Weekday PM Peak with Convention

EXISTING 2015 PLUS PROJECT – BASKETBALL GAME
WEEKDAY PM PEAK

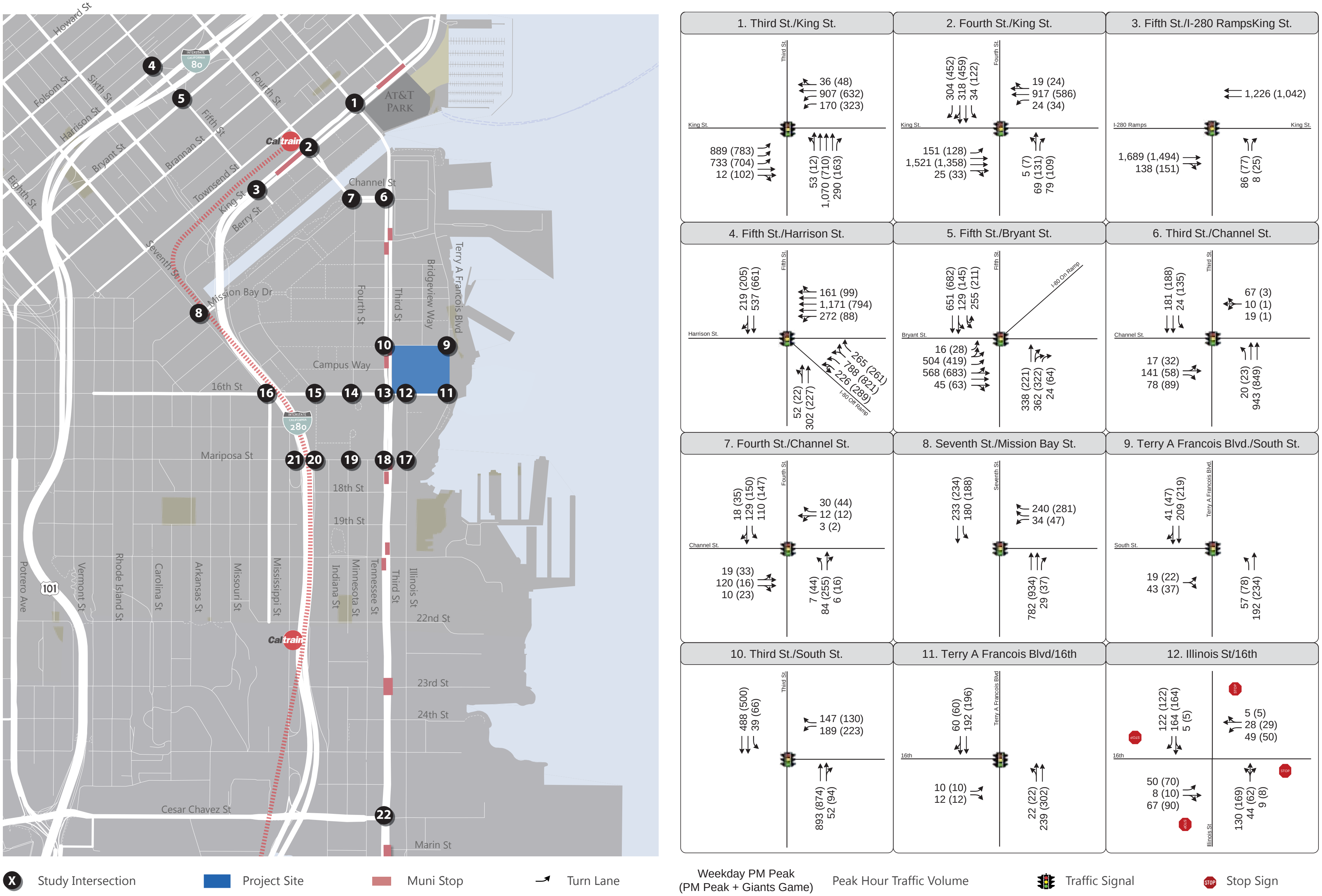
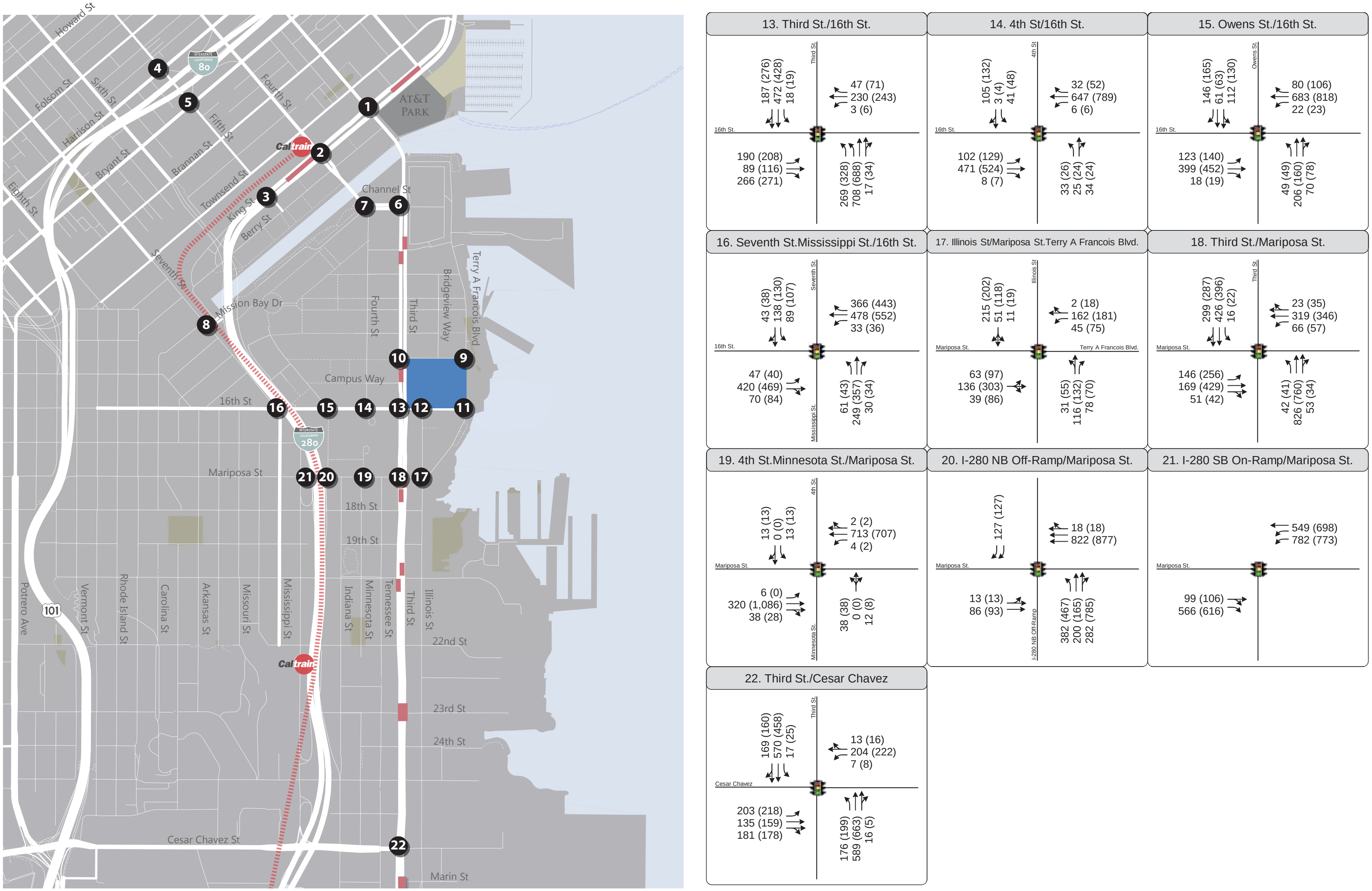


Figure 7a

Peak Hour Traffic Volumes and Lane Configurations
Existing Plus Project (2015) Conditions - with Basketball Game



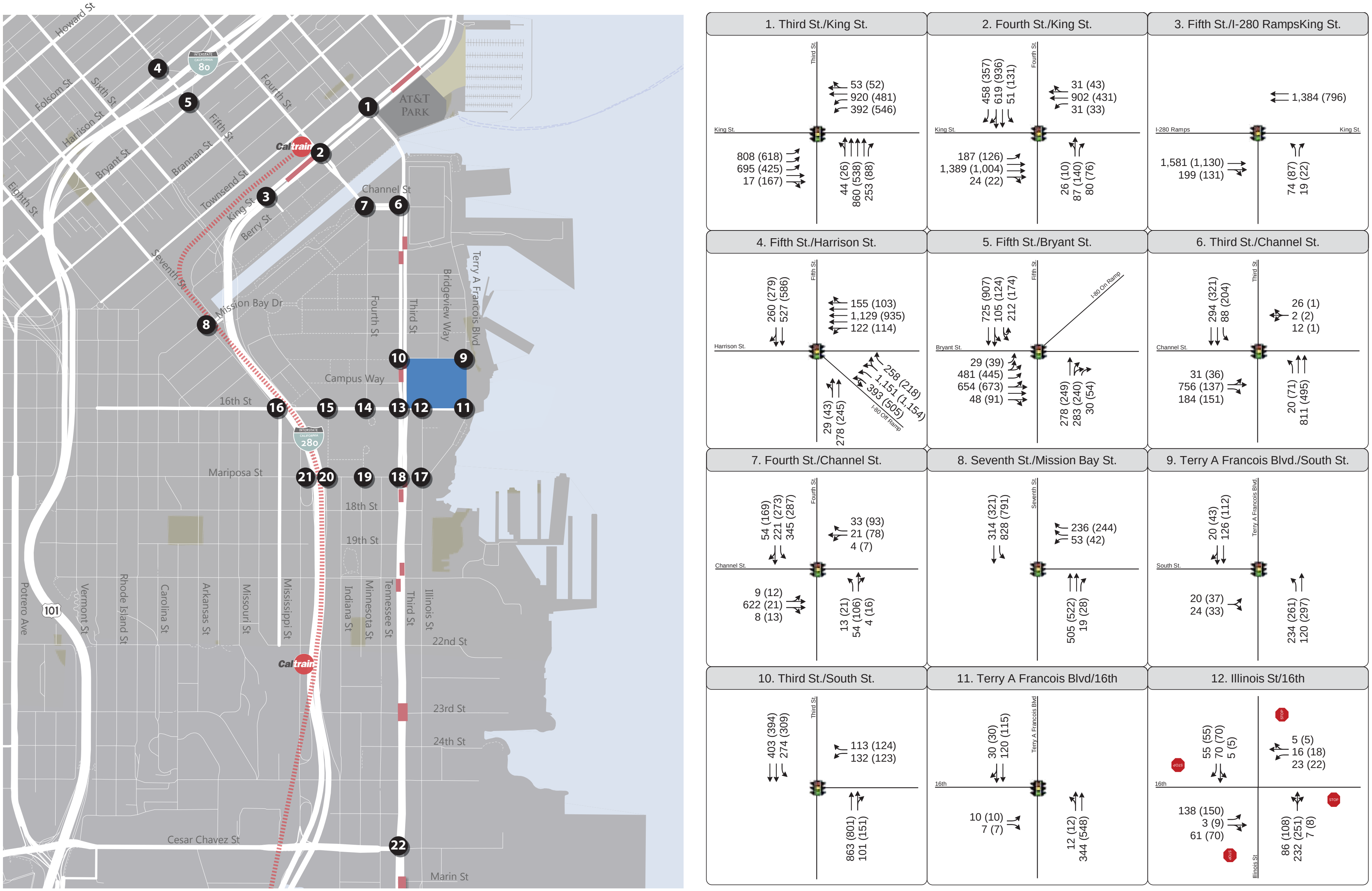
Study Intersection | Project Site | Muni Stop | Turn Lane

Weekday PM Peak (PM Peak + Giants Game) | Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 7b

Peak Hour Traffic Volumes and Lane Configurations
Existing Plus Project (2015) Conditions - with Basketball Game

EXISTING 2015 PLUS PROJECT – BASKETBALL GAME WEEKDAY EVENING

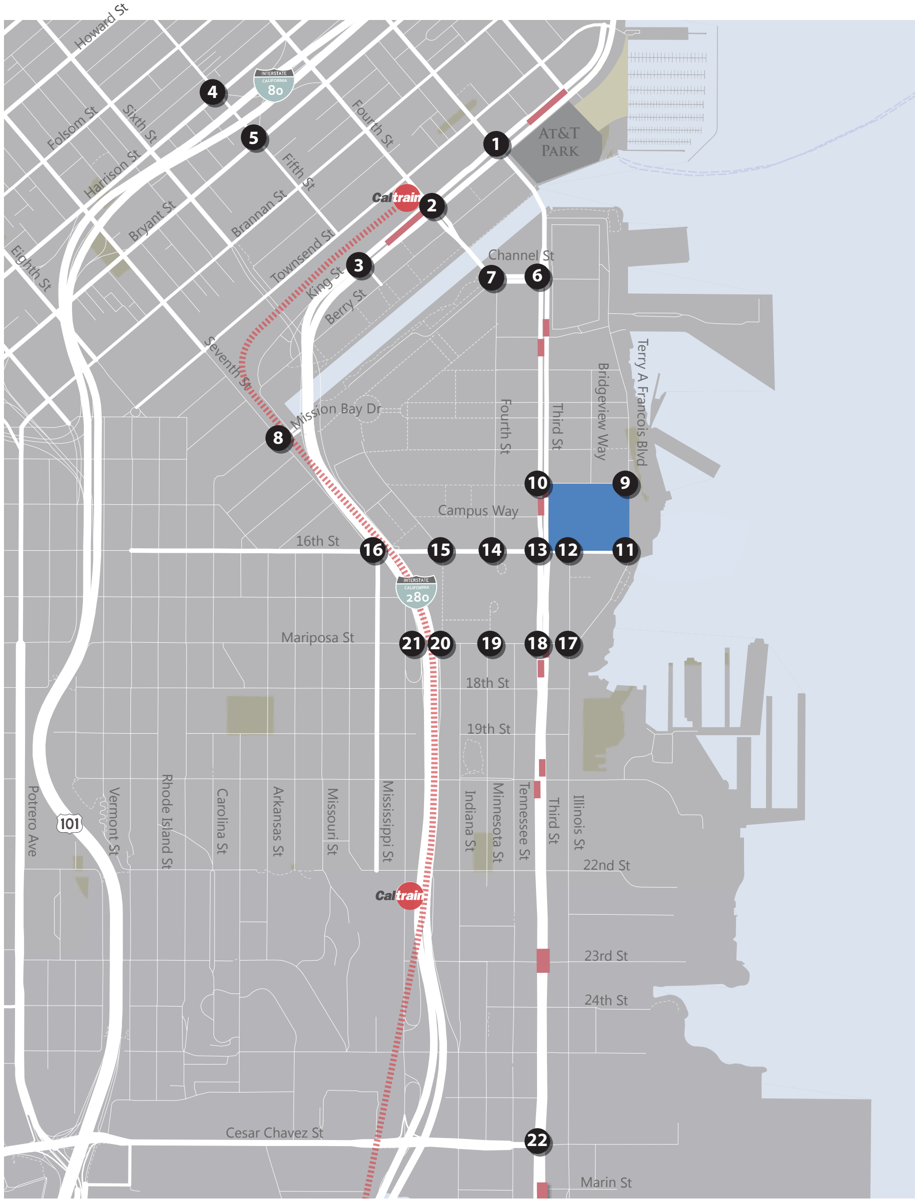


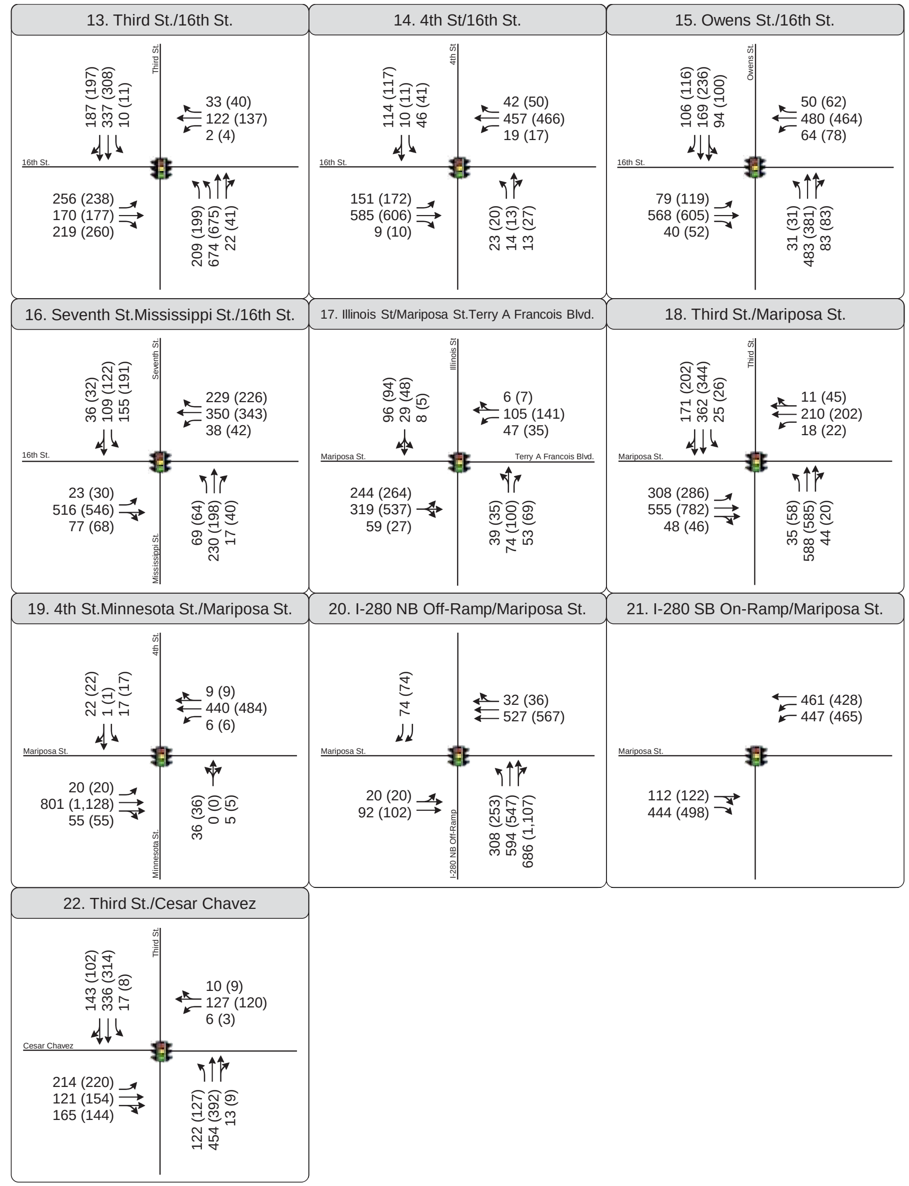
Study Intersection | Project Site | Muni Stop | Turn Lane

Weekday Evening (Weekday Evening + Giants Game) Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 8a

Peak Hour Traffic Volumes and Lane Configurations
Existing Plus Project (2015) Conditions - with Basketball Game



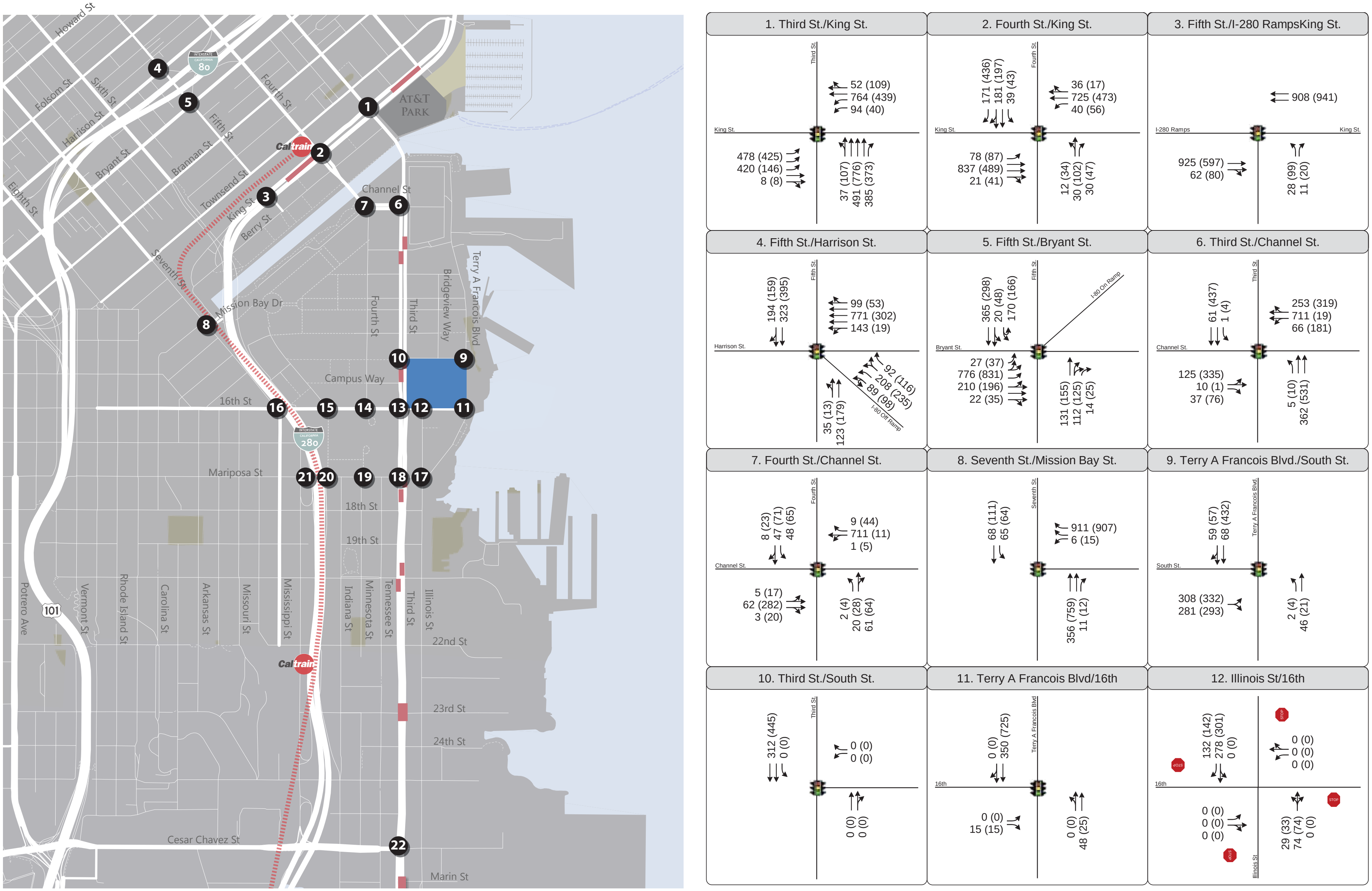


X Study Intersection | Project Site | Muni Stop | Turn Lane | Weekday Evening (Weekday Evening + Giants Game) Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 8b

Peak Hour Traffic Volumes and Lane Configurations
Existing Plus Project (2015) Conditions - with Basketball Game

EXISTING 2015 PLUS PROJECT – BASKETBALL GAME
WEEKDAY LATE EVENING



Study Intersection | Project Site | Muni Stop | Turn Lane

Weekday Late Evening (Weekday Late Evening + Giants Game) | Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 9a

Peak Hour Traffic Volumes and Lane Configurations
Existing Plus Project (2015) Conditions - with Basketball Game

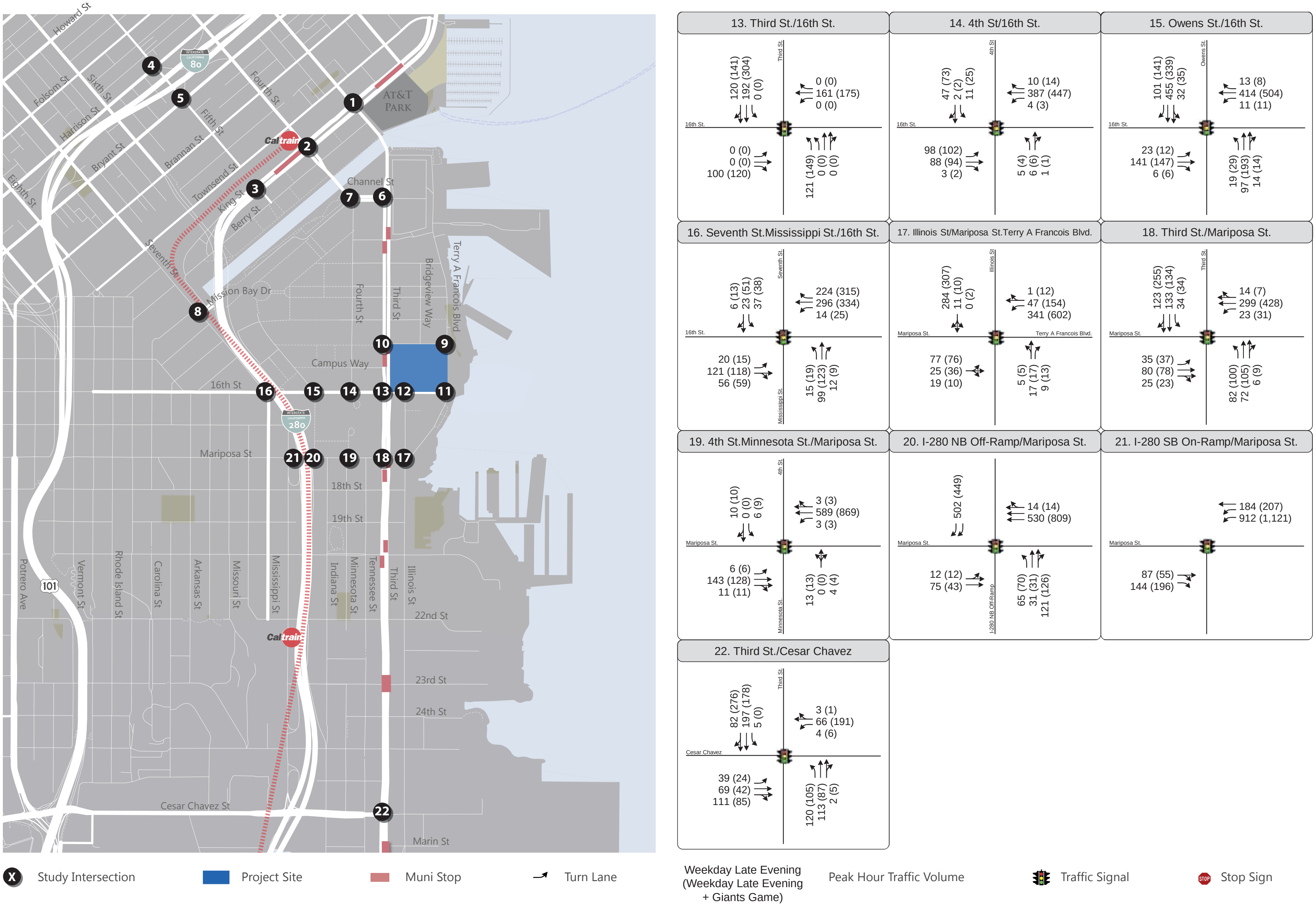
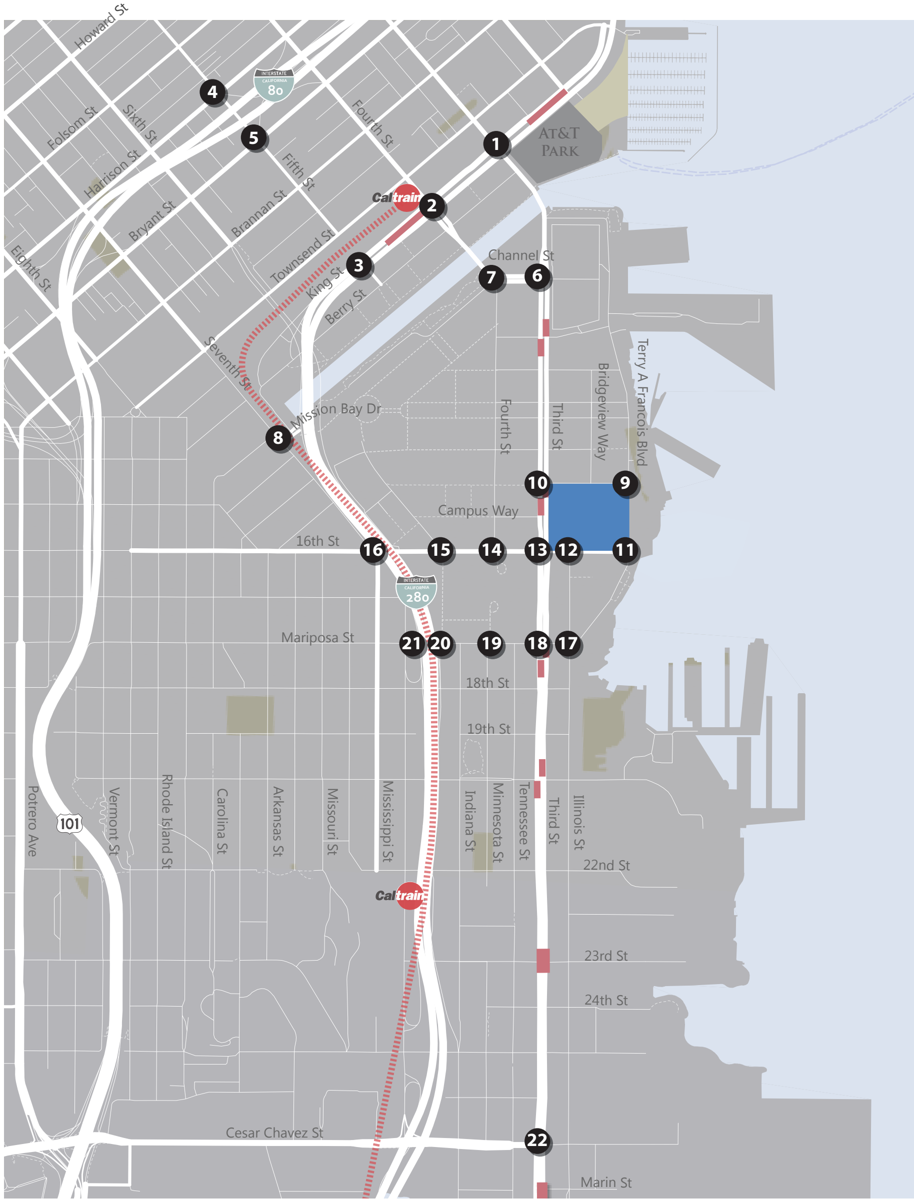


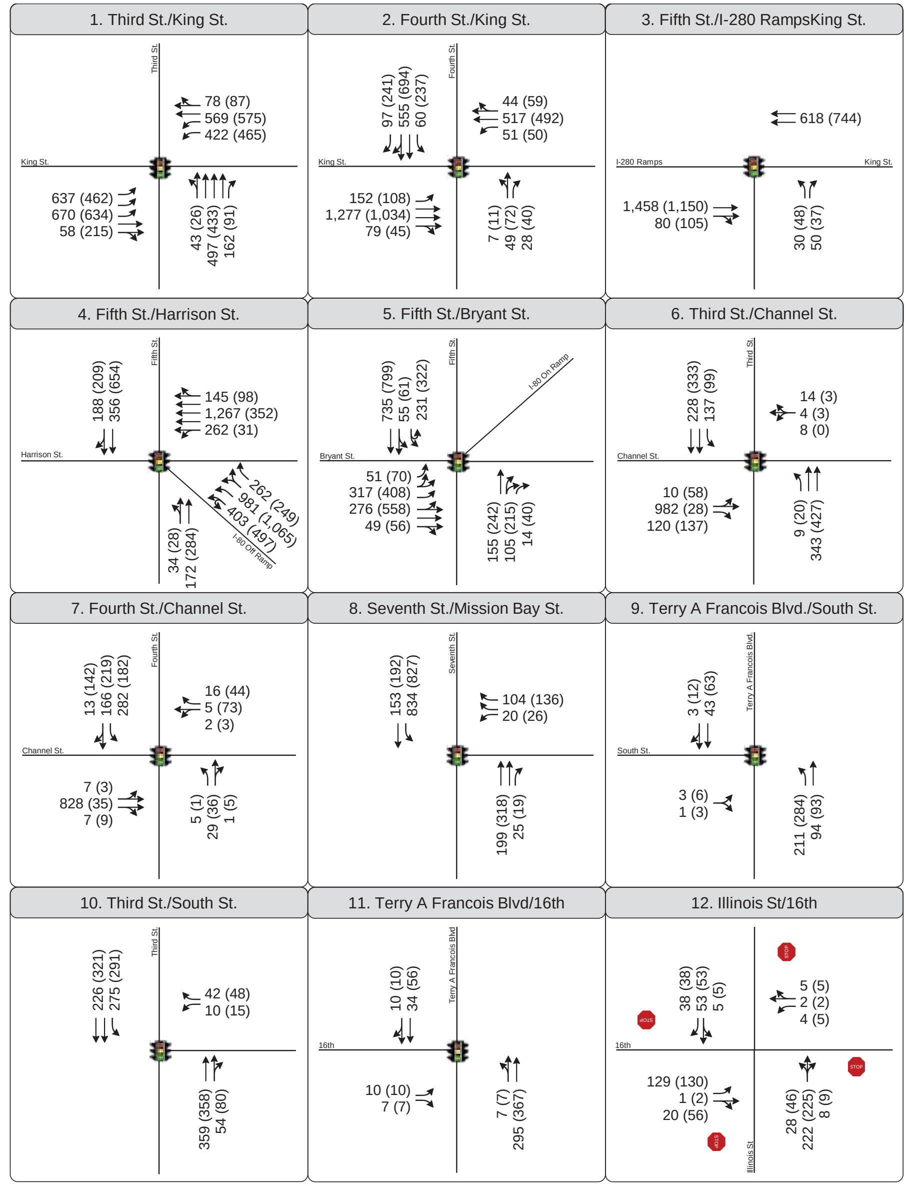
Figure 9b

Peak Hour Traffic Volumes and Lane Configurations

Existing Plus Project (2015) Conditions - with Basketball Game

EXISTING 2015 PLUS PROJECT – BASKETBALL GAME
SATURDAY EVENING



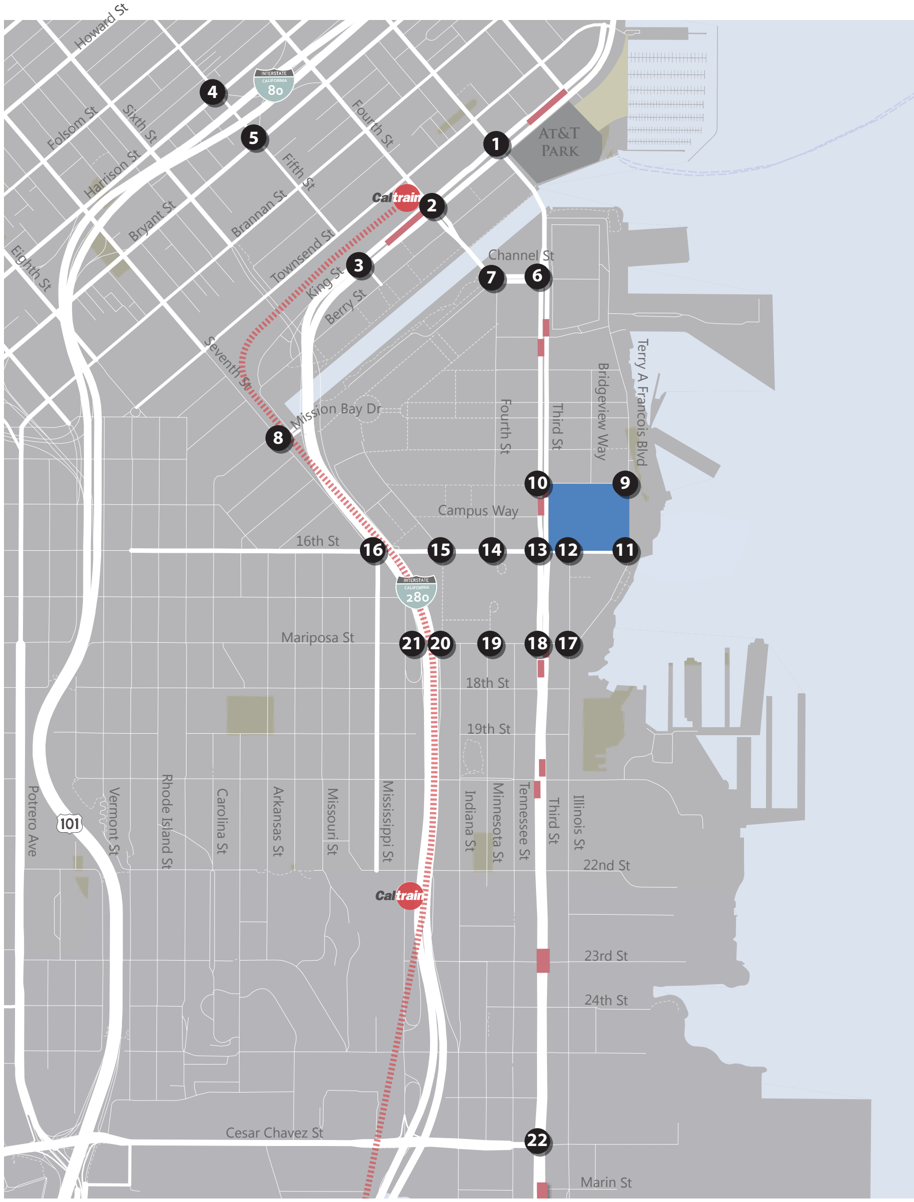


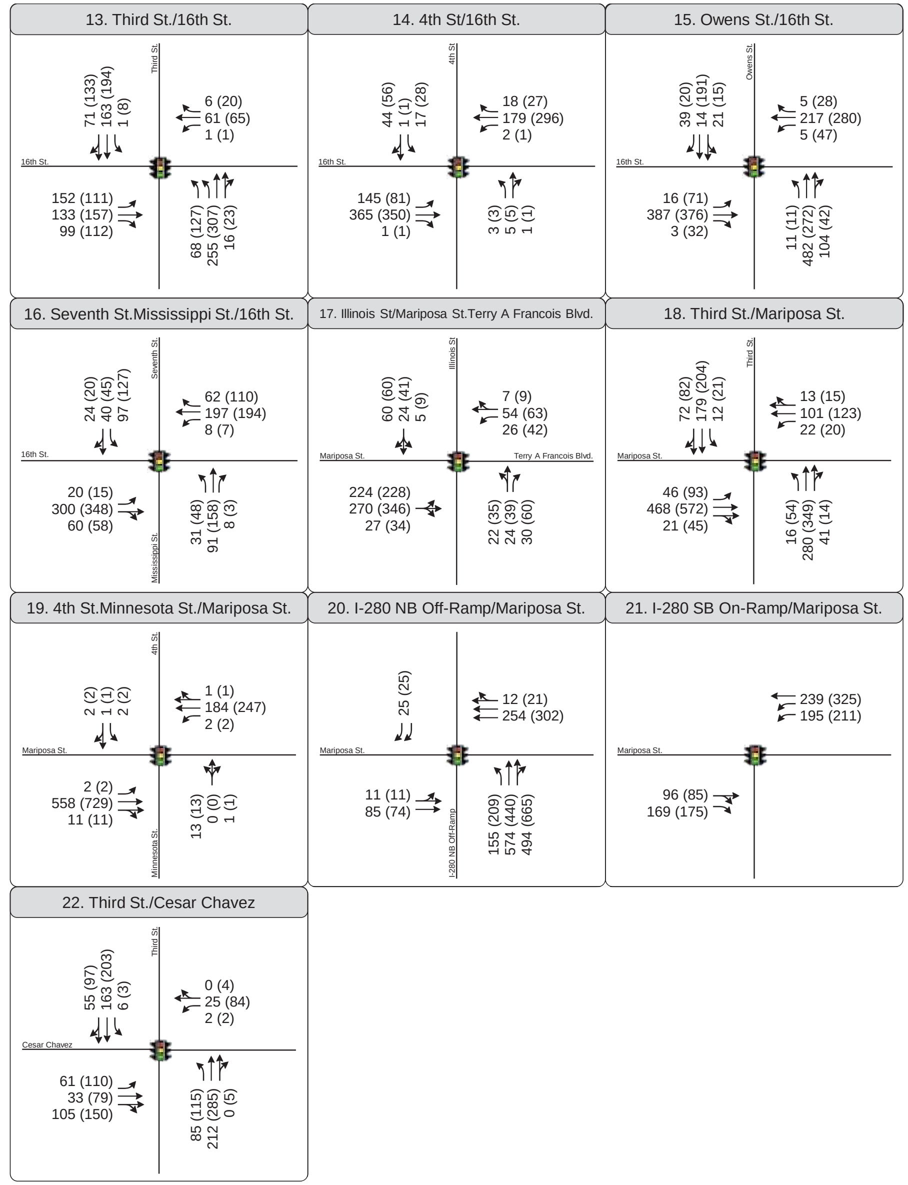
X Study Intersection | Project Site | Muni Stop | Turn Lane

Saturday Evening (Saturday Evening + Giants Game) | Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 10a

Peak Hour Traffic Volumes and Lane Configurations
Existing Plus Project (2015) Conditions - with Basketball Game





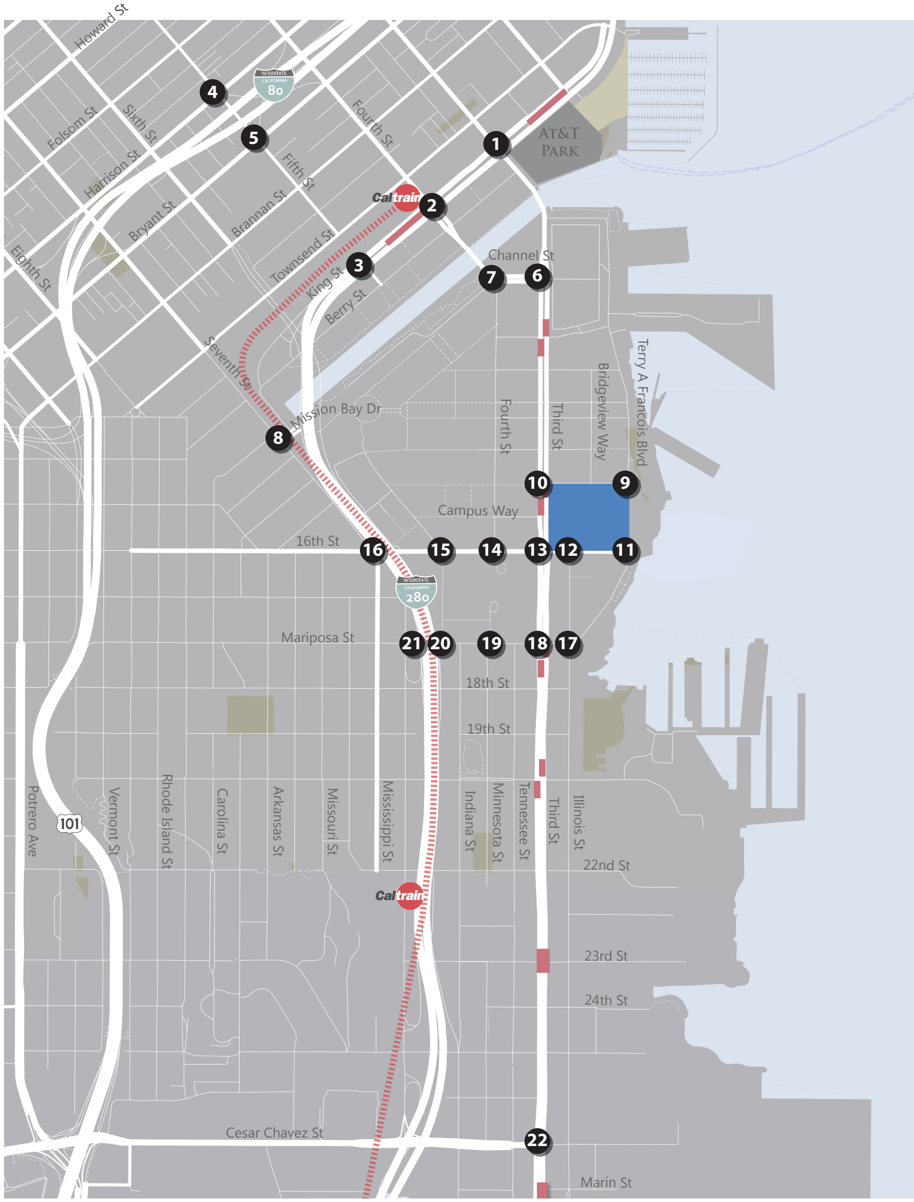
X Study Intersection | Project Site | Muni Stop | Turn Lane

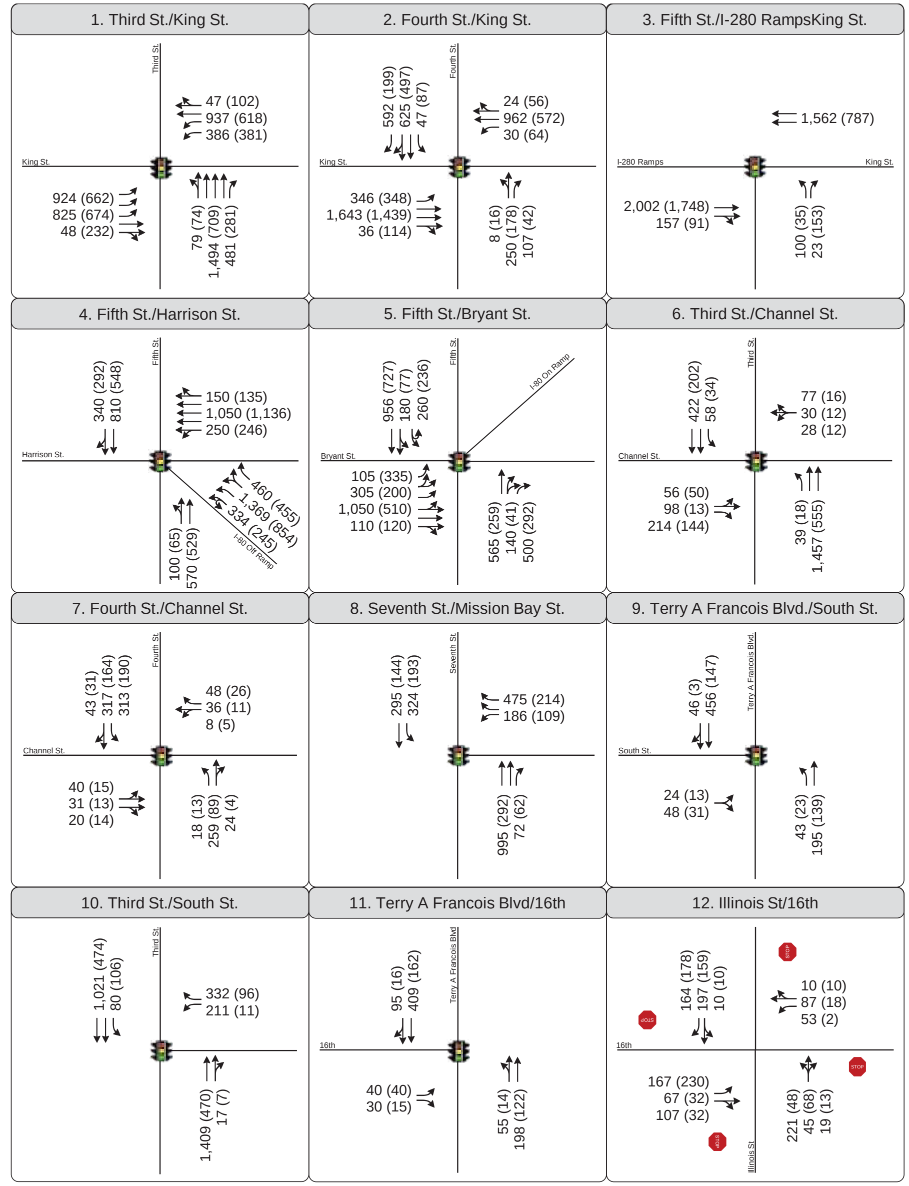
Saturday Evening (Saturday Evening + Giants Game) Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 10b

Peak Hour Traffic Volumes and Lane Configurations
Existing Plus Project (2015) Conditions - with Basketball Game

2040 Cumulative with Project – No Event
Weekday PM Peak / Saturday Evening





Study Intersection | Project Site | Muni Stop | Turn Lane

PM Peak (Saturday Peak) | Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 13a

Peak Hour Traffic Volumes and Lane Configurations
Cumulative Plus Project (2040) Conditions - No Event

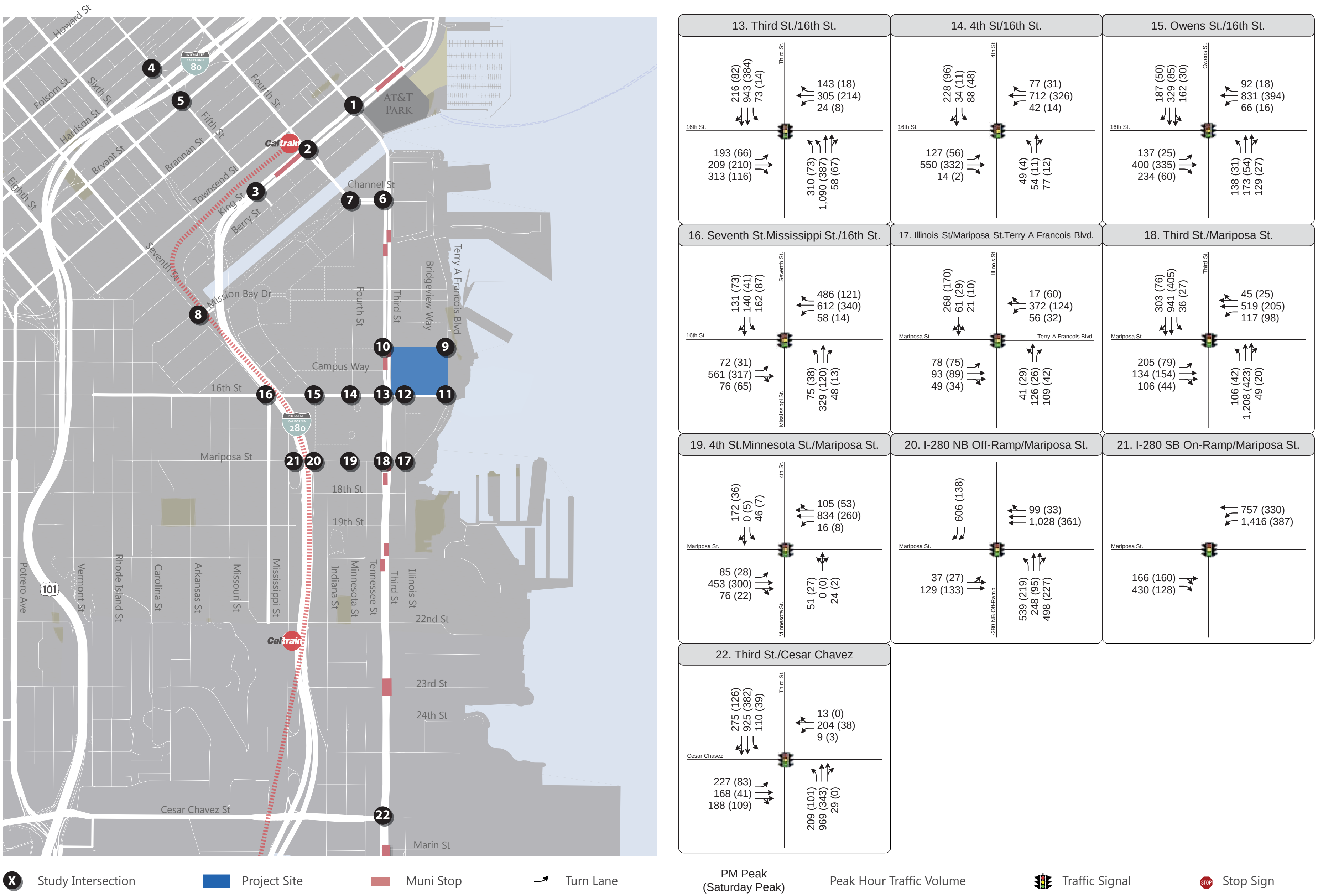
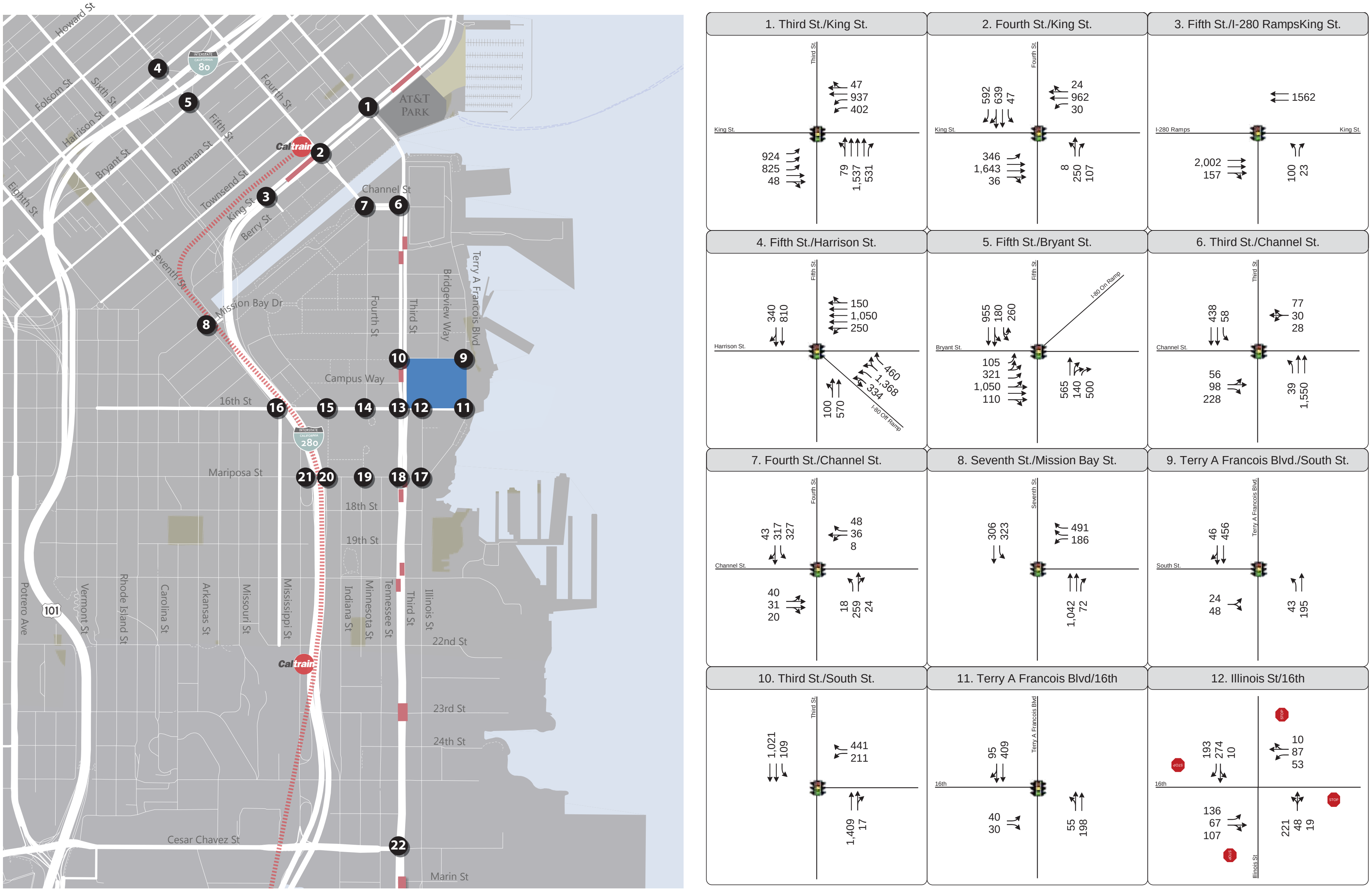


Figure 13b

Peak Hour Traffic Volumes and Lane Configurations
Cumulative Plus Project (2040) Conditions - No Event

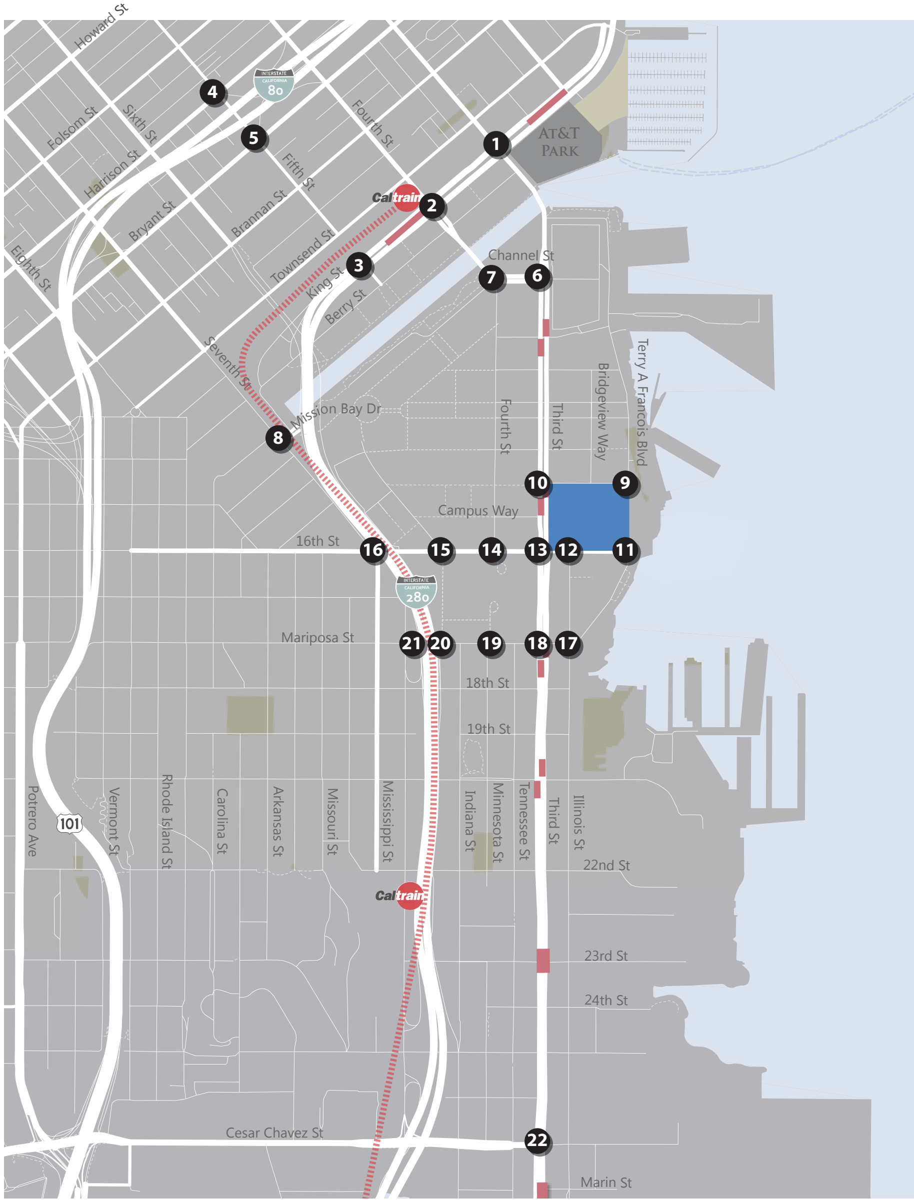
2040 Cumulative with Project - Convention Event
Weekday PM Peak

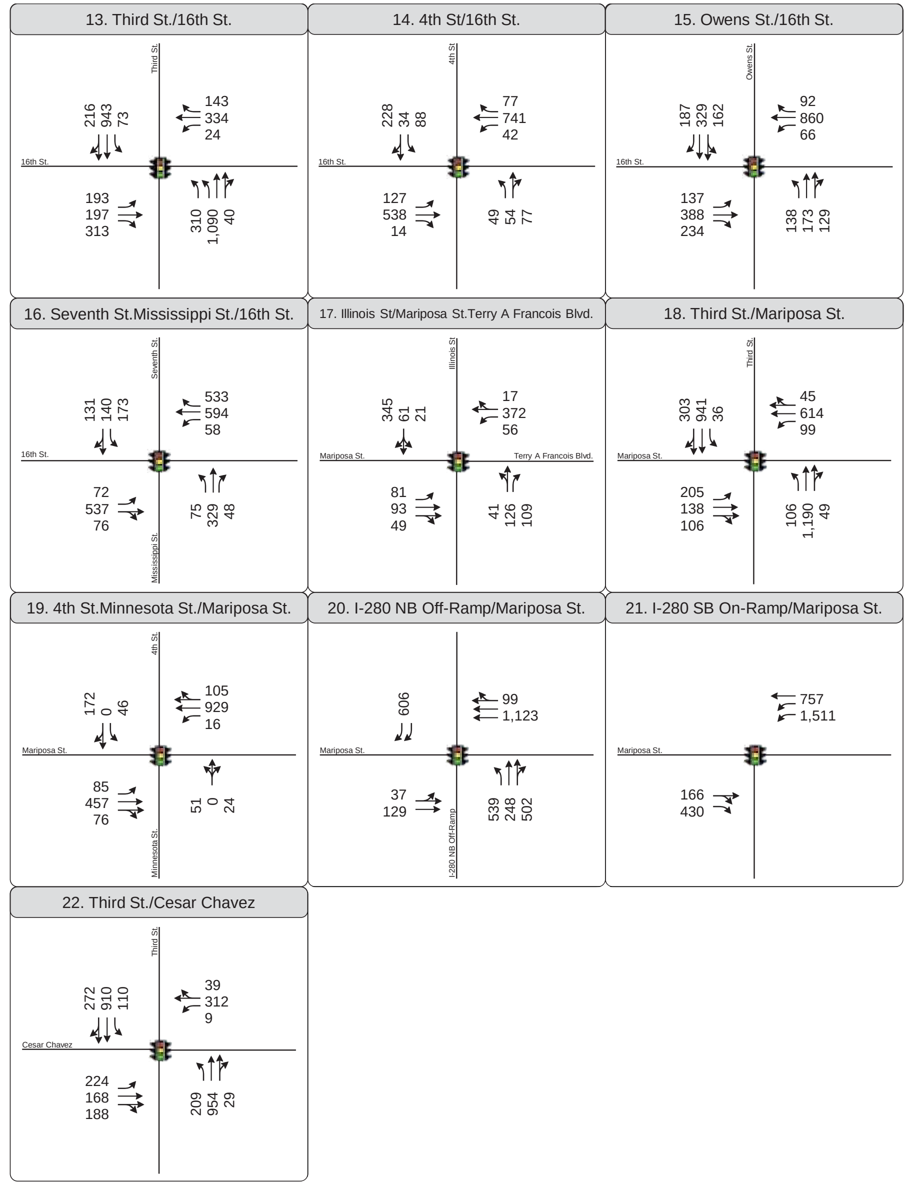


Study Intersection | Project Site | Muni Stop | Turn Lane | PM Peak | Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 14a

Peak Hour Traffic Volumes and Lane Configurations
Cumulative Plus Project (2040) Conditions - with Convention



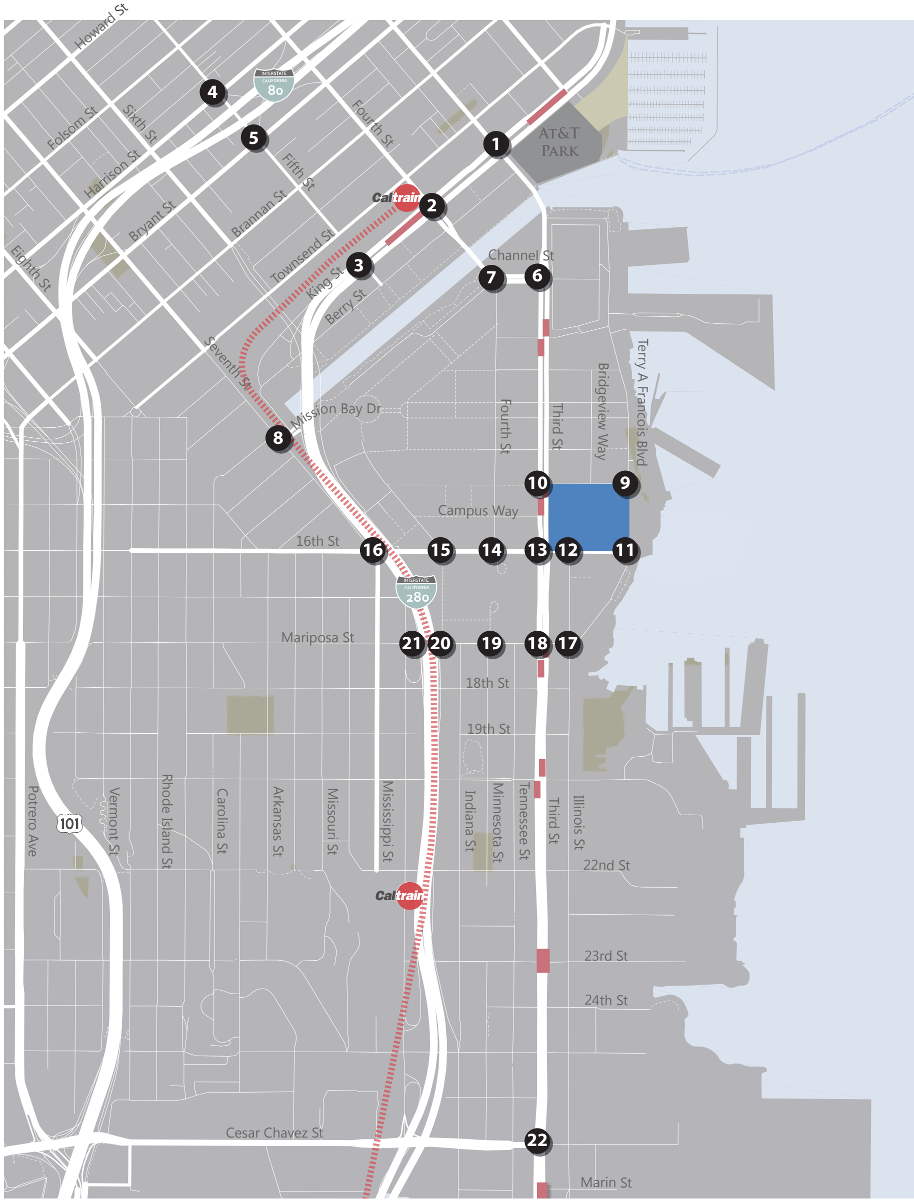


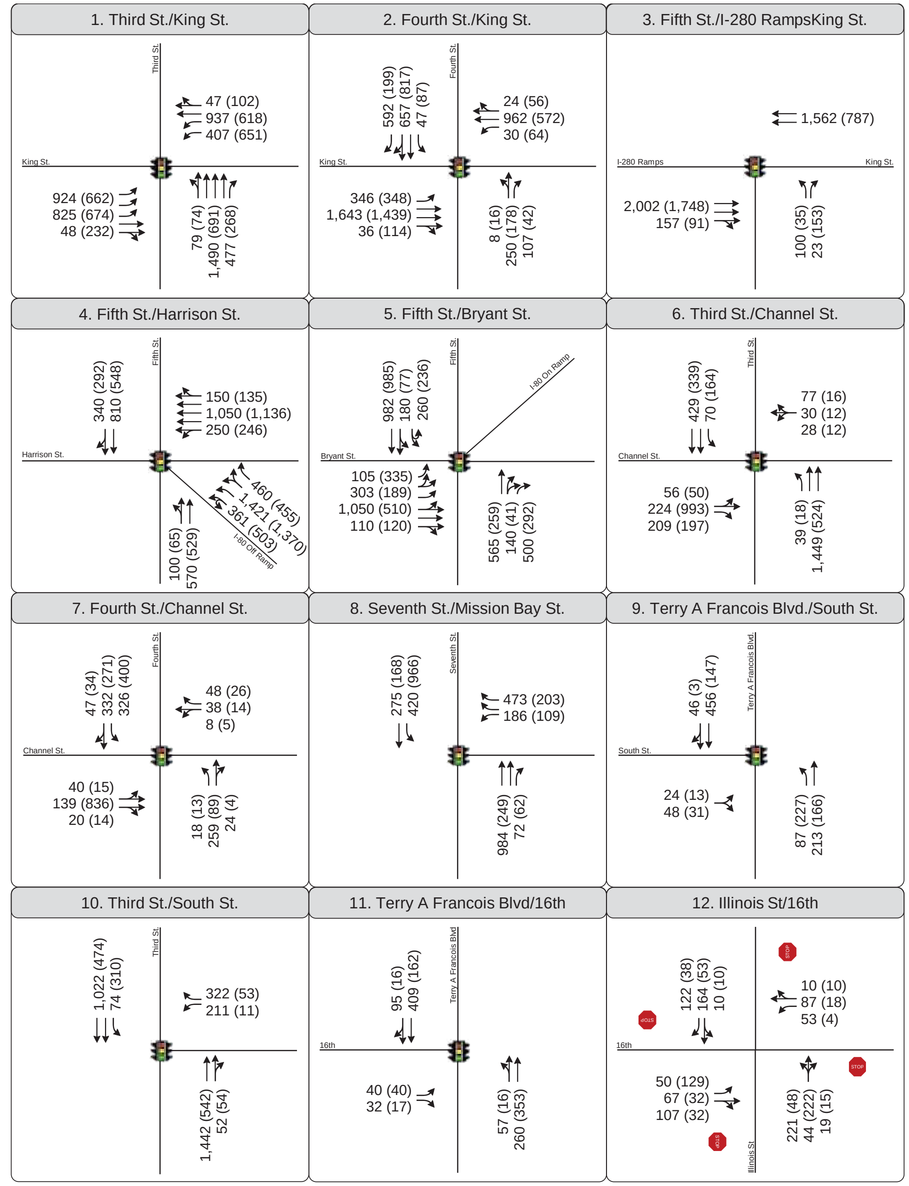
X Study Intersection | Project Site | Muni Stop | Turn Lane | PM Peak | Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 14b

Peak Hour Traffic Volumes and Lane Configurations
Cumulative Plus Project (2040) Conditions - with Convention

2040 Cumulative with Project – Basketball Game
Weekday PM Peak / Saturday Evening

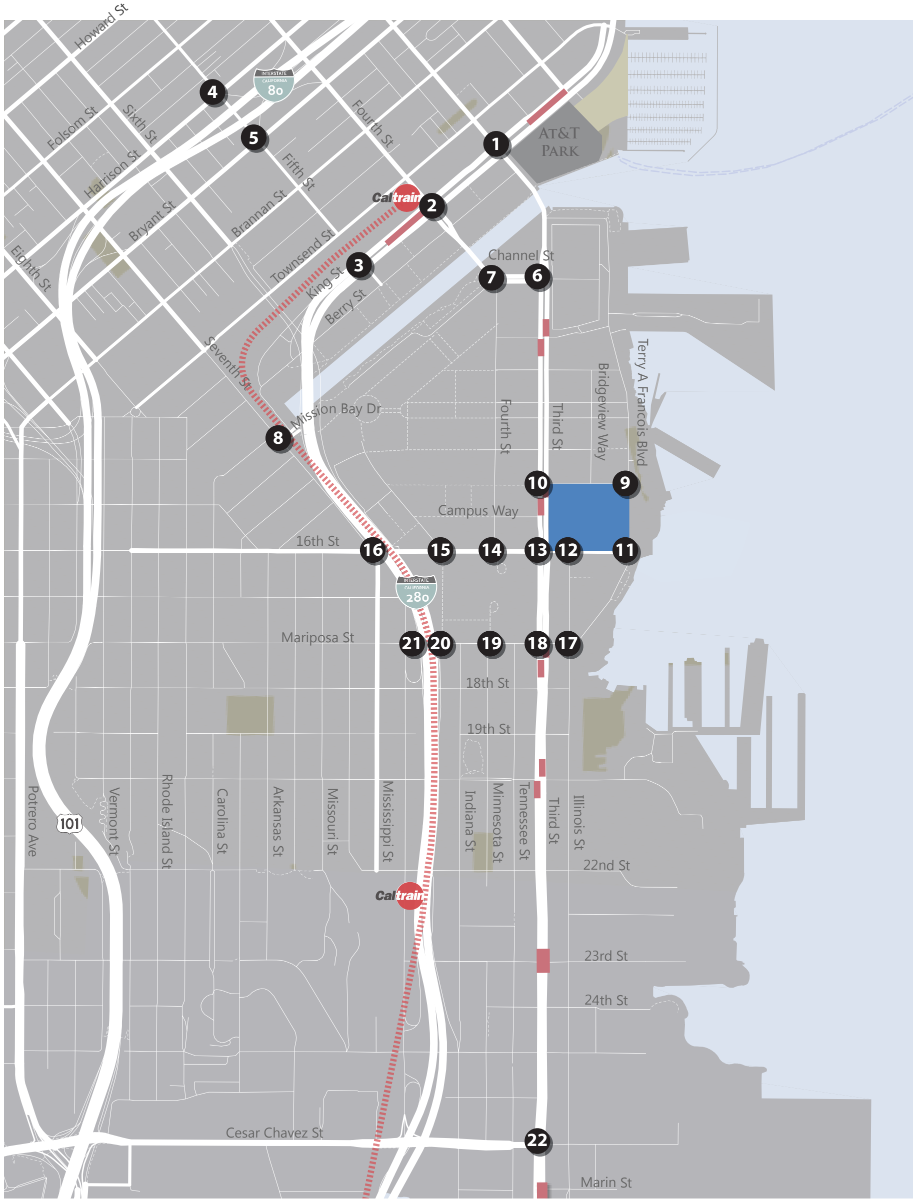


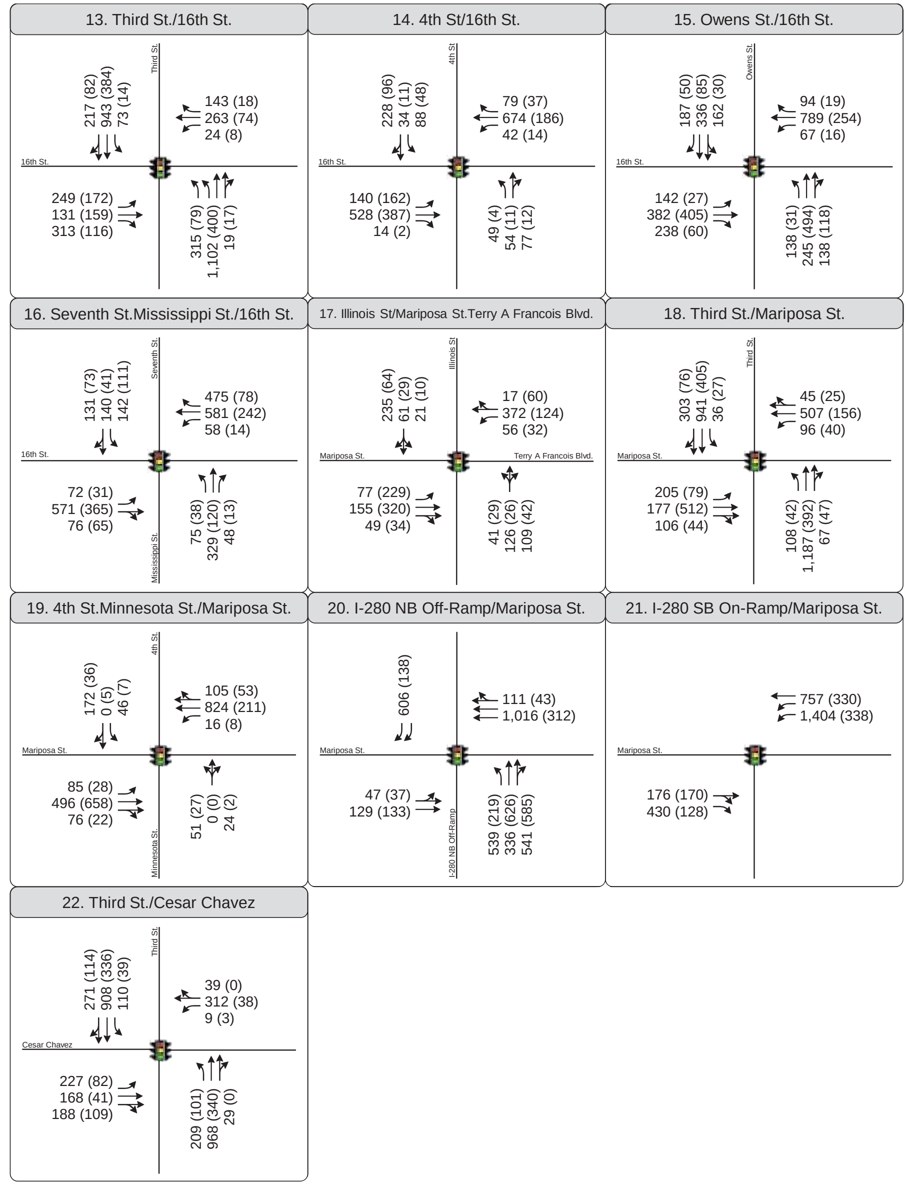


Study Intersection | Project Site | Muni Stop | Turn Lane | PM Peak (Saturday Peak) | Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 15a

Peak Hour Traffic Volumes and Lane Configurations
Cumulative Plus Project (2040) Conditions - with Basketball Game





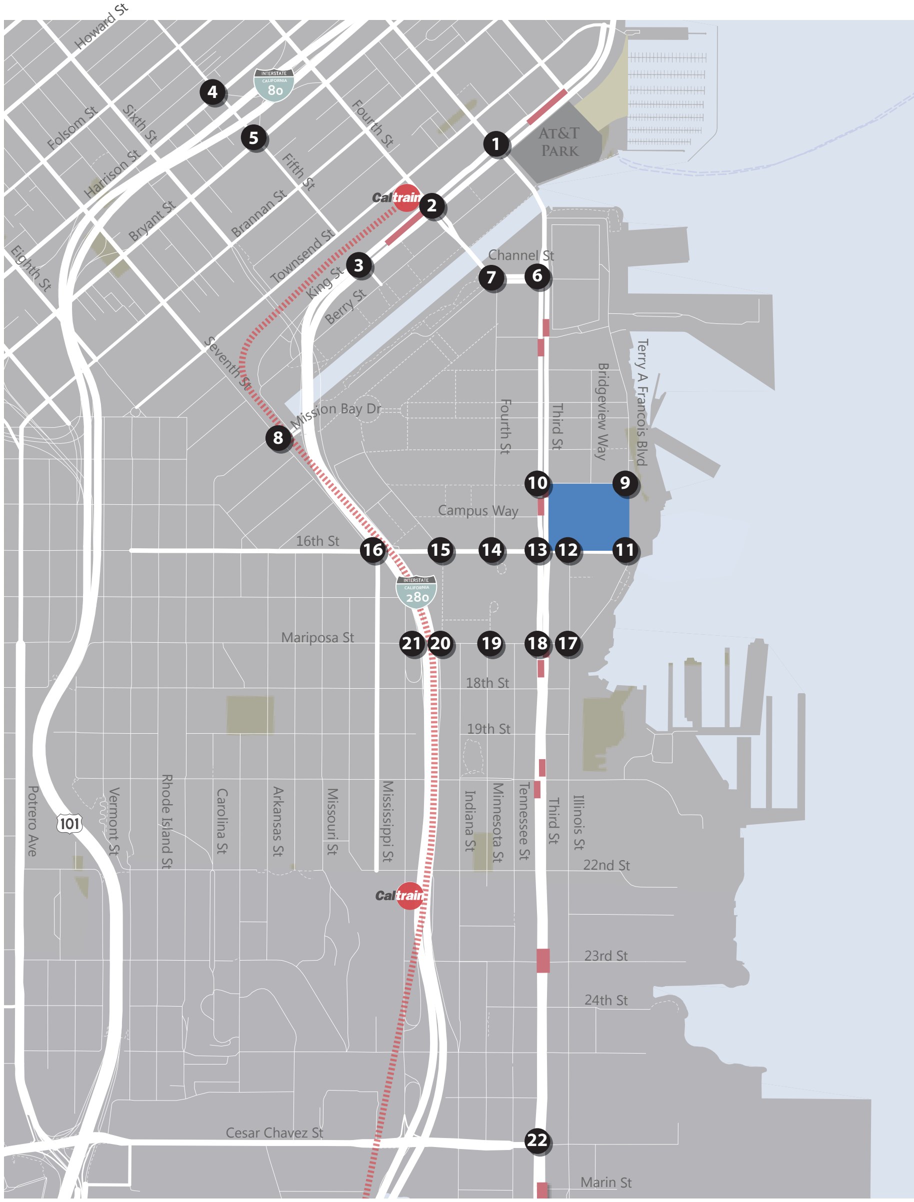
Study Intersection · Project Site · Muni Stop · Turn Lane

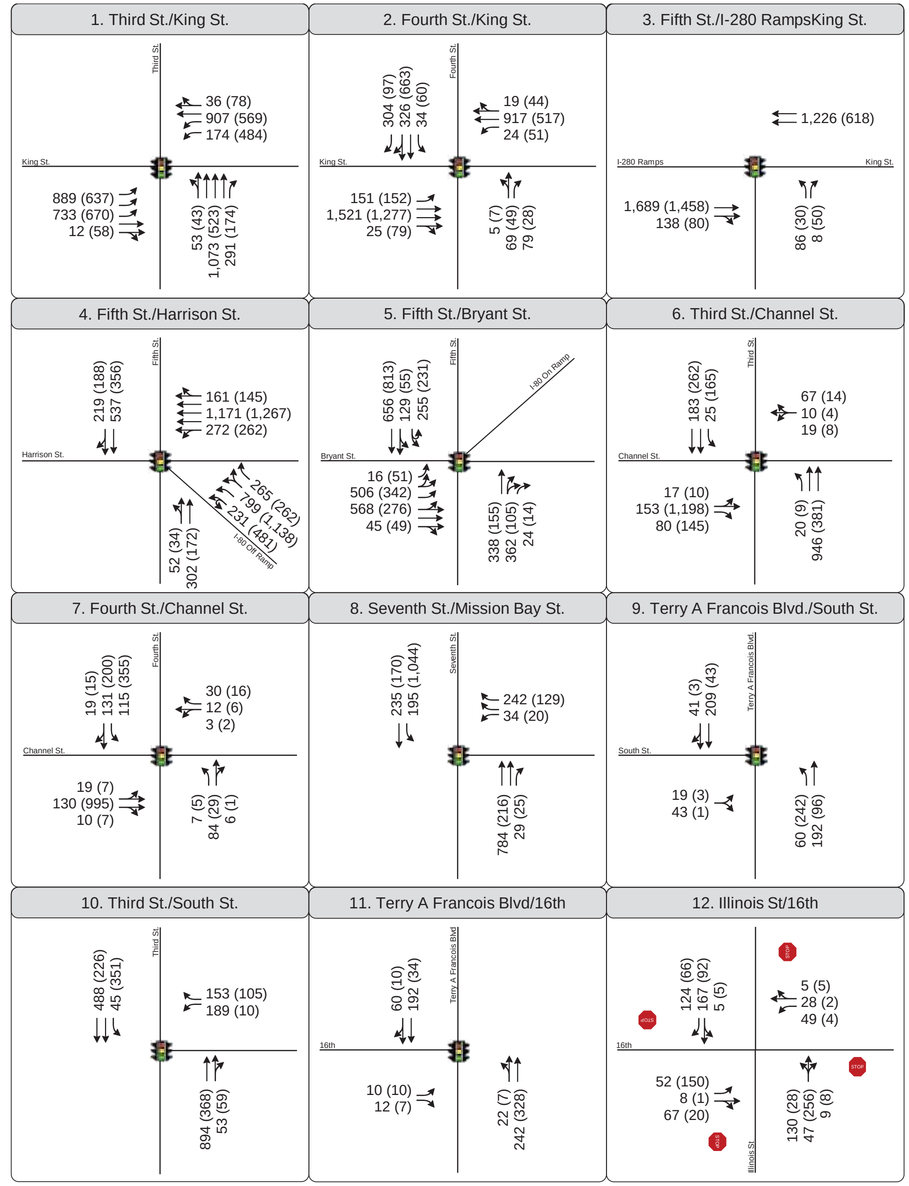
PM Peak (Saturday Peak) · Peak Hour Traffic Volume · Traffic Signal · Stop Sign

Figure 15b

Peak Hour Traffic Volumes and Lane Configurations
Cumulative Plus Project (2040) Conditions - with Basketball Game

EXISTING 2015 PLUS PROJECT – BASKETBALL GAME
NO TSP - WEEKDAY PM PEAK / SATURDAY EVENING



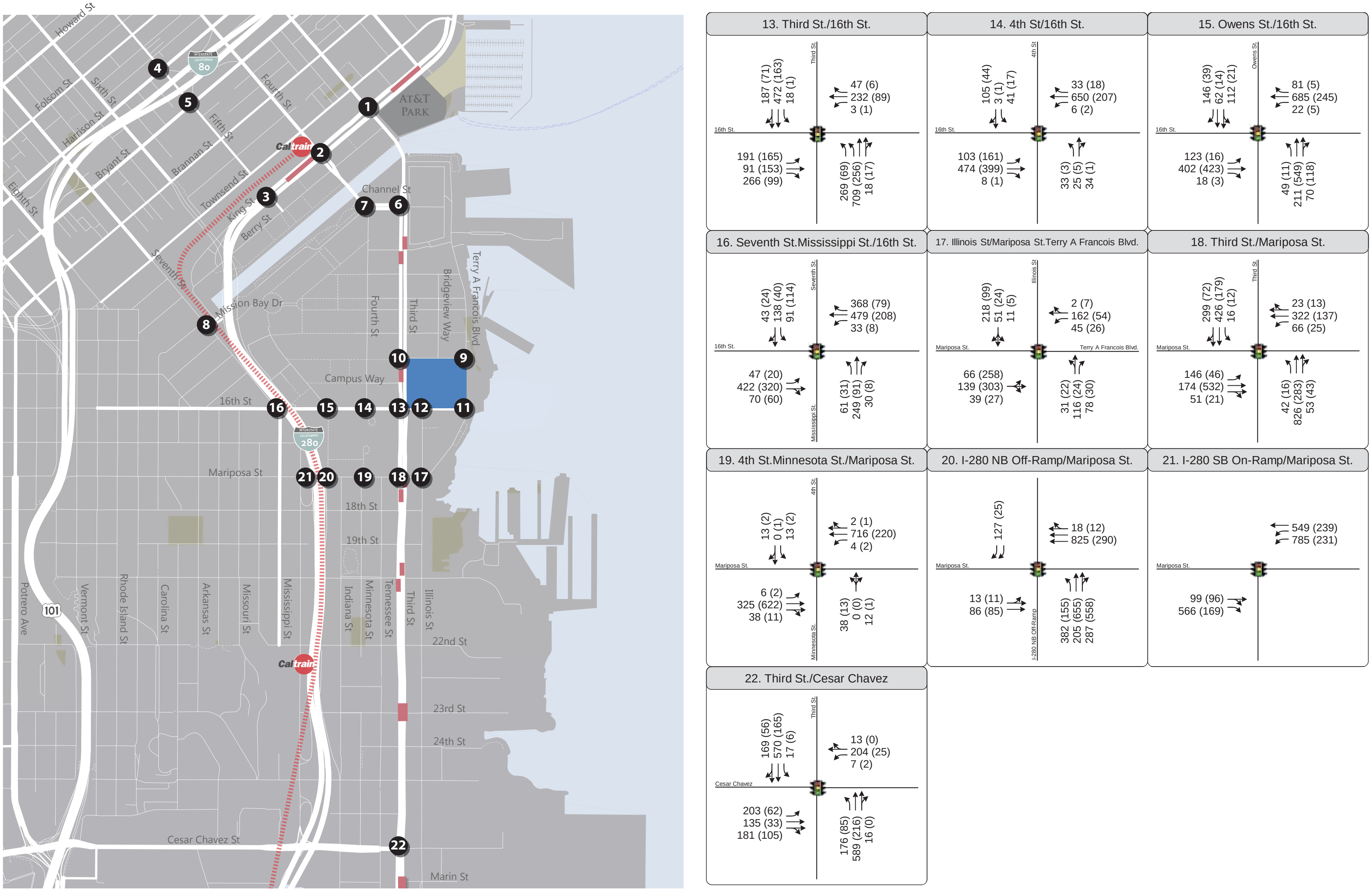


Study Intersection | Project Site | Muni Stop | Turn Lane

Weekday PM Peak (Saturday Evening) | Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 11a

Peak Hour Traffic Volumes and Lane Configurations
Existing Plus Project (2015) Conditions - with Basketball Game, No TSP



Study Intersection | Project Site | Muni Stop | Turn Lane

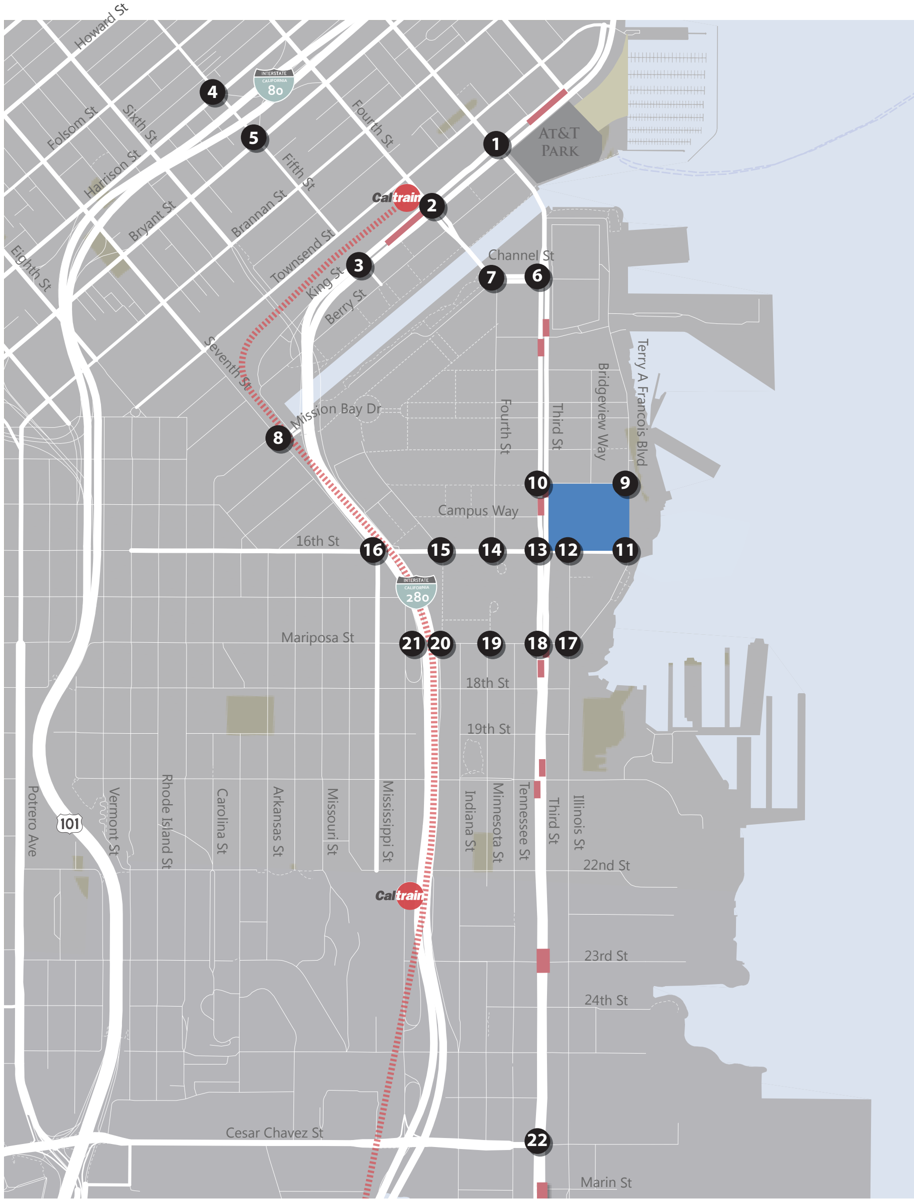
Weekday PM Peak (Saturday Evening) | Peak Hour Traffic Volume | Traffic Signal | Stop Sign

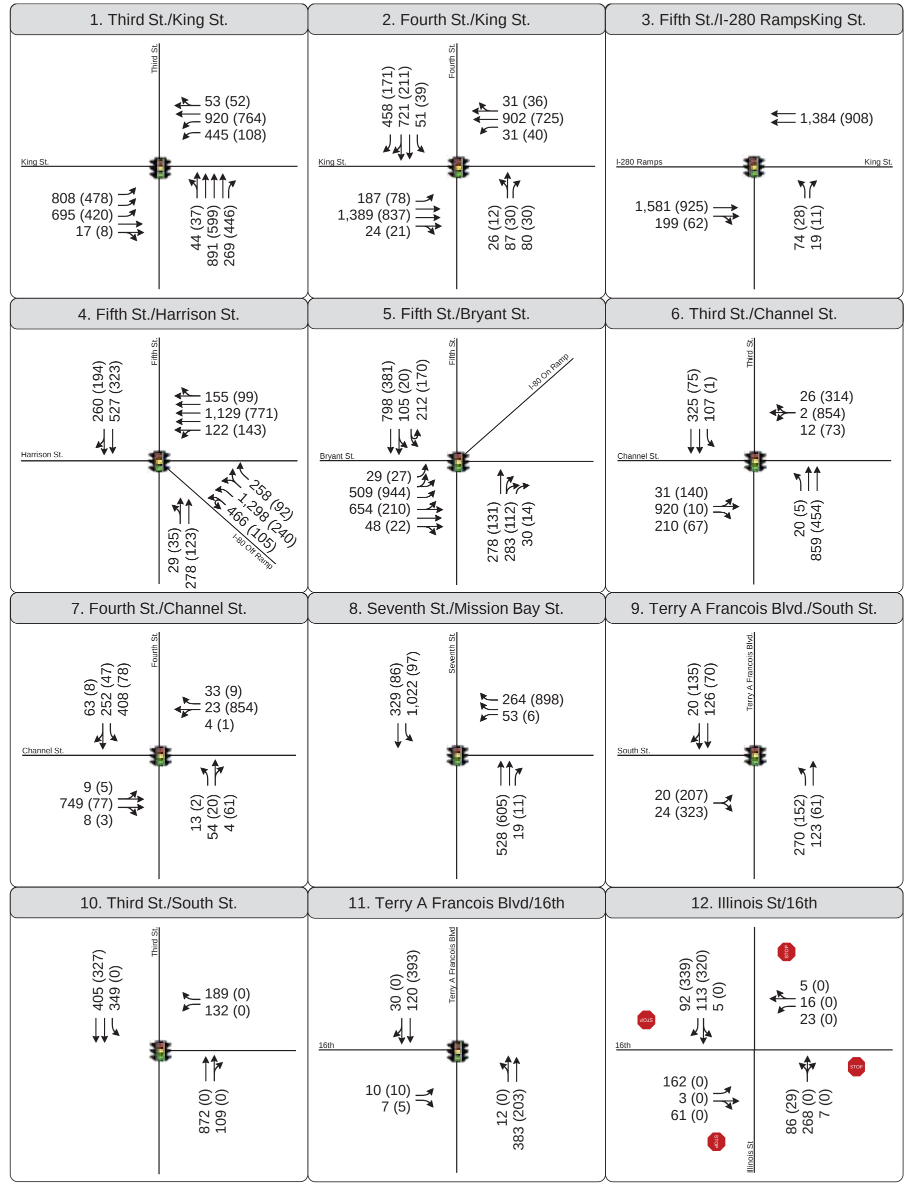
Figure 11b

Peak Hour Traffic Volumes and Lane Configurations

Existing Plus Project (2015) Conditions - with Basketball Game, No TSP

EXISTING 2015 PLUS PROJECT – BASKETBALL GAME
NO TSP - WEEKDAY EVENING / WEEKDAY LATE EVENING





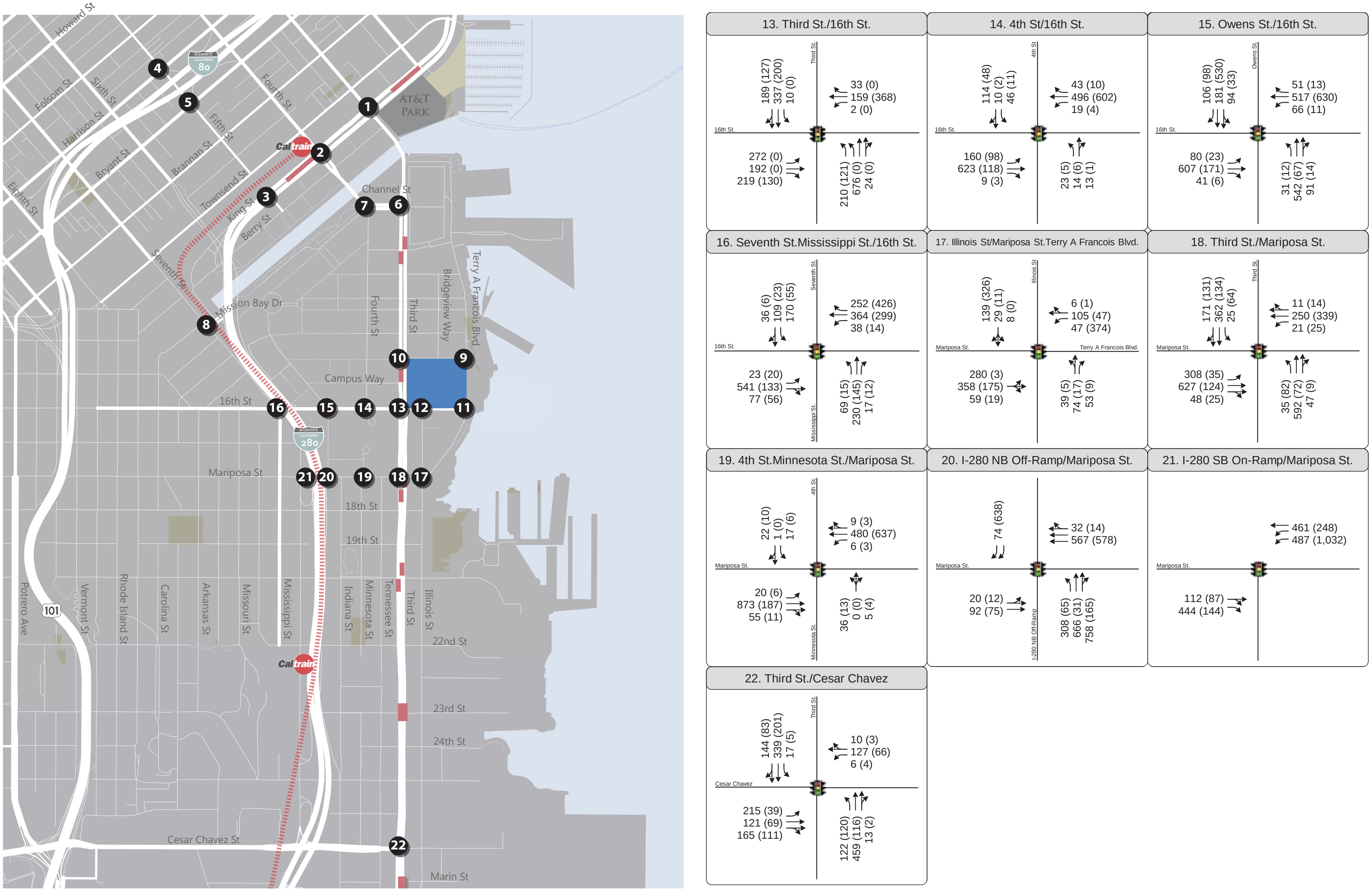
Study Intersection | Project Site | Muni Stop | Turn Lane

Weekday Evening (Late Evening) | Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 12a

Peak Hour Traffic Volumes and Lane Configurations

Existing Plus Project (2015) Conditions - with Basketball Game, No TSP



Study Intersection | Project Site | Muni Stop | Turn Lane | Weekday Evening (Late Evening) | Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 12b

Peak Hour Traffic Volumes and Lane Configurations

Existing Plus Project (2015) Conditions - with Basketball Game, No TSP

APPENDIX TR-4

INTERSECTION LEVEL OF SERVICE ANALYSIS

EXISTING 2015 (NO PROJECT)
NO SF GIANTS GAME AT AT&T PARK
WEEKDAY PM PEAK

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰↰	↑↱		↰↰	↑↱			↰↑↑↑	↱			
Volume (vph)	889	733	12	137	907	36	53	1043	272	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.68			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	1.00		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	3057		2987	3023			5478	941			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	3057		2987	3023			5478	941			
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	916	756	12	141	935	37	55	1075	280	0	0	0
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	190	0	0	0
Lane Group Flow (vph)	916	767	0	141	971	0	0	1130	90	0	0	0
Confl. Peds. (#/hr)			400			400	400		400			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.2	40.9		13.2	37.4			35.5	35.5			
Effective Green, g (s)	18.2	40.9		13.2	37.4			35.5	35.5			
Actuated g/C Ratio	0.17	0.37		0.12	0.34			0.32	0.32			
Clearance Time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	741	1136		358	1027			1767	303			
v/s Ratio Prot	c0.20	0.25		0.05	c0.32							
v/s Ratio Perm								0.21	0.10			
v/c Ratio	1.24	0.67		0.39	0.95			0.64	0.30			
Uniform Delay, d1	45.9	29.0		44.7	35.3			31.8	27.9			
Progression Factor	1.37	1.61		1.53	1.02			0.89	2.83			
Incremental Delay, d2	114.1	2.1		0.2	6.6			0.7	0.5			
Delay (s)	177.1	48.8		68.8	42.7			29.1	79.5			
Level of Service	F	D		E	D			C	E			
Approach Delay (s)		118.6			46.0			39.1			0.0	
Approach LOS		F			D			D			A	

Intersection Summary			
HCM 2000 Control Delay	72.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑↱		↰	↑↱			↰↑	↱	↰	↑↱	↱
Volume (vph)	151	1521	25	24	917	19	5	69	79	34	268	304
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	0.64	1.00	0.83	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00	0.68	1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85	1.00	0.95	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	4385		1296	2553			1585	858	1044	2330	581
Flt Permitted	0.95	1.00		0.95	1.00			0.97	1.00	0.71	1.00	1.00
Satd. Flow (perm)	1540	4385		1296	2553			1543	858	778	2330	581
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	154	1552	26	24	936	19	5	70	81	35	273	310
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	53	0	47	116
Lane Group Flow (vph)	154	1577	0	24	954	0	0	75	28	35	356	64
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.4	45.9		6.0	35.9			38.2	38.2	39.2	39.2	39.2
Effective Green, g (s)	14.4	45.9		6.0	35.9			38.2	38.2	39.2	39.2	39.2
Actuated g/C Ratio	0.13	0.42		0.05	0.33			0.35	0.35	0.36	0.36	0.36
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	201	1829		70	833			535	297	277	830	207
v/s Ratio Prot	0.10	c0.36		0.02	c0.37						c0.15	
v/s Ratio Perm								0.05	0.03	0.04		0.11
v/c Ratio	0.77	0.86		0.34	1.14			0.14	0.09	0.13	0.43	0.31
Uniform Delay, d1	46.2	29.2		50.1	37.0			24.6	24.2	23.9	26.9	25.6
Progression Factor	0.58	1.17		0.88	0.91			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.6	0.5		1.1	71.0			0.1	0.1	0.2	0.4	0.9
Delay (s)	28.4	34.8		45.4	104.7			24.8	24.4	24.1	27.3	26.5
Level of Service	C	C		D	F			C	C	C	C	C
Approach Delay (s)		34.2			103.2			24.6			26.8	
Approach LOS		C			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	51.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	115.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1689	138	0	1226	86	8
Ideal Flow (vphpl)	1850	1850	1850	1850	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2957			2998	1540	1357
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	2957			2998	1540	1357
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1759	144	0	1277	90	8
RTOR Reduction (vph)	6	0	0	0	0	5
Lane Group Flow (vph)	1897	0	0	1277	90	3
Confl. Peds. (#/hr)		37	37		1	3
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	1669			1692	512	451
v/s Ratio Prot	c0.64			0.43	c0.06	
v/s Ratio Perm						0.00
v/c Ratio	1.14			0.75	0.18	0.01
Uniform Delay, d1	23.9			18.2	26.0	24.5
Progression Factor	1.00			0.53	1.00	1.00
Incremental Delay, d2	69.5			1.0	0.7	0.0
Delay (s)	93.5			10.7	26.8	24.6
Level of Service	F			B	C	C
Approach Delay (s)	93.5			10.7	26.6	
Approach LOS	F			B	C	

Intersection Summary			
HCM 2000 Control Delay	59.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	98.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	272	1171	161	52	302	537	219	193	722	265
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		2.0			2.0	2.0			2.0	2.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.99	0.87
Flpb, ped/bikes		0.99			1.00	1.00			1.00	1.00
Frt		0.98			1.00	0.96			1.00	0.85
Flt Protected		0.99			0.99	1.00			0.95	1.00
Satd. Flow (prot)		5749			2857	2464			4086	978
Flt Permitted		0.99			0.66	1.00			0.95	1.00
Satd. Flow (perm)		5749			1899	2464			4086	978
Peak-hour factor, PHF	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93
Adj. Flow (vph)	296	1259	173	56	325	577	235	210	776	285
RTOR Reduction (vph)	0	22	0	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	1706	0	0	381	808	0	0	1015	256
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Perm
Protected Phases		6			4	4		7	7	
Permitted Phases	6			4						7
Actuated Green, G (s)		27.0			25.0	25.0			24.0	24.0
Effective Green, g (s)		29.0			28.0	28.0			27.0	27.0
Actuated g/C Ratio		0.32			0.31	0.31			0.30	0.30
Clearance Time (s)		4.0			5.0	5.0			5.0	5.0
Lane Grp Cap (vph)		1852			590	766			1225	293
v/s Ratio Prot						c0.33			0.25	
v/s Ratio Perm		0.30			0.20					c0.26
v/c Ratio		0.92			0.65	1.05			0.83	0.87
Uniform Delay, d1		29.4			26.7	31.0			29.3	29.9
Progression Factor		1.48			0.06	1.00			1.00	1.00
Incremental Delay, d2		6.6			0.5	47.9			6.5	28.4
Delay (s)		50.1			2.1	78.9			35.9	58.2
Level of Service		D			A	E			D	E
Approach Delay (s)		50.1			2.1	78.9			40.4	
Approach LOS		D			A	E			D	

Intersection Summary			
HCM 2000 Control Delay	48.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	109.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

5: Fifth St. & Bryant St. & I-80 EB On-Ramp

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	16	472	568	45	338	362	24	255	129	618
Ideal Flow (vphpl)	1000	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.84		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.99		0.92		0.85		1.00	1.00
Flt Protected		0.95	1.00		1.00		1.00		0.95	0.99
Satd. Flow (prot)		1313	1914		2130		1163		1327	2541
Flt Permitted		0.95	1.00		1.00		1.00		0.15	0.63
Satd. Flow (perm)		1313	1914		2130		1163		207	1616
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	17	508	611	48	363	389	26	274	139	665
RTOR Reduction (vph)	0	0	8	0	0	0	17	0	0	0
Lane Group Flow (vph)	0	464	712	0	755	0	6	0	306	772
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	5	0	5	0	0	0	0	5
Parking (#/hr)			10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		22.5	22.5		23.0		23.0		42.0	42.0
Effective Green, g (s)		22.5	25.0		24.5		23.0		43.5	43.5
Actuated g/C Ratio		0.25	0.28		0.27		0.26		0.48	0.48
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		328	531		579		297		305	950
v/s Ratio Prot		0.35	c0.37		c0.35				c0.18	0.15
v/s Ratio Perm							0.01		0.30	0.24
v/c Ratio		1.41	1.34		1.42dr		0.02		1.00	0.81
Uniform Delay, d1		33.8	32.5		32.8		25.1		31.1	19.8
Progression Factor		1.00	1.00		1.00		1.00		1.10	1.16
Incremental Delay, d2		203.7	165.8		149.0		0.1		28.0	2.2
Delay (s)		237.5	198.3		181.8		25.2		62.3	25.1
Level of Service		F	F		F		C		E	C
Approach Delay (s)			213.6		177.1					35.7
Approach LOS			F		F					D

Intersection Summary			
HCM 2000 Control Delay	141.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	101.9%	ICU Level of Service	G
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

6: Third St. & Channel St.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	15	66	19	10	67	20	898	18	12	161	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		0.99	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.91		1.00	1.00		1.00	0.99	
Flt Protected		0.97	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1569	1353		1426		1272	2531		1540	3037	
Flt Permitted		0.87	1.00		0.95		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1405	1353		1373		1272	2531		1540	3037	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	18	16	69	20	11	71	21	945	19	13	169	14
RTOR Reduction (vph)	0	0	47	0	48	0	0	1	0	0	6	0
Lane Group Flow (vph)	0	34	22	0	54	0	21	963	0	13	177	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		32.1	32.1		32.1		14.8	37.5		14.5	37.5	
Effective Green, g (s)		32.1	32.1		32.1		14.8	37.5		14.5	37.5	
Actuated g/C Ratio		0.32	0.32		0.32		0.15	0.38		0.14	0.38	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Grp Cap (vph)		451	434		440		188	949		223	1138	
v/s Ratio Prot							0.02	c0.38		0.01	c0.06	
v/s Ratio Perm		0.02	0.02		c0.04							
v/c Ratio		0.08	0.05		0.12		0.11	1.01		0.06	0.16	
Uniform Delay, d1		23.6	23.4		24.0		36.9	31.2		36.9	20.7	
Progression Factor		1.00	1.00		1.00		1.63	0.50		1.00	1.00	
Incremental Delay, d2		0.3	0.2		0.6		0.8	27.9		0.5	0.3	
Delay (s)		23.9	23.7		24.6		61.1	43.7		37.4	21.0	
Level of Service		C	C		C		E	D		D	C	
Approach Delay (s)		23.8			24.6			44.0			22.1	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	38.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.9
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	12	10	3	10	30	7	84	6	80	114	14
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00	1.00	1.00	1.00		1.00	0.98	
Flpb, ped/bikes		0.99			1.00	1.00	0.84	1.00		1.00	1.00	
Frt		0.96			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.98			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2553			1434	1227	1155	1432		1377	1393	
Flt Permitted		0.95			1.00	1.00	0.80	1.00		0.95	1.00	
Satd. Flow (perm)		2493			1449	1227	973	1432		1377	1393	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	20	13	11	3	11	32	8	90	6	86	123	15
RTOR Reduction (vph)	0	10	0	0	0	17	0	4	0	0	5	0
Lane Group Flow (vph)	0	34	0	0	14	15	8	92	0	86	133	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		2.3			2.3	18.6	5.0	5.0		16.3	26.3	
Effective Green, g (s)		2.3			2.3	18.6	5.0	5.0		16.3	26.3	
Actuated g/C Ratio		0.06			0.06	0.48	0.13	0.13		0.42	0.68	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		148			86	750	126	185		581	949	
v/s Ratio Prot						0.01		c0.06		0.06	c0.10	
v/s Ratio Perm		c0.01			0.01	0.00	0.01					
v/c Ratio		0.23			0.16	0.02	0.06	0.50		0.15	0.14	
Uniform Delay, d1		17.3			17.2	5.2	14.7	15.6		6.9	2.2	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8			0.9	0.0	0.2	2.1		0.1	0.1	
Delay (s)		18.1			18.1	5.2	15.0	17.7		7.0	2.2	
Level of Service		B			B	A	B	B		A	A	
Approach Delay (s)		18.1			9.2			17.5			4.1	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	38.6	Sum of lost time (s)	15.0
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	34	208	743	29	71	219
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1743	1535	848	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1743	1535	848	1134	1194
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	226	808	32	77	238
RTOR Reduction (vph)	0	202	0	5	0	0
Lane Group Flow (vph)	37	24	808	27	77	238
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	8.6	8.6	47.5	42.5	9.1	61.6
Effective Green, g (s)	8.6	8.6	47.5	42.5	9.1	61.6
Actuated g/C Ratio	0.11	0.11	0.59	0.53	0.11	0.77
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	121	186	909	502	128	917
v/s Ratio Prot	c0.03		c0.53	0.01	c0.07	0.20
v/s Ratio Perm		0.01		0.02		
v/c Ratio	0.31	0.13	0.89	0.05	0.60	0.26
Uniform Delay, d1	33.0	32.4	14.1	9.1	33.8	2.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	0.3	10.6	0.0	7.7	0.2
Delay (s)	34.5	32.7	24.6	9.2	41.6	2.8
Level of Service	C	C	C	A	D	A
Approach Delay (s)	33.0		24.1			12.3
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	80.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	19	43	13	164	149	41
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	21	48	14	182	166	46
Pedestrians	50			50	50	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	4			4	4	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	408	206	261			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	408	206	261			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	94	99			
cM capacity (veh/h)	522	741	1251			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	21	48	75	121	110	101
Volume Left	21	0	14	0	0	0
Volume Right	0	48	0	0	0	46
cSH	522	741	1251	1700	1700	1700
Volume to Capacity	0.04	0.06	0.01	0.07	0.06	0.06
Queue Length 95th (ft)	3	5	1	0	0	0
Control Delay (s)	12.2	10.2	1.6	0.0	0.0	0.0
Lane LOS	B	B	A			
Approach Delay (s)	10.8		0.6		0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	32.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	189	71	860	17	2	487
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.96	1.00		1.00	1.00
Flpb, ped/bikes	0.93	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1584	1466	3408		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1584	1466	3408		1711	3421
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	210	79	956	19	2	541
RTOR Reduction (vph)	0	56	1	0	0	0
Lane Group Flow (vph)	210	23	974	0	2	541
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	28.7	28.7	54.0		2.0	61.1
Effective Green, g (s)	28.7	28.7	54.0		2.0	61.1
Actuated g/C Ratio	0.29	0.29	0.54		0.02	0.61
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	454	420	1840		34	2090
v/s Ratio Prot			c0.29		0.00	c0.16
v/s Ratio Perm	c0.13	0.02				
v/c Ratio	0.46	0.05	0.53		0.06	0.26
Uniform Delay, d1	29.3	25.8	14.8		48.1	9.0
Progression Factor	1.00	1.00	2.21		1.19	0.78
Incremental Delay, d2	0.7	0.1	0.8		0.7	0.1
Delay (s)	30.1	25.9	33.5		58.0	7.1
Level of Service	C	C	C		E	A
Approach Delay (s)	28.9		33.5			7.3
Approach LOS	C		C			A

Intersection Summary			
HCM 2000 Control Delay	24.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
11: Terry A Francois Blvd./Terry A Francois Blvd & 16th

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	177	192	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	0	208	226	0
Pedestrians	25			1	1	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	2			0	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	356	139	251			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	356	139	251			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	604	866	1287			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	0	69	139	151	75
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1700	1287	1700	1700	1700
Volume to Capacity	0.00	0.00	0.08	0.09	0.04
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	0.0	0.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	20.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
12: Illinois St & 16th

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	8	67	49	28	130	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	9	77	56	32	149	5
Pedestrians	50			50	50	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	4			4	4	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	499					
pX, platoon unblocked						
vC, conflicting volume			136		293	148
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			136		293	148
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		76	99
cM capacity (veh/h)			1393		620	832

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	86	89	154
Volume Left	0	56	149
Volume Right	77	0	5
cSH	1700	1393	625
Volume to Capacity	0.05	0.04	0.25
Queue Length 95th (ft)	0	3	24
Control Delay (s)	0.0	5.0	12.6
Lane LOS		A	B
Approach Delay (s)	0.0	5.0	12.6
Approach LOS			B

Intersection Summary			
Average Delay	7.3		
Intersection Capacity Utilization	31.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	134	52	266	3	108	47	264	696	5	18	472	186
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.97	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1257	1365	1126	1282	1365	1099	2515	2590		1296	2464	
Flt Permitted	0.68	1.00	1.00	0.72	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	901	1365	1126	971	1365	1099	2515	2590		1296	2464	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	147	57	292	3	119	52	290	765	5	20	519	204
RTOR Reduction (vph)	0	0	191	0	0	34	0	1	0	0	42	0
Lane Group Flow (vph)	147	57	101	3	119	18	290	769	0	20	681	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Effective Green, g (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Actuated g/C Ratio	0.34	0.34	0.34	0.34	0.34	0.34	0.14	0.38		0.12	0.36	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Grp Cap (vph)	310	470	388	334	470	379	352	979		155	882	
v/s Ratio Prot		0.04			0.09		0.12	c0.30		0.02	c0.28	
v/s Ratio Perm	c0.16		0.09	0.00		0.02						
v/c Ratio	0.47	0.12	0.26	0.01	0.25	0.05	0.82	0.79		0.13	0.77	
Uniform Delay, d1	25.6	22.4	23.6	21.5	23.5	21.8	41.8	27.5		39.3	28.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.65	0.76		1.02	1.00	
Incremental Delay, d2	5.1	0.5	1.6	0.0	1.3	0.2	9.8	3.0		1.7	6.3	
Delay (s)	30.8	22.9	25.2	21.6	24.8	22.0	37.1	23.9		41.9	34.8	
Level of Service	C	C	C	C	C	C	D	C		D	C	
Approach Delay (s)		26.6			23.9			27.5			35.0	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	102.5%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	89	377	8	6	522	30	33	25	34	41	3	105
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.85	1.00	0.98		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1411	1621	1706	1238	1621	1527		1491	1355	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.68	1.00		0.72	1.00	
Satd. Flow (perm)	1621	1706	1411	1621	1706	1238	1163	1527		1123	1355	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	410	9	7	567	33	36	27	37	45	3	114
RTOR Reduction (vph)	0	0	4	0	0	18	0	28	0	0	85	0
Lane Group Flow (vph)	97	410	5	7	567	15	36	36	0	45	32	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	10.9	47.6	47.6	2.7	39.4	39.4	21.9	21.9		21.9	21.9	
Effective Green, g (s)	10.9	47.6	47.6	2.7	39.4	39.4	21.9	21.9		21.9	21.9	
Actuated g/C Ratio	0.12	0.55	0.55	0.03	0.45	0.45	0.25	0.25		0.25	0.25	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	202	931	770	50	770	559	292	383		282	340	
v/s Ratio Prot	c0.06	0.24		0.00	c0.33			0.02			0.02	
v/s Ratio Perm			0.00			0.01	0.03			c0.04		
v/c Ratio	0.48	0.44	0.01	0.14	0.74	0.03	0.12	0.09		0.16	0.09	
Uniform Delay, d1	35.5	11.8	9.0	41.1	19.6	13.3	25.2	25.0		25.5	25.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	1.5	0.0	1.3	3.7	0.0	0.2	0.1		0.3	0.1	
Delay (s)	37.3	13.3	9.0	42.4	23.3	13.3	25.4	25.2		25.7	25.2	
Level of Service	D	B	A	D	C	B	C	C		C	C	
Approach Delay (s)		17.8			23.0			25.3			25.3	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	21.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	87.2	Sum of lost time (s)	15.0
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	118	301	14	21	561	78	49	134	61	112	54	146
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.97	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1050	1540	2934			2978	1072
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.64	1.00			0.69	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1050	1041	2934			2120	1072
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	123	314	15	22	584	81	51	140	64	117	56	152
RTOR Reduction (vph)	0	0	5	0	0	22	0	54	0	0	0	130
Lane Group Flow (vph)	123	314	10	22	584	59	51	150	0	0	173	22
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	7.0	56.8	56.8	2.7	51.5	51.5	13.3	13.3			12.3	12.3
Effective Green, g (s)	7.0	56.8	56.8	2.7	51.5	51.5	13.3	13.3			12.3	12.3
Actuated g/C Ratio	0.08	0.66	0.66	0.03	0.60	0.60	0.16	0.16			0.14	0.14
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	99	804	912	48	729	630	161	454			303	153
v/s Ratio Prot	c0.10	0.26		0.01	c0.48			0.05				
v/s Ratio Perm			0.01			0.06	0.05				c0.08	0.02
v/c Ratio	1.24	0.39	0.01	0.46	0.80	0.09	0.32	0.33			0.57	0.14
Uniform Delay, d1	39.4	6.6	4.9	40.8	13.2	7.3	32.2	32.3			34.3	32.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	169.2	1.4	0.0	6.8	6.3	0.1	1.1	0.4			2.6	0.4
Delay (s)	208.6	8.0	5.0	47.6	19.5	7.3	33.3	32.7			36.9	32.6
Level of Service	F	A	A	D	B	A	C	C			D	C
Approach Delay (s)		62.5			19.0			32.8			34.9	
Approach LOS		E			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	35.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	85.8	Sum of lost time (s)	15.0
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	328	70	33	396	327	61	249	30	75	138	43
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.91	1.00	1.00	0.96	1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1337	925		1335	1126	867	1070	957	923	1070	1069	
Flt Permitted	0.14	1.00		0.32	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	193	925		444	1126	867	1070	957	923	1070	1069	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	50	349	74	35	421	348	65	265	32	80	147	46
RTOR Reduction (vph)	0	9	0	0	0	184	0	0	23	0	14	0
Lane Group Flow (vph)	50	414	0	35	421	164	65	265	9	80	179	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	34.1	34.1		34.1	34.1	41.1	13.1	25.1	25.1	7.0	19.0	
Effective Green, g (s)	34.1	34.1		34.1	34.1	41.1	13.1	25.1	25.1	7.0	19.0	
Actuated g/C Ratio	0.39	0.39		0.39	0.39	0.46	0.15	0.28	0.28	0.08	0.21	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	104	356		194	433	451	158	271	261	84	229	
v/s Ratio Prot	0.01	c0.45		0.00	c0.37	0.03	0.06	c0.28		0.07	c0.17	
v/s Ratio Perm	0.17			0.06		0.16			0.01			
v/c Ratio	0.48	1.16		0.18	0.97	0.36	0.41	0.98	0.03	0.95	0.78	
Uniform Delay, d1	20.5	27.2		25.0	26.7	15.3	34.2	31.4	22.9	40.6	32.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.5	100.2		0.4	35.8	0.5	1.7	48.0	0.1	81.8	15.8	
Delay (s)	23.9	127.4		25.5	62.6	15.8	35.9	79.4	23.0	122.4	48.5	
Level of Service	C	F		C	E	B	D	E	C	F	D	
Approach Delay (s)		116.5			40.7			66.6			70.2	
Approach LOS		F			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	68.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	88.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	19	74	39	45	162	2	31	116	78	11	51	51
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	21	82	43	50	180	2	34	129	87	12	57	57

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	147	50	182	163	87	126
Volume Left (vph)	21	50	0	34	0	12
Volume Right (vph)	43	0	2	0	87	57
Hadj (s)	-0.11	0.53	0.03	0.14	-0.67	-0.22
Departure Headway (s)	5.8	6.3	5.8	5.9	5.1	5.8
Degree Utilization, x	0.24	0.09	0.29	0.27	0.12	0.20
Capacity (veh/h)	579	539	589	578	661	580
Control Delay (s)	10.6	8.7	9.9	9.9	7.6	10.2
Approach Delay (s)	10.6	9.7		9.1		10.2
Approach LOS	B	A		A		B

Intersection Summary			
Delay	9.7		
Level of Service	A		
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	146	81	51	19	202	23	40	796	35	16	426	299
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	0.98		1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1668	3177		1676	3353		1260	2500		1260	2331	
Flt Permitted	0.60	1.00		0.66	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1059	3177		1170	3353		1260	2500		1260	2331	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	155	86	54	20	215	24	43	847	37	17	453	318
RTOR Reduction (vph)	0	35	0	0	8	0	0	3	0	0	127	0
Lane Group Flow (vph)	155	105	0	20	231	0	43	881	0	17	644	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	34.7	34.7		34.7	34.7		11.9	34.9		14.9	37.9	
Effective Green, g (s)	34.7	34.7		34.7	34.7		11.9	34.9		14.9	37.9	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.12	0.35		0.15	0.38	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Grp Cap (vph)	367	1102		405	1163		149	872		187	883	
v/s Ratio Prot		0.03			0.07		0.03	c0.35		0.01	c0.28	
v/s Ratio Perm	c0.15			0.02								
v/c Ratio	0.42	0.10		0.05	0.20		0.29	1.01		0.09	0.73	
Uniform Delay, d1	25.0	22.0		21.7	22.9		40.2	32.5		36.7	26.6	
Progression Factor	1.00	1.00		1.00	1.00		0.91	0.79		1.55	0.71	
Incremental Delay, d2	3.5	0.2		0.2	0.4		3.6	28.7		0.7	3.8	
Delay (s)	28.5	22.2		21.9	23.3		40.0	54.6		57.5	22.8	
Level of Service	C	C		C	C		D	D		E	C	
Approach Delay (s)		25.5			23.2			53.9			23.6	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	36.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	107.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	232	38	4	553	2	38	0	12	13	0	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00			0.97		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3349		1711	3420			1678		1711	1531	
Flt Permitted	0.38	1.00		0.57	1.00			0.84		0.72	1.00	
Satd. Flow (perm)	677	3349		1031	3420			1467		1300	1531	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	252	41	4	601	2	41	0	13	14	0	14
RTOR Reduction (vph)	0	22	0	0	1	0	0	20	0	0	8	0
Lane Group Flow (vph)	7	271	0	4	602	0	0	34	0	14	6	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	24.0	24.0		24.0	24.0			26.0		26.0	26.0	
Effective Green, g (s)	24.0	24.0		24.0	24.0			26.0		26.0	26.0	
Actuated g/C Ratio	0.40	0.40		0.40	0.40			0.43		0.43	0.43	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Grp Cap (vph)	270	1339		412	1368			635		563	663	
v/s Ratio Prot		0.08			c0.18						0.00	
v/s Ratio Perm	0.01			0.00				c0.02		0.01		
v/c Ratio	0.03	0.20		0.01	0.44			0.05		0.02	0.01	
Uniform Delay, d1	10.9	11.8		10.8	13.1			9.9		9.7	9.7	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.3		0.0	1.0			0.2		0.1	0.0	
Delay (s)	11.1	12.1		10.9	14.1			10.0		9.8	9.7	
Level of Service	B	B		B	B			B		A	A	
Approach Delay (s)		12.1			14.1			10.0			9.8	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	86	0	0	705	6	382	112	194	0	0	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				3.5
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Flpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Frt		1.00			1.00		1.00	0.90				0.85
Flt Protected		1.00			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3416			5125		1711	3096				2694
Flt Permitted		0.95			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3248			5125		1711	3096				2694
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	3	88	0	0	719	6	390	114	198	0	0	130
RTOR Reduction (vph)	0	0	0	0	1	0	0	103	0	0	0	121
Lane Group Flow (vph)	0	91	0	0	724	0	390	209	0	0	0	9
Confl. Peds. (#/hr)												20
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		47.5			36.5		53.0	53.0				7.5
Effective Green, g (s)		47.5			36.5		53.0	53.0				7.5
Actuated g/C Ratio		0.43			0.33		0.48	0.48				0.07
Clearance Time (s)		4.5			4.5		5.0	5.0				3.5
Lane Grp Cap (vph)		1414			1700		824	1491				183
v/s Ratio Prot		c0.00			c0.14		c0.23	0.07				0.00
v/s Ratio Perm		0.02										
v/c Ratio		0.06			0.43		0.47	0.14				0.05
Uniform Delay, d1		18.3			28.6		19.1	15.8				47.9
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			0.8		1.9	0.2				0.5
Delay (s)		18.4			29.4		21.1	16.0				48.4
Level of Service		B			C		C	B				D
Approach Delay (s)		18.4			29.4			18.8			48.4	
Approach LOS		B			C			B			D	

Intersection Summary			
HCM 2000 Control Delay	25.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	52.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.

4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	89	566	665	549	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.89	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1502	1426	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1502	1426	3319	1801		
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	92	584	686	566	0	0
RTOR Reduction (vph)	44	44	0	0	0	0
Lane Group Flow (vph)	299	289	686	566	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	40.0	40.0	20.0	70.0		
Effective Green, g (s)	40.0	40.0	20.0	70.0		
Actuated g/C Ratio	0.57	0.57	0.29	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	858	814	948	1801		
v/s Ratio Prot	0.20		c0.21	0.31		
v/s Ratio Perm		c0.20				
v/c Ratio	0.35	0.35	0.72	0.31		
Uniform Delay, d1	8.0	8.1	22.5	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.2	0.3	2.8	0.1		
Delay (s)	8.3	8.3	25.3	0.1		
Level of Service	A	A	C	A		
Approach Delay (s)	8.3			13.9	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	193	135	181	7	204	13	176	549	16	17	532	160
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.93		1.00	0.99		1.00	1.00		1.00	0.97	
Flpb, ped/bikes	0.98	1.00		0.94	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.99		1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1188	1945		1139	1257		1215	2412		1215	2287	
Flt Permitted	0.36	1.00		0.55	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	454	1945		662	1257		1215	2412		1215	2287	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	201	141	189	7	212	14	183	572	17	18	554	167
RTOR Reduction (vph)	0	125	0	0	2	0	0	2	0	0	29	0
Lane Group Flow (vph)	201	205	0	7	224	0	183	587	0	18	692	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	33.8	33.8		21.9	21.9		17.3	45.6		4.3	32.6	
Effective Green, g (s)	33.8	33.8		21.9	21.9		17.3	45.6		4.3	32.6	
Actuated g/C Ratio	0.34	0.34		0.22	0.22		0.17	0.46		0.04	0.33	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	201	657		144	275		210	1099		52	745	
v/s Ratio Prot	c0.07	0.11			0.18		c0.15	0.24		0.01	c0.30	
v/s Ratio Perm	c0.27			0.01								
v/c Ratio	1.00	0.31		0.05	0.81		0.87	0.53		0.35	0.93	
Uniform Delay, d1	33.2	24.5		30.8	37.1		40.3	19.6		46.5	32.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.03	0.84	
Incremental Delay, d2	63.5	0.3		0.1	16.6		30.2	1.9		3.1	16.2	
Delay (s)	96.7	24.8		31.0	53.7		70.5	21.4		50.8	43.6	
Level of Service	F	C		C	D		E	C		D	D	
Approach Delay (s)		52.0			53.0			33.1			43.8	
Approach LOS		D			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	43.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

EXISTING 2015 (NO PROJECT)
WITH SF GIANTS GAME AT AT&T PARK
WEEKDAY PM PEAK

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	783	704	102	290	632	48	12	683	145	0	0	0
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Lane Util. Factor	0.94	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.93		1.00	0.96			1.00	0.47			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	0.98		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	3656	2370		2515	2469			4649	547			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	3656	2370		2515	2469			4649	547			
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	807	726	105	299	652	49	12	704	149	0	0	0
RTOR Reduction (vph)	0	10	0	0	0	0	0	0	114	0	0	0
Lane Group Flow (vph)	807	821	0	299	701	0	0	716	35	0	0	0
Confl. Peds. (#/hr)			1700			1700	1700		1700			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	20.8	43.9		19.6	44.2			26.1	26.1			
Effective Green, g (s)	20.8	43.9		19.6	44.2			26.1	26.1			
Actuated g/C Ratio	0.19	0.40		0.18	0.40			0.24	0.24			
Clearance Time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	691	945		448	992			1103	129			
v/s Ratio Prot	c0.22	c0.35		0.12	c0.28							
v/s Ratio Perm								0.15	0.06			
v/c Ratio	1.17	0.87		0.67	0.71			0.65	0.27			
Uniform Delay, d1	44.6	30.4		42.2	27.5			37.8	34.2			
Progression Factor	1.21	1.39		1.51	1.20			0.83	2.32			
Incremental Delay, d2	81.2	4.0		1.1	0.7			1.2	1.0			
Delay (s)	135.1	46.3		64.7	33.7			32.5	80.4			
Level of Service	F	D		E	C			C	F			
Approach Delay (s)		90.1			43.0			40.8			0.0	
Approach LOS		F			D			D			A	

Intersection Summary			
HCM 2000 Control Delay	64.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	128	1358	33	34	586	24	7	131	109	122	409	452
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	*0.80		1.00	*0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00	0.64	1.00	0.84	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00	0.71	1.00	1.00
Frt	1.00	1.00		1.00	0.99			1.00	0.85	1.00	0.95	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1296	3234		1296	2516			1601	858	1088	2349	581
Flt Permitted	0.95	1.00		0.95	1.00			0.96	1.00	0.67	1.00	1.00
Satd. Flow (perm)	1296	3234		1296	2516			1548	858	764	2349	581
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	131	1386	34	35	598	24	7	134	111	124	417	461
RTOR Reduction (vph)	0	2	0	0	3	0	0	0	72	0	43	175
Lane Group Flow (vph)	131	1418	0	35	619	0	0	141	39	124	563	97
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.4	43.0		8.9	35.9			38.2	38.2	39.2	39.2	39.2
Effective Green, g (s)	14.4	43.0		8.9	35.9			38.2	38.2	39.2	39.2	39.2
Actuated g/C Ratio	0.13	0.39		0.08	0.33			0.35	0.35	0.36	0.36	0.36
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	169	1264		104	821			537	297	272	837	207
v/s Ratio Prot	0.10	c0.44		0.03	c0.25						c0.24	
v/s Ratio Perm								0.09	0.04	0.16		0.17
v/c Ratio	0.78	1.12		0.34	0.75			0.26	0.13	0.46	0.67	0.47
Uniform Delay, d1	46.2	33.5		47.8	33.1			25.8	24.5	27.2	30.0	27.3
Progression Factor	0.63	0.91		0.97	0.94			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.1	56.0		1.3	2.8			0.3	0.2	1.2	2.1	1.7
Delay (s)	31.2	86.5		47.6	33.9			26.0	24.7	28.4	32.1	29.0
Level of Service	C	F		D	C			C	C	C	C	C
Approach Delay (s)		81.8			34.6			25.5			30.8	
Approach LOS		F			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	54.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	134.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1494	151	3	1042	77	25
Ideal Flow (vphpl)	1700	1700	1400	1400	1700	1700
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2709			2269	1377	1214
Flt Permitted	1.00			0.95	0.95	1.00
Satd. Flow (perm)	2709			2157	1377	1214
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1556	157	3	1085	80	26
RTOR Reduction (vph)	7	0	0	0	0	14
Lane Group Flow (vph)	1706	0	0	1088	80	12
Confl. Peds. (#/hr)		37	37		1	3
Confl. Bikes (#/hr)		1				
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	1529			1217	458	403
v/s Ratio Prot	c0.63				c0.06	
v/s Ratio Perm				0.50		0.01
v/c Ratio	1.12			0.89	0.17	0.03
Uniform Delay, d1	23.9			21.1	26.0	24.7
Progression Factor	1.00			0.82	1.00	1.00
Incremental Delay, d2	61.7			7.4	0.8	0.1
Delay (s)	85.6			24.7	26.8	24.9
Level of Service	F			C	C	C
Approach Delay (s)	85.6			24.7	26.3	
Approach LOS	F			C	C	

Intersection Summary			
HCM 2000 Control Delay	60.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	88	794	99	22	227	661	205	256	755	261
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		2.0			2.0	2.0			2.0	2.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.97			0.99	0.87
Flpb, ped/bikes		1.00			1.00	1.00			1.00	1.00
Frt		0.98			1.00	0.96			1.00	0.85
Flt Protected		1.00			1.00	1.00			0.95	1.00
Satd. Flow (prot)		5795			2871	2501			4091	978
Flt Permitted		1.00			0.74	1.00			0.95	1.00
Satd. Flow (perm)		5795			2124	2501			4091	978
Peak-hour factor, PHF	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93
Adj. Flow (vph)	96	854	106	24	244	711	220	278	812	281
RTOR Reduction (vph)	0	22	0	0	0	7	0	0	0	0
Lane Group Flow (vph)	0	1034	0	0	268	924	0	0	1118	253
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Perm
Protected Phases		6			4	4		7	7	
Permitted Phases	6			4						7
Actuated Green, G (s)		27.0			25.0	25.0			24.0	24.0
Effective Green, g (s)		29.0			28.0	28.0			27.0	27.0
Actuated g/C Ratio		0.32			0.31	0.31			0.30	0.30
Clearance Time (s)		4.0			5.0	5.0			5.0	5.0
Lane Grp Cap (vph)		1867			660	778			1227	293
v/s Ratio Prot						c0.37			c0.27	
v/s Ratio Perm		0.18			0.13					0.26
v/c Ratio		0.55			0.41	1.19			0.91	0.86
Uniform Delay, d1		25.2			24.4	31.0			30.3	29.8
Progression Factor		1.66			0.15	1.00			1.00	1.00
Incremental Delay, d2		0.6			0.2	97.2			11.7	27.0
Delay (s)		42.3			3.9	128.2			42.0	56.8
Level of Service		D			A	F			D	E
Approach Delay (s)		42.3			3.9	128.2			44.7	
Approach LOS		D			A	F			D	

Intersection Summary			
HCM 2000 Control Delay	62.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	88.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

4/22/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	28	387	683	63	221	322	64	211	145	649
Ideal Flow (vphpl)	1000	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.81		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.99		0.91		0.85		1.00	1.00
Flt Protected		0.95	1.00		1.00		1.00		0.95	1.00
Satd. Flow (prot)		1313	1910		2041		1163		1327	2548
Flt Permitted		0.95	1.00		1.00		1.00		0.23	0.84
Satd. Flow (perm)		1313	1910		2041		1163		326	2161
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	30	416	734	68	238	346	69	227	156	698
RTOR Reduction (vph)	0	0	9	0	1	0	46	0	0	0
Lane Group Flow (vph)	0	404	835	0	590	0	16	0	319	762
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	5	0	5	0	0	0	0	5
Parking (#/hr)			10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		22.5	22.5		23.0		23.0		42.0	42.0
Effective Green, g (s)		22.5	25.0		24.5		23.0		43.5	43.5
Actuated g/C Ratio		0.25	0.28		0.27		0.26		0.48	0.48
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		328	530		555		297		341	1115
v/s Ratio Prot		0.31	c0.44		c0.29				c0.17	0.13
v/s Ratio Perm							0.01		0.28	0.20
v/c Ratio		1.23	1.57		1.32dr		0.05		0.94	0.68
Uniform Delay, d1		33.8	32.5		32.8		25.3		27.6	17.9
Progression Factor		1.00	1.00		1.00		1.00		1.05	1.14
Incremental Delay, d2		128.0	267.6		56.2		0.3		5.7	0.3
Delay (s)		161.8	300.1		89.0		25.6		34.8	20.7
Level of Service		F	F		F		C		C	C
Approach Delay (s)			255.3		82.9					24.9
Approach LOS			F		F					C

Intersection Summary			
HCM 2000 Control Delay	134.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	99.3%	ICU Level of Service	F
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	32	58	72	1	1	3	23	804	56	135	160	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.98		1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.92		1.00	0.99		1.00	0.98	
Flt Protected		0.98	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1584	1353		1450		1272	2499		1540	2993	
Flt Permitted		0.91	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1473	1353		1431		1272	2499		1540	2993	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	34	61	76	1	1	3	24	846	59	142	168	31
RTOR Reduction (vph)	0	0	52	0	2	0	0	5	0	0	15	0
Lane Group Flow (vph)	0	95	24	0	3	0	24	900	0	142	184	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		32.1	32.1		32.1		14.8	38.5		13.5	37.5	
Effective Green, g (s)		32.1	32.1		32.1		14.8	38.5		13.5	37.5	
Actuated g/C Ratio		0.32	0.32		0.32		0.15	0.38		0.14	0.38	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Grp Cap (vph)		472	434		459		188	962		207	1122	
v/s Ratio Prot							0.02	c0.36		c0.09	0.06	
v/s Ratio Perm		c0.06	0.02		0.00							
v/c Ratio		0.20	0.06		0.01		0.13	0.94		0.69	0.16	
Uniform Delay, d1		24.6	23.5		23.1		37.0	29.6		41.2	20.8	
Progression Factor		1.00	1.00		1.00		1.57	0.38		1.00	1.00	
Incremental Delay, d2		1.0	0.2		0.0		1.1	14.0		17.0	0.3	
Delay (s)		25.6	23.7		23.1		59.0	25.2		58.2	21.1	
Level of Service		C	C		C		E	C		E	C	
Approach Delay (s)		24.8			23.1			26.1			36.6	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	28.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.9
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	33	16	23	2	7	44	44	255	16	130	128	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00	0.99	1.00	1.00		1.00	0.96	
Flpb, ped/bikes		0.99			1.00	1.00	0.82	1.00		1.00	1.00	
Frt		0.95			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.98			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2811			1604	1363	1265	1603		1540	1518	
Flt Permitted		0.90			0.91	1.00	0.65	1.00		0.95	1.00	
Satd. Flow (perm)		2596			1473	1363	869	1603		1540	1518	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	35	17	25	2	8	47	47	274	17	140	138	27
RTOR Reduction (vph)	0	23	0	0	0	31	0	3	0	0	7	0
Lane Group Flow (vph)	0	54	0	0	10	16	47	288	0	140	158	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		3.8			3.8	14.7	14.6	14.6		10.9	30.5	
Effective Green, g (s)		3.8			3.8	14.7	14.6	14.6		10.9	30.5	
Actuated g/C Ratio		0.09			0.09	0.33	0.33	0.33		0.25	0.69	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		222			126	606	286	528		378	1045	
v/s Ratio Prot						0.01		c0.18		c0.09	0.10	
v/s Ratio Perm		c0.02			0.01	0.01	0.05					
v/c Ratio		0.24			0.08	0.03	0.16	0.55		0.37	0.15	
Uniform Delay, d1		18.9			18.6	10.0	10.5	12.1		13.9	2.4	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.6			0.3	0.0	0.3	1.2		0.6	0.1	
Delay (s)		19.5			18.9	10.0	10.8	13.3		14.5	2.5	
Level of Service		B			B	A	B	B		B	A	
Approach Delay (s)		19.5			11.6			13.0			8.0	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	44.3	Sum of lost time (s)	15.0
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.

4/22/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	47	249	895	37	85	214
Ideal Flow (vphpl)	1900	1900	1400	1400	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1540	2365	1791	990	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1540	2365	1791	990	1134	1194
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	271	973	40	92	233
RTOR Reduction (vph)	0	242	0	6	0	0
Lane Group Flow (vph)	51	29	973	34	92	233
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	8.6	8.6	47.6	42.6	10.1	62.7
Effective Green, g (s)	8.6	8.6	47.6	42.6	10.1	62.7
Actuated g/C Ratio	0.11	0.11	0.59	0.52	0.12	0.77
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	162	250	1048	579	140	920
v/s Ratio Prot	c0.03		c0.54	0.01	c0.08	0.20
v/s Ratio Perm		0.01		0.02		
v/c Ratio	0.31	0.11	0.93	0.06	0.66	0.25
Uniform Delay, d1	33.6	32.9	15.3	9.5	33.9	2.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	0.2	13.6	0.0	10.6	0.1
Delay (s)	34.7	33.1	29.0	9.5	44.6	2.8
Level of Service	C	C	C	A	D	A
Approach Delay (s)	33.4		28.2			14.6
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	26.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	81.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
9: Terry A Francois Blvd/Terry A Francois Blvd. & South St.

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	22	37	16	224	159	47
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	26	44	19	264	187	55
Pedestrians	50			50	50	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	4			4	4	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	484	221	292			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	484	221	292			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	94	94	98			
cM capacity (veh/h)	466	724	1218			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	26	44	107	176	125	118
Volume Left	26	0	19	0	0	0
Volume Right	0	44	0	0	0	55
cSH	466	724	1218	1700	1700	1700
Volume to Capacity	0.06	0.06	0.02	0.10	0.07	0.07
Queue Length 95th (ft)	4	5	1	0	0	0
Control Delay (s)	13.2	10.3	1.5	0.0	0.0	0.0
Lane LOS	B	B	A			
Approach Delay (s)	11.4		0.6		0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	36.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
10: Third St. & South St.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	223	54	874	44	14	498
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.96	1.00		1.00	1.00
Flpb, ped/bikes	0.93	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1584	1466	3389		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1584	1466	3389		1711	3421
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	248	60	971	49	16	553
RTOR Reduction (vph)	0	43	3	0	0	0
Lane Group Flow (vph)	248	17	1017	0	16	553
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	28.7	28.7	52.0		4.0	61.1
Effective Green, g (s)	28.7	28.7	52.0		4.0	61.1
Actuated g/C Ratio	0.29	0.29	0.52		0.04	0.61
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	454	420	1762		68	2090
v/s Ratio Prot			c0.30		0.01	c0.16
v/s Ratio Perm	c0.16	0.01				
v/c Ratio	0.55	0.04	0.58		0.24	0.26
Uniform Delay, d1	30.1	25.7	16.5		46.5	9.0
Progression Factor	1.00	1.00	1.90		1.06	0.90
Incremental Delay, d2	1.3	0.0	1.0		1.8	0.1
Delay (s)	31.5	25.8	32.3		51.0	8.1
Level of Service	C	C	C		D	A
Approach Delay (s)	30.4		32.3			9.4
Approach LOS	C		C			A

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
11: Terry A Francois Blvd./Terry A Francois Blvd & 16th

4/22/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	240	196	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	0	282	231	0
Pedestrians	25			1	1	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	2			0	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	398	141	256			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	398	141	256			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	568	863	1281			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	0	94	188	154	77
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1700	1281	1700	1700	1700
Volume to Capacity	0.00	0.00	0.11	0.09	0.05
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	0.0	0.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	20.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
12: Illinois St & 16th

4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	10	90	50	29	169	3
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	12	107	60	35	201	4
Pedestrians	50			50	50	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	4			4	4	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	499					
pX, platoon unblocked						
vC, conflicting volume			169		319	165
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			169		319	165
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		66	100
cM capacity (veh/h)			1355		596	813

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	119	94	205
Volume Left	0	60	201
Volume Right	107	0	4
cSH	1700	1355	599
Volume to Capacity	0.07	0.04	0.34
Queue Length 95th (ft)	0	3	38
Control Delay (s)	0.0	5.1	14.1
Lane LOS		A	B
Approach Delay (s)	0.0	5.1	14.1
Approach LOS			B

Intersection Summary			
Average Delay	8.0		
Intersection Capacity Utilization	31.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰↰	↑↱		↰	↑↱	
Volume (vph)	176	64	271	6	121	71	316	671	17	19	428	274
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.97	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1258	1365	1126	1282	1365	1099	2515	2580		1296	2415	
Flt Permitted	0.67	1.00	1.00	0.71	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	890	1365	1126	960	1365	1099	2515	2580		1296	2415	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	193	70	298	7	133	78	347	737	19	21	470	301
RTOR Reduction (vph)	0	0	195	0	0	51	0	2	0	0	103	0
Lane Group Flow (vph)	193	70	103	7	133	27	347	754	0	21	668	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Effective Green, g (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Actuated g/C Ratio	0.34	0.34	0.34	0.34	0.34	0.34	0.14	0.38		0.12	0.36	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Grp Cap (vph)	307	470	388	331	470	379	352	975		155	864	
v/s Ratio Prot		0.05			0.10		c0.14	0.29		0.02	c0.28	
v/s Ratio Perm	c0.22		0.09	0.01		0.02						
v/c Ratio	0.63	0.15	0.26	0.02	0.28	0.07	0.99	0.77		0.14	0.77	
Uniform Delay, d1	27.4	22.6	23.6	21.6	23.8	22.0	42.9	27.3		39.4	28.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.81	0.74		1.11	1.17	
Incremental Delay, d2	9.4	0.7	1.7	0.1	1.5	0.4	27.8	2.6		1.7	6.4	
Delay (s)	36.8	23.3	25.3	21.7	25.3	22.4	62.5	22.9		45.5	39.6	
Level of Service	D	C	C	C	C	C	E	C		D	D	
Approach Delay (s)		29.0			24.1			35.3			39.8	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	34.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	116.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↱		↰	↱	
Volume (vph)	102	439	7	6	658	47	26	24	24	48	4	132
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.86	1.00	1.00		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1243	1621	1578		1493	1358	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.65	1.00		0.72	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1243	1101	1578		1136	1358	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	110	472	8	6	708	51	28	26	26	52	4	142
RTOR Reduction (vph)	0	0	4	0	0	28	0	19	0	0	106	0
Lane Group Flow (vph)	110	472	4	6	708	23	28	33	0	52	40	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	10.6	45.8	45.8	2.7	37.9	37.9	21.3	21.3		21.3	21.3	
Effective Green, g (s)	10.6	45.8	45.8	2.7	37.9	37.9	21.3	21.3		21.3	21.3	
Actuated g/C Ratio	0.12	0.54	0.54	0.03	0.45	0.45	0.25	0.25		0.25	0.25	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	202	921	783	51	762	555	276	396		285	341	
v/s Ratio Prot	c0.07	0.28		0.00	c0.42			0.02			0.03	
v/s Ratio Perm			0.00			0.02	0.03			c0.05		
v/c Ratio	0.54	0.51	0.01	0.12	0.93	0.04	0.10	0.08		0.18	0.12	
Uniform Delay, d1	34.8	12.4	9.0	39.9	22.2	13.2	24.4	24.3		24.9	24.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.0	2.0	0.0	1.0	17.5	0.0	0.2	0.1		0.3	0.2	
Delay (s)	37.8	14.4	9.0	40.9	39.6	13.2	24.6	24.4		25.2	24.6	
Level of Service	D	B	A	D	D	B	C	C		C	C	
Approach Delay (s)		18.7			37.9			24.4			24.8	
Approach LOS		B			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	28.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	84.8	Sum of lost time (s)	15.0
Intersection Capacity Utilization	86.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	126	358	14	21	696	99	49	134	60	130	54	165
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.97	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1050	1540	2937			2974	1072
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.63	1.00			0.68	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1050	1024	2937			2107	1072
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	131	373	15	22	725	103	51	140	62	135	56	172
RTOR Reduction (vph)	0	0	5	0	0	22	0	52	0	0	0	146
Lane Group Flow (vph)	131	373	10	22	725	81	51	150	0	0	191	26
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	7.0	57.6	57.6	1.9	51.5	51.5	14.3	14.3			13.3	13.3
Effective Green, g (s)	7.0	57.6	57.6	1.9	51.5	51.5	14.3	14.3			13.3	13.3
Actuated g/C Ratio	0.08	0.66	0.66	0.02	0.59	0.59	0.16	0.16			0.15	0.15
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	97	806	914	33	720	622	168	483			322	164
v/s Ratio Prot	c0.11	0.31		0.01	c0.60			0.05				
v/s Ratio Perm			0.01			0.08	0.05				c0.09	0.02
v/c Ratio	1.35	0.46	0.01	0.67	1.01	0.13	0.30	0.31			0.89dl	0.16
Uniform Delay, d1	39.9	7.1	4.9	42.1	17.6	7.8	31.9	31.9			34.2	31.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	211.1	0.4	0.0	40.8	35.3	0.1	1.0	0.4			2.9	0.5
Delay (s)	251.0	7.5	5.0	83.0	52.9	7.9	32.9	32.3			37.2	32.4
Level of Service	F	A	A	F	D	A	C	C			D	C
Approach Delay (s)		68.9			48.2			32.4			34.9	
Approach LOS		E			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	49.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	86.8	Sum of lost time (s)	15.0
Intersection Capacity Utilization	95.4%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	377	84	36	470	404	43	357	34	87	130	38
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.90		1.00	*0.90	*0.80	*0.80	*0.80	*0.80	*1.00	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.89	1.00	1.00	0.97	1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1337	1039		1335	1267	853	1070	957	924	1337	1073	
Flt Permitted	0.16	1.00		0.30	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	220	1039		416	1267	853	1070	957	924	1337	1073	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	43	401	89	38	500	430	46	380	36	93	138	40
RTOR Reduction (vph)	0	7	0	0	0	132	0	0	25	0	9	0
Lane Group Flow (vph)	43	483	0	38	500	298	46	380	11	93	169	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	46.1	46.1		46.1	46.1	53.1	7.8	35.2	35.2	7.0	34.4	
Effective Green, g (s)	46.1	46.1		46.1	46.1	53.1	7.8	35.2	35.2	7.0	34.4	
Actuated g/C Ratio	0.42	0.42		0.42	0.42	0.48	0.07	0.32	0.32	0.06	0.31	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	114	433		192	528	448	75	304	294	84	333	
v/s Ratio Prot	0.01	c0.46		0.00	0.39	c0.04	0.04	c0.40		c0.07	0.16	
v/s Ratio Perm	0.15			0.08		0.31			0.01			
v/c Ratio	0.38	1.12		0.20	0.95	0.67	0.61	1.25	0.04	1.11	0.51	
Uniform Delay, d1	23.5	32.2		30.9	31.1	22.0	49.9	37.7	26.0	51.8	31.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.1	78.5		0.5	26.2	3.7	14.0	136.8	0.1	130.2	1.2	
Delay (s)	25.5	110.8		31.4	57.3	25.7	63.9	174.5	26.1	182.0	32.4	
Level of Service	C	F		C	E	C	E	F	C	F	C	
Approach Delay (s)		103.9			42.2			152.0			83.7	
Approach LOS		F			D			F			F	

Intersection Summary			
HCM 2000 Control Delay	84.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	110.6	Sum of lost time (s)	20.0
Intersection Capacity Utilization	82.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	35	241	86	75	181	18	55	132	70	19	118	38
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	39	268	96	83	201	20	61	147	78	21	131	42

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	402	83	221	208	78	194
Volume Left (vph)	39	83	0	61	0	21
Volume Right (vph)	96	0	20	0	78	42
Hadj (s)	-0.09	0.53	-0.03	0.18	-0.67	-0.07
Departure Headway (s)	6.8	7.6	7.0	7.5	6.6	7.5
Degree Utilization, x	0.75	0.18	0.43	0.43	0.14	0.40
Capacity (veh/h)	518	440	469	440	494	426
Control Delay (s)	27.6	11.0	14.1	14.9	9.6	15.5
Approach Delay (s)	27.6	13.2		13.5		15.5
Approach LOS	D	B		B		C

Intersection Summary			
Delay	18.5		
Level of Service	C		
Intersection Capacity Utilization	67.2%	ICU Level of Service	C
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	256	306	42	10	229	35	39	713	34	22	396	287
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1300	1300	1300	1300	1300	1300
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.98		1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1495	2992		1509	2981		1170	2320		1170	2161	
Flt Permitted	0.57	1.00		0.49	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	897	2992		779	2981		1170	2320		1170	2161	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	272	326	45	11	244	37	41	759	36	23	421	305
RTOR Reduction (vph)	0	11	0	0	12	0	0	3	0	0	130	0
Lane Group Flow (vph)	272	360	0	11	269	0	41	792	0	23	596	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	34.7	34.7		34.7	34.7		11.9	34.9		14.9	37.9	
Effective Green, g (s)	34.7	34.7		34.7	34.7		11.9	34.9		14.9	37.9	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.12	0.35		0.15	0.38	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Grp Cap (vph)	311	1038		270	1034		139	809		174	819	
v/s Ratio Prot		0.12			0.09		0.04	c0.34		0.02	c0.28	
v/s Ratio Perm	c0.30			0.01								
v/c Ratio	0.87	0.35		0.04	0.26		0.29	0.98		0.13	0.73	
Uniform Delay, d1	30.6	24.2		21.6	23.4		40.2	32.2		36.9	26.6	
Progression Factor	1.00	1.00		1.00	1.00		0.91	0.80		1.45	0.72	
Incremental Delay, d2	27.2	0.9		0.3	0.6		3.5	21.1		1.1	4.1	
Delay (s)	57.8	25.2		21.9	24.1		40.1	46.8		54.9	23.3	
Level of Service	E	C		C	C		D	D		D	C	
Approach Delay (s)		39.0			24.0			46.5			24.3	
Approach LOS		D			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	35.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	110.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	963	28	2	588	2	38	0	8	13	0	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor		0.95		1.00	0.95			1.00		1.00	1.00	
Frpb, ped/bikes		1.00		1.00	1.00			0.99		1.00	0.96	
Flpb, ped/bikes		1.00		0.99	1.00			0.99		0.98	1.00	
Frt		1.00		1.00	1.00			0.98		1.00	0.85	
Flt Protected		1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)		3402		1702	3419			1653		1682	1477	
Flt Permitted		1.00		0.17	1.00			0.83		0.72	1.00	
Satd. Flow (perm)		3402		296	3419			1421		1283	1477	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1047	30	2	639	2	41	0	9	14	0	14
RTOR Reduction (vph)	0	3	0	0	1	0	0	22	0	0	9	0
Lane Group Flow (vph)	0	1074	0	2	640	0	0	28	0	14	5	0
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		27.0		27.0	27.0			23.0		23.0	23.0	
Effective Green, g (s)		27.0		27.0	27.0			23.0		23.0	23.0	
Actuated g/C Ratio		0.45		0.45	0.45			0.38		0.38	0.38	
Clearance Time (s)		5.0		5.0	5.0			5.0		5.0	5.0	
Lane Grp Cap (vph)		1530		133	1538			544		491	566	
v/s Ratio Prot		c0.32			0.19						0.00	
v/s Ratio Perm				0.01				c0.02		0.01		
v/c Ratio		0.70		0.02	0.42			0.05		0.03	0.01	
Uniform Delay, d1		13.3		9.1	11.2			11.6		11.5	11.4	
Progression Factor		1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2		2.7		0.2	0.8			0.2		0.1	0.0	
Delay (s)		16.0		9.3	12.0			11.8		11.6	11.5	
Level of Service		B		A	B			B		B	B	
Approach Delay (s)		16.0			12.0			11.8			11.6	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	93	0	0	760	6	467	112	662	0	0	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frpb, ped/bikes		1.00			1.00		1.00	0.98				1.00
Flpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Frt		1.00			1.00		1.00	0.87				0.85
Flt Protected		1.00			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3416			5125		1711	2925				2694
Flt Permitted		0.95			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3235			5125		1711	2925				2694
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	3	97	0	0	792	6	486	117	690	0	0	132
RTOR Reduction (vph)	0	0	0	0	1	0	0	368	0	0	0	126
Lane Group Flow (vph)	0	100	0	0	797	0	486	439	0	0	0	6
Confl. Peds. (#/hr)	20					20	1		10			
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		38.5			29.5		42.0	42.0				4.0
Effective Green, g (s)		38.5			29.5		42.0	42.0				4.0
Actuated g/C Ratio		0.43			0.33		0.47	0.47				0.04
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1391			1679		798	1365				119
v/s Ratio Prot		c0.00			c0.16		c0.28	0.15				0.00
v/s Ratio Perm		0.03										
v/c Ratio		0.07			0.47		0.61	0.32				0.05
Uniform Delay, d1		15.2			24.1		17.9	15.1				41.2
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			1.0		3.4	0.6				0.8
Delay (s)		15.3			25.0		21.3	15.7				42.0
Level of Service		B			C		C	B				D
Approach Delay (s)		15.3			25.0			17.8			42.0	
Approach LOS		B			C			B			D	

Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.
4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	96	616	656	698	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.98	0.97	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.89	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1494	1417	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1494	1417	3319	1801		
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	98	629	669	712	0	0
RTOR Reduction (vph)	39	39	0	0	0	0
Lane Group Flow (vph)	329	320	669	712	0	0
Confl. Peds. (#/hr)		4	5			
Confl. Bikes (#/hr)		24				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	32.8	32.8	17.2	60.0		
Effective Green, g (s)	32.8	32.8	17.2	60.0		
Actuated g/C Ratio	0.55	0.55	0.29	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	816	774	951	1801		
v/s Ratio Prot	0.22		c0.20	c0.40		
v/s Ratio Perm		0.23				
v/c Ratio	0.40	0.41	0.70	0.40		
Uniform Delay, d1	7.9	8.0	19.1	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.3	0.4	2.4	0.1		
Delay (s)	8.2	8.3	21.5	0.1		
Level of Service	A	A	C	A		
Approach Delay (s)	8.3			10.5	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	9.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	52.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	208	159	178	8	222	16	199	623	5	25	420	151
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.94		1.00	0.99		1.00	1.00		1.00	0.97	
Flpb, ped/bikes	0.98	1.00		0.94	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.92		1.00	0.99		1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1191	1972		1141	1254		1215	2426		1215	2267	
Flt Permitted	0.34	1.00		0.54	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	431	1972		650	1254		1215	2426		1215	2267	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	217	166	185	8	231	17	207	649	5	26	438	157
RTOR Reduction (vph)	0	114	0	0	3	0	0	1	0	0	38	0
Lane Group Flow (vph)	217	237	0	8	245	0	207	653	0	26	557	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	38.3	38.3		23.1	23.1		16.1	41.6		3.8	29.3	
Effective Green, g (s)	38.3	38.3		23.1	23.1		16.1	41.6		3.8	29.3	
Actuated g/C Ratio	0.38	0.38		0.23	0.23		0.16	0.42		0.04	0.29	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	240	755		150	289		195	1009		46	664	
v/s Ratio Prot	c0.09	0.12			0.20		c0.17	0.27		0.02	c0.25	
v/s Ratio Perm	c0.26			0.01								
v/c Ratio	0.90	0.31		0.05	0.85		1.06	0.65		0.57	0.84	
Uniform Delay, d1	27.6	21.6		29.9	36.8		42.0	23.3		47.3	33.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.91	
Incremental Delay, d2	33.5	0.2		0.1	20.0		81.7	3.2		10.9	9.0	
Delay (s)	61.0	21.9		30.1	56.7		123.6	26.6		58.3	39.0	
Level of Service	E	C		C	E		F	C		E	D	
Approach Delay (s)		36.8			55.9			49.9			39.8	
Approach LOS		D			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	44.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	97.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

EXISTING 2015 (NO PROJECT)
NO SF GIANTS GAME AT AT&T PARK
WEEKDAY EVENING

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	808	695	17	159	920	53	44	831	236	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00	0.68			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00			
Frt	1.00	1.00		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	3046		2987	2999			5475	941			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	3046		2987	2999			5475	941			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	878	755	18	173	1000	58	48	903	257	0	0	0
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	184	0	0	0
Lane Group Flow (vph)	878	772	0	173	1057	0	0	951	73	0	0	0
Confl. Peds. (#/hr)			400			400	400		400			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.2	48.5		11.3	41.6			31.3	31.3			
Effective Green, g (s)	18.2	48.5		11.3	41.6			31.3	31.3			
Actuated g/C Ratio	0.17	0.44		0.10	0.38			0.28	0.28			
Clearance Time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	741	1343		306	1134			1557	267			
v/s Ratio Prot	c0.20	0.25		0.06	c0.35							
v/s Ratio Perm								0.17	0.08			
v/c Ratio	1.18	0.57		0.57	0.93			0.61	0.27			
Uniform Delay, d1	45.9	23.0		47.0	32.9			34.1	30.5			
Progression Factor	0.63	0.55		0.98	0.46			1.43	5.39			
Incremental Delay, d2	92.7	1.2		1.1	7.0			0.6	0.5			
Delay (s)	121.4	13.9		47.3	22.2			49.5	165.1			
Level of Service	F	B		D	C			D	F			
Approach Delay (s)		71.1			25.7			74.1			0.0	
Approach LOS		E			C			E			A	

Intersection Summary			
HCM 2000 Control Delay	58.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.9
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	187	1389	24	31	902	31	26	87	80	51	279	458
Ideal Flow (vphpl)	1700	1700	1700	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00	0.63	1.00	0.77	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.95	1.00	0.70	1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85	1.00	0.93	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1377	3923		1296	2527			1524	856	1077	2107	581
Flt Permitted	0.95	1.00		0.95	1.00			0.65	1.00	0.68	1.00	1.00
Satd. Flow (perm)	1377	3923		1296	2527			1000	856	768	2107	581
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	205	1526	26	34	991	34	29	96	88	56	307	503
RTOR Reduction (vph)	0	1	0	0	2	0	0	0	66	0	152	191
Lane Group Flow (vph)	205	1551	0	34	1023	0	0	125	22	56	401	66
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	23.1	53.8		8.9	38.0			27.4	27.4	28.4	28.4	28.4
Effective Green, g (s)	23.1	53.8		8.9	38.0			27.4	27.4	28.4	28.4	28.4
Actuated g/C Ratio	0.21	0.49		0.08	0.35			0.25	0.25	0.26	0.26	0.26
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	289	1918		104	872			249	213	198	543	150
v/s Ratio Prot	0.15	c0.40		0.03	c0.40						c0.19	
v/s Ratio Perm								0.13	0.03	0.07		0.11
v/c Ratio	0.71	0.81		0.33	1.17			0.50	0.10	0.28	0.74	0.44
Uniform Delay, d1	40.3	23.7		47.7	36.0			35.4	31.8	32.7	37.4	34.2
Progression Factor	0.63	0.79		0.59	0.63			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.4		0.8	83.3			1.6	0.2	0.8	5.2	2.1
Delay (s)	26.2	19.0		28.7	105.9			37.0	32.0	33.4	42.6	36.2
Level of Service	C	B		C	F			D	C	C	D	D
Approach Delay (s)		19.9			103.4			35.0			40.1	
Approach LOS		B			F			C			D	

Intersection Summary			
HCM 2000 Control Delay	47.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	118.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1581	199	2	1384	74	19
Ideal Flow (vphpl)	1850	1850	1850	1850	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.98			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2937			2998	1540	1357
Flt Permitted	1.00			0.93	0.95	1.00
Satd. Flow (perm)	2937			2789	1540	1357
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1664	209	2	1457	78	20
RTOR Reduction (vph)	9	0	0	0	0	11
Lane Group Flow (vph)	1864	0	0	1459	78	9
Confl. Peds. (#/hr)		37	37		1	3
Confl. Bikes (#/hr)		1				
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	1658			1574	512	451
v/s Ratio Prot	c0.63				c0.05	
v/s Ratio Perm				0.52		0.01
v/c Ratio	1.12			0.93	0.15	0.02
Uniform Delay, d1	23.9			21.9	25.8	24.7
Progression Factor	1.00			0.72	1.00	1.00
Incremental Delay, d2	64.5			3.3	0.6	0.1
Delay (s)	88.5			19.1	26.4	24.7
Level of Service	F			B	C	C
Approach Delay (s)	88.5			19.1	26.1	
Approach LOS	F			B	C	

Intersection Summary			
HCM 2000 Control Delay	57.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	97.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

4/22/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	122	1129	155	29	278	527	260	144	654	258
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		3.5			3.0	3.0			3.0	3.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.99	1.00
Flpb, ped/bikes		1.00			1.00	1.00			1.00	1.00
Frt		0.98			1.00	0.95			1.00	0.85
Flt Protected		1.00			1.00	1.00			0.95	1.00
Satd. Flow (prot)		5773			2869	2440			4080	1122
Flt Permitted		1.00			0.75	1.00			0.95	1.00
Satd. Flow (perm)		5773			2150	2440			4080	1122
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	139	1283	176	33	316	599	295	164	743	293
RTOR Reduction (vph)	0	29	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	1569	0	0	349	893	0	0	936	264
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Prot
Protected Phases		6			4	4		7	7	7
Permitted Phases	6			4						
Actuated Green, G (s)		20.5			22.0	22.0			15.0	15.0
Effective Green, g (s)		22.5			25.0	25.0			18.0	18.0
Actuated g/C Ratio		0.30			0.33	0.33			0.24	0.24
Clearance Time (s)		5.5			6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1731			716	813			979	269
v/s Ratio Prot						c0.37			0.23	c0.24
v/s Ratio Perm		0.27			0.16					
v/c Ratio		0.91			0.49	1.10			0.96	0.98
Uniform Delay, d1		25.2			19.9	25.0			28.1	28.3
Progression Factor		1.00			1.00	1.00			1.00	1.00
Incremental Delay, d2		7.2			0.5	61.8			18.8	49.5
Delay (s)		32.4			20.4	86.8			47.0	77.8
Level of Service		C			C	F			D	E
Approach Delay (s)		32.4			20.4	86.8			53.7	
Approach LOS		C			C	F			D	

Intersection Summary			
HCM 2000 Control Delay	49.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	87.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	29	453	654	48	278	283	30	212	105	476
Ideal Flow (vphpl)	1000	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)	2.0	4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor	1.00	0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes	1.00	1.00	0.99		0.85		0.98		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00		1.00		1.00	1.00
Frt	1.00	1.00	0.99		0.92		0.85		1.00	1.00
Flt Protected	0.95	0.95	1.00		1.00		1.00		0.95	0.99
Satd. Flow (prot)	810	1313	1911		2182		1161		1327	2539
Flt Permitted	0.95	0.95	1.00		1.00		1.00		0.20	0.72
Satd. Flow (perm)	810	1313	1911		2182		1161		279	1849
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	31	477	688	51	293	298	32	223	111	501
RTOR Reduction (vph)	0	0	9	0	1	0	23	0	0	0
Lane Group Flow (vph)	31	429	778	0	593	0	6	0	244	591
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	8	0	5	0	0	0	0	5
Parking (#/hr)			10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)	18.5	18.5	18.5		16.0		16.0		31.0	31.0
Effective Green, g (s)	21.0	18.5	21.0		17.5		16.0		32.5	32.5
Actuated g/C Ratio	0.27	0.24	0.27		0.23		0.21		0.42	0.42
Clearance Time (s)	4.5	4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)	220	315	521		495		241		287	892
v/s Ratio Prot	0.04	0.33	c0.41		c0.27				c0.14	0.11
v/s Ratio Perm							0.01		0.22	0.17
v/c Ratio	0.14	1.36	1.49		1.28dr		0.03		0.85	0.66
Uniform Delay, d1	21.2	29.2	28.0		29.8		24.3		25.7	17.9
Progression Factor	1.00	1.00	1.00		1.00		1.00		1.00	1.00
Incremental Delay, d2	1.3	182.1	232.2		107.5		0.2		25.8	3.9
Delay (s)	22.5	211.3	260.2		137.3		24.5		51.5	21.7
Level of Service	C	F	F		F		C		D	C
Approach Delay (s)			237.5		132.0					30.4
Approach LOS			F		F					C

Intersection Summary			
HCM 2000 Control Delay	149.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	89.1%	ICU Level of Service	E
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	17	99	12	2	26	20	765	1	4	156	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		0.99	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.91		1.00	1.00		1.00	0.98	
Flt Protected		0.97	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1557	1353		1428		1272	2544		1540	3004	
Flt Permitted		0.83	1.00		0.93		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1339	1353		1352		1272	2544		1540	3004	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	38	21	122	15	2	32	25	944	1	5	193	30
RTOR Reduction (vph)	0	0	83	0	22	0	0	0	0	0	13	0
Lane Group Flow (vph)	0	59	39	0	27	0	25	945	0	5	211	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		32.1	32.1		32.1		14.8	37.5		14.5	37.5	
Effective Green, g (s)		32.1	32.1		32.1		14.8	37.5		14.5	37.5	
Actuated g/C Ratio		0.32	0.32		0.32		0.15	0.38		0.14	0.38	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Grp Cap (vph)		429	434		433		188	954		223	1126	
v/s Ratio Prot							0.02	c0.37		0.00	c0.07	
v/s Ratio Perm		c0.04	0.03		0.02							
v/c Ratio		0.14	0.09		0.06		0.13	0.99		0.02	0.19	
Uniform Delay, d1		24.1	23.7		23.5		37.0	31.1		36.7	21.0	
Progression Factor		1.00	1.00		1.00		1.65	0.50		1.00	1.00	
Incremental Delay, d2		0.7	0.4		0.3		1.0	21.8		0.2	0.4	
Delay (s)		24.8	24.2		23.8		62.0	37.3		36.9	21.4	
Level of Service		C	C		C		E	D		D	C	
Approach Delay (s)		24.4			23.8			37.9			21.7	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	33.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.9
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	5	8	4	9	33	13	54	4	138	119	23
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00	1.00	1.00	1.00		1.00	0.97	
Flpb, ped/bikes		0.99			1.00	1.00	0.84	1.00		1.00	1.00	
Frt		0.95			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.98			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2362			1427	1230	1160	1430		1377	1366	
Flt Permitted		0.95			1.00	1.00	0.93	1.00		0.95	1.00	
Satd. Flow (perm)		2302			1449	1230	1136	1430		1377	1366	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	9	5	8	4	9	34	14	56	4	144	124	24
RTOR Reduction (vph)	0	8	0	0	0	17	0	4	0	0	7	0
Lane Group Flow (vph)	0	14	0	0	13	17	14	56	0	144	141	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Parking (#/hr)		2										
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		1.0			1.0	19.0	4.3	4.3		18.0	27.3	
Effective Green, g (s)		1.0			1.0	19.0	4.3	4.3		18.0	27.3	
Actuated g/C Ratio		0.03			0.03	0.50	0.11	0.11		0.47	0.71	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		60			37	770	127	160		647	973	
v/s Ratio Prot						0.01		c0.04		c0.10	0.10	
v/s Ratio Perm		0.01			c0.01	0.00	0.01					
v/c Ratio		0.24			0.35	0.02	0.11	0.35		0.22	0.15	
Uniform Delay, d1		18.3			18.3	4.9	15.3	15.7		6.0	1.8	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.0			5.7	0.0	0.4	1.3		0.2	0.1	
Delay (s)		20.3			24.0	4.9	15.7	17.1		6.2	1.8	
Level of Service		C			C	A	B	B		A	A	
Approach Delay (s)		20.3			10.2			16.8			4.0	
Approach LOS		C			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	7.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	38.3	Sum of lost time (s)	15.0
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	53	208	479	19	115	242
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1743	1535	849	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1743	1535	849	1134	1194
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	57	224	515	20	124	260
RTOR Reduction (vph)	0	197	0	6	0	0
Lane Group Flow (vph)	57	27	515	14	124	260
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	10.0	10.0	42.4	37.4	14.9	62.3
Effective Green, g (s)	10.0	10.0	42.4	37.4	14.9	62.3
Actuated g/C Ratio	0.12	0.12	0.52	0.45	0.18	0.76
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	137	211	790	437	205	903
v/s Ratio Prot	c0.05		c0.34	0.01	c0.11	0.22
v/s Ratio Perm		0.02		0.01		
v/c Ratio	0.42	0.13	0.65	0.03	0.60	0.29
Uniform Delay, d1	33.4	32.3	14.6	12.4	31.0	3.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.0	0.3	1.9	0.0	5.0	0.2
Delay (s)	35.5	32.5	16.5	12.5	36.0	3.3
Level of Service	D	C	B	B	D	A
Approach Delay (s)	33.1		16.4			13.8
Approach LOS	C		B			B

Intersection Summary			
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	82.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	52.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
9: Terry A Francois Blvd/Terry A Francois Blvd. & South St.

4/22/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	20	24	2	85	96	20
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	24	28	2	100	113	24
Pedestrians	50			50	50	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	4			4	4	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	279	168	186			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	279	168	186			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	96	100			
cM capacity (veh/h)	635	783	1332			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	24	28	36	67	75	61
Volume Left	24	0	2	0	0	0
Volume Right	0	28	0	0	0	24
cSH	635	783	1332	1700	1700	1700
Volume to Capacity	0.04	0.04	0.00	0.04	0.04	0.04
Queue Length 95th (ft)	3	3	0	0	0	0
Control Delay (s)	10.9	9.8	0.5	0.0	0.0	0.0
Lane LOS	B	A	A			
Approach Delay (s)	10.3		0.2		0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	30.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
10: Third St. & South St.

4/22/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	132	39	792	34	6	394
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.96	1.00		1.00	1.00
Flpb, ped/bikes	0.93	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1584	1466	3394		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1584	1466	3394		1711	3421
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	148	44	890	38	7	443
RTOR Reduction (vph)	0	31	3	0	0	0
Lane Group Flow (vph)	148	13	925	0	7	443
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	28.7	28.7	54.0		2.0	61.1
Effective Green, g (s)	28.7	28.7	54.0		2.0	61.1
Actuated g/C Ratio	0.29	0.29	0.54		0.02	0.61
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	454	420	1832		34	2090
v/s Ratio Prot			c0.27		0.00	c0.13
v/s Ratio Perm	c0.09	0.01				
v/c Ratio	0.33	0.03	0.51		0.21	0.21
Uniform Delay, d1	28.0	25.6	14.5		48.2	8.7
Progression Factor	1.00	1.00	2.17		1.13	0.79
Incremental Delay, d2	0.4	0.0	0.7		3.0	0.1
Delay (s)	28.5	25.7	32.3		57.6	6.9
Level of Service	C	C	C		E	A
Approach Delay (s)	27.8		32.3			7.7
Approach LOS	C		C			A

Intersection Summary			
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
11: Terry A Francois Blvd./Terry A Francois Blvd & 16th

4/22/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	87	120	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	0	102	141	0
Pedestrians	25			1	1	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	2			0	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	218	97	166			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	218	97	166			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	735	922	1382			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	0	34	68	94	47
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1700	1382	1700	1700	1700
Volume to Capacity	0.00	0.00	0.04	0.06	0.03
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	0.0	0.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	19.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
12: Illinois St & 16th

4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	3	61	23	16	86	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	4	75	28	20	106	2
Pedestrians	50			50	50	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	4			4	4	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	499					
pX, platoon unblocked						
vC, conflicting volume			129		218	141
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			129		218	141
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		85	100
cM capacity (veh/h)			1401		698	839

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	79	48	109
Volume Left	0	28	106
Volume Right	75	0	2
cSH	1700	1401	701
Volume to Capacity	0.05	0.02	0.16
Queue Length 95th (ft)	0	2	14
Control Delay (s)	0.0	4.6	11.1
Lane LOS		A	B
Approach Delay (s)	0.0	4.6	11.1
Approach LOS			B

Intersection Summary			
Average Delay	6.0		
Intersection Capacity Utilization	30.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	136	49	219	2	67	33	202	657	5	10	337	178
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.97	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1255	1365	1126	1282	1365	1099	2515	2589		1296	2435	
Flt Permitted	0.71	1.00	1.00	0.72	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	934	1365	1126	972	1365	1099	2515	2589		1296	2435	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	156	56	252	2	77	38	232	755	6	11	387	205
RTOR Reduction (vph)	0	0	165	0	0	25	0	1	0	0	69	0
Lane Group Flow (vph)	156	56	87	2	77	13	232	760	0	11	523	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Effective Green, g (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Actuated g/C Ratio	0.34	0.34	0.34	0.34	0.34	0.34	0.14	0.38		0.12	0.36	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Grp Cap (vph)	322	470	388	335	470	379	352	978		155	871	
v/s Ratio Prot		0.04			0.06		0.09	c0.29		0.01	c0.21	
v/s Ratio Perm	c0.17		0.08	0.00		0.01						
v/c Ratio	0.48	0.12	0.22	0.01	0.16	0.03	0.66	0.78		0.07	0.60	
Uniform Delay, d1	25.8	22.4	23.2	21.5	22.7	21.7	40.7	27.4		39.1	26.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.90	0.80		1.00	0.88	
Incremental Delay, d2	5.1	0.5	1.3	0.0	0.7	0.2	6.2	4.0		0.9	3.0	
Delay (s)	30.9	22.9	24.6	21.5	23.5	21.9	43.0	26.0		39.9	26.0	
Level of Service	C	C	C	C	C	C	D	C		D	C	
Approach Delay (s)		26.5			22.9			30.0			26.3	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	102.5%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	95	344	9	19	389	39	23	14	13	46	10	114
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.86	1.00	1.00		1.00	0.94	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1245	1621	1582		1491	1378	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.65	1.00		0.74	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1245	1109	1582		1157	1378	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	110	400	10	22	452	45	27	16	15	53	12	133
RTOR Reduction (vph)	0	0	5	0	0	25	0	11	0	0	99	0
Lane Group Flow (vph)	110	400	5	22	452	20	27	20	0	53	46	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	10.7	42.0	42.0	5.3	36.6	36.6	21.3	21.3		21.3	21.3	
Effective Green, g (s)	10.7	42.0	42.0	5.3	36.6	36.6	21.3	21.3		21.3	21.3	
Actuated g/C Ratio	0.13	0.50	0.50	0.06	0.44	0.44	0.25	0.25		0.25	0.25	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	207	857	728	102	746	545	282	403		294	351	
v/s Ratio Prot	c0.07	0.23		0.01	c0.26			0.01			0.03	
v/s Ratio Perm			0.00			0.02	0.02			c0.05		
v/c Ratio	0.53	0.47	0.01	0.22	0.61	0.04	0.10	0.05		0.18	0.13	
Uniform Delay, d1	34.1	13.5	10.4	37.2	18.0	13.4	23.8	23.5		24.3	24.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.6	1.8	0.0	1.1	1.4	0.0	0.1	0.1		0.3	0.2	
Delay (s)	36.7	15.3	10.4	38.2	19.4	13.5	23.9	23.6		24.6	24.2	
Level of Service	D	B	B	D	B	B	C	C		C	C	
Approach Delay (s)		19.8			19.7			23.7			24.3	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	20.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	83.6	Sum of lost time (s)	15.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↱			↰↑	↱
Volume (vph)	69	317	32	55	425	47	31	102	37	94	124	106
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.98	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1049	1540	2957			3014	1072
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.60	1.00			0.78	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1049	979	2957			2386	1072
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	345	35	60	462	51	34	111	40	102	135	115
RTOR Reduction (vph)	0	0	16	0	0	25	0	32	0	0	0	94
Lane Group Flow (vph)	75	345	19	60	462	26	34	119	0	0	237	21
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	7.2	40.4	40.4	5.4	37.6	37.6	14.7	14.7			13.7	13.7
Effective Green, g (s)	7.2	40.4	40.4	5.4	37.6	37.6	14.7	14.7			13.7	13.7
Actuated g/C Ratio	0.10	0.55	0.55	0.07	0.51	0.51	0.20	0.20			0.19	0.19
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	119	667	757	113	621	536	195	591			444	199
v/s Ratio Prot	c0.06	c0.28		0.04	c0.38			0.04				
v/s Ratio Perm			0.01			0.02	0.03				c0.10	0.02
v/c Ratio	0.63	0.52	0.03	0.53	0.74	0.05	0.17	0.20			0.53	0.11
Uniform Delay, d1	31.9	10.4	7.6	32.8	14.2	9.0	24.4	24.5			27.0	24.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	10.4	0.7	0.0	4.7	4.8	0.0	0.4	0.2			1.2	0.2
Delay (s)	42.3	11.1	7.6	37.6	19.0	9.0	24.8	24.7			28.3	25.1
Level of Service	D	B	A	D	B	A	C	C			C	C
Approach Delay (s)		16.0			20.0			24.7			27.2	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	21.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	73.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑	↱	↰	↑	↱	↰	↑↱	
Volume (vph)	23	319	77	38	321	203	69	230	17	83	109	36
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.90	1.00	1.00	0.96	1.00	0.98	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1328	921		1335	1126	860	1070	957	921	1070	1064	
Flt Permitted	0.30	1.00		0.33	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	423	921		470	1126	860	1070	957	921	1070	1064	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	347	84	41	349	221	75	250	18	90	118	39
RTOR Reduction (vph)	0	8	0	0	0	103	0	0	13	0	12	0
Lane Group Flow (vph)	25	423	0	41	349	118	75	250	5	90	145	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	49.1	49.1		49.1	49.1	58.1	17.9	28.0	28.0	9.0	19.1	
Effective Green, g (s)	49.1	49.1		49.1	49.1	58.1	17.9	28.0	28.0	9.0	19.1	
Actuated g/C Ratio	0.45	0.45		0.45	0.45	0.54	0.17	0.26	0.26	0.08	0.18	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	210	417		231	510	500	176	247	237	88	187	
v/s Ratio Prot	0.00	c0.46		0.00	c0.31	0.02	0.07	c0.26		c0.08	0.14	
v/s Ratio Perm	0.05			0.08		0.12			0.01			
v/c Ratio	0.12	1.02		0.18	0.68	0.24	0.43	1.01	0.02	1.02	0.78	
Uniform Delay, d1	18.3	29.7		25.8	23.5	13.4	40.6	40.2	30.0	49.7	42.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	48.0		0.4	3.8	0.2	1.7	60.4	0.0	102.3	18.2	
Delay (s)	18.5	77.6		26.1	27.3	13.6	42.3	100.6	30.0	152.0	60.8	
Level of Service	B	E		C	C	B	D	F	C	F	E	
Approach Delay (s)		74.4			22.3			84.2			94.0	
Approach LOS		E			C			F			F	

Intersection Summary			
HCM 2000 Control Delay	60.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	108.4	Sum of lost time (s)	20.0
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	12	62	59	47	105	6	39	74	53	8	29	26
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	13	68	65	52	115	7	43	81	58	9	32	29

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	146	52	122	124	58	69
Volume Left (vph)	13	52	0	43	0	9
Volume Right (vph)	65	0	7	0	58	29
Hadj (s)	-0.21	0.53	0.00	0.21	-0.67	-0.19
Departure Headway (s)	5.2	5.9	5.3	5.6	4.8	5.4
Degree Utilization, x	0.21	0.08	0.18	0.19	0.08	0.10
Capacity (veh/h)	653	581	642	606	709	618
Control Delay (s)	9.6	8.2	8.3	8.8	7.0	9.0
Approach Delay (s)	9.6	8.3		8.2		9.0
Approach LOS	A	A		A		A

Intersection Summary			
Delay	8.7		
Level of Service	A		
Intersection Capacity Utilization	37.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	308	90	48	7	152	11	32	546	19	25	362	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.97	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.99		1.00	0.99		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1665	3202		1677	3376		1260	2504		1260	2373	
Flt Permitted	0.64	1.00		0.65	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1118	3202		1156	3376		1260	2504		1260	2373	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	342	100	53	8	169	12	36	607	21	28	402	190
RTOR Reduction (vph)	0	37	0	0	5	0	0	2	0	0	56	0
Lane Group Flow (vph)	342	116	0	8	176	0	36	626	0	28	536	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	29.7	29.7		29.7	29.7		16.9	39.9		14.9	37.9	
Effective Green, g (s)	29.7	29.7		29.7	29.7		16.9	39.9		14.9	37.9	
Actuated g/C Ratio	0.30	0.30		0.30	0.30		0.17	0.40		0.15	0.38	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Grp Cap (vph)	332	950		343	1002		212	999		187	899	
v/s Ratio Prot		0.04			0.05		0.03	c0.25		0.02	c0.23	
v/s Ratio Perm	c0.31			0.01								
v/c Ratio	1.03	0.12		0.02	0.18		0.17	0.63		0.15	0.60	
Uniform Delay, d1	35.1	25.6		24.9	26.1		35.5	24.1		37.0	24.9	
Progression Factor	1.00	1.00		1.00	1.00		0.85	0.74		1.51	0.77	
Incremental Delay, d2	57.4	0.3		0.1	0.4		1.1	1.9		1.4	2.4	
Delay (s)	92.5	25.9		25.0	26.5		31.2	19.7		57.4	21.6	
Level of Service	F	C		C	C		C	B		E	C	
Approach Delay (s)		71.9			26.4			20.3			23.2	
Approach LOS		E			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	34.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	98.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	336	55	6	379	9	36	0	5	17	1	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00			0.98		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3349		1711	3409			1698		1711	1541	
Flt Permitted	0.51	1.00		0.50	1.00			0.81		0.73	1.00	
Satd. Flow (perm)	910	3349		908	3409			1441		1312	1541	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	365	60	7	412	10	39	0	5	18	1	24
RTOR Reduction (vph)	0	22	0	0	3	0	0	22	0	0	15	0
Lane Group Flow (vph)	22	403	0	7	419	0	0	22	0	18	10	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	27.0	27.0		27.0	27.0			23.0		23.0	23.0	
Effective Green, g (s)	27.0	27.0		27.0	27.0			23.0		23.0	23.0	
Actuated g/C Ratio	0.45	0.45		0.45	0.45			0.38		0.38	0.38	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Grp Cap (vph)	409	1507		408	1534			552		502	590	
v/s Ratio Prot		0.12			c0.12						0.01	
v/s Ratio Perm	0.02			0.01				c0.02		0.01		
v/c Ratio	0.05	0.27		0.02	0.27			0.04		0.04	0.02	
Uniform Delay, d1	9.3	10.3		9.1	10.3			11.6		11.6	11.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.4		0.1	0.4			0.1		0.1	0.1	
Delay (s)	9.6	10.8		9.2	10.8			11.7		11.7	11.5	
Level of Service	A	B		A	B			B		B	B	
Approach Delay (s)		10.7			10.8			11.7			11.6	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	33.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	92	0	0	469	19	308	129	221	0	0	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frt		1.00			0.99		1.00	0.91				0.85
Flt Protected		0.99			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3404			5102		1711	3097				2694
Flt Permitted		0.92			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3139			5102		1711	3097				2694
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	12	107	0	0	545	22	358	150	257	0	0	86
RTOR Reduction (vph)	0	0	0	0	5	0	0	151	0	0	0	80
Lane Group Flow (vph)	0	119	0	0	562	0	358	256	0	0	0	6
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		40.5			29.5		35.0	35.0				6.0
Effective Green, g (s)		40.5			29.5		35.0	35.0				6.0
Actuated g/C Ratio		0.48			0.35		0.41	0.41				0.07
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1514			1770		704	1275				190
v/s Ratio Prot		c0.01			c0.11		c0.21	0.08				0.00
v/s Ratio Perm		0.03										
v/c Ratio		0.08			0.32		0.51	0.20				0.03
Uniform Delay, d1		12.1			20.4		18.6	16.0				36.8
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			0.5		2.6	0.4				0.3
Delay (s)		12.2			20.8		21.2	16.4				37.1
Level of Service		B			C		C	B				D
Approach Delay (s)		12.2			20.8			18.6			37.1	
Approach LOS		B			C			B			D	

Intersection Summary			
HCM 2000 Control Delay	20.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St. 4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	102	444	389	461	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.90	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1529	1428	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1529	1428	3319	1801		
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	121	529	463	549	0	0
RTOR Reduction (vph)	76	76	0	0	0	0
Lane Group Flow (vph)	257	241	463	549	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	36.4	36.4	13.6	60.0		
Effective Green, g (s)	36.4	36.4	13.6	60.0		
Actuated g/C Ratio	0.61	0.61	0.23	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	927	866	752	1801		
v/s Ratio Prot	0.17		c0.14	c0.30		
v/s Ratio Perm		0.17				
v/c Ratio	0.28	0.28	0.62	0.30		
Uniform Delay, d1	5.6	5.6	20.9	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.2	0.2	1.5	0.1		
Delay (s)	5.7	5.8	22.4	0.1		
Level of Service	A	A	C	A		
Approach Delay (s)	5.8			10.3	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	8.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	38.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez 4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	200	121	165	6	127	10	122	398	13	17	327	141
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.93		1.00	0.99		1.00	1.00		1.00	0.97	
Flpb, ped/bikes	0.97	1.00		0.94	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.99		1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1175	1943		1137	1253		1215	2411		1215	2244	
Flt Permitted	0.43	1.00		0.56	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	538	1943		670	1253		1215	2411		1215	2244	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	222	134	183	7	141	11	136	442	14	19	363	157
RTOR Reduction (vph)	0	119	0	0	3	0	0	2	0	0	49	0
Lane Group Flow (vph)	222	198	0	7	149	0	136	454	0	19	471	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	34.9	34.9		17.1	17.1		16.4	42.4		6.4	32.4	
Effective Green, g (s)	34.9	34.9		17.1	17.1		16.4	42.4		6.4	32.4	
Actuated g/C Ratio	0.35	0.35		0.17	0.17		0.16	0.42		0.06	0.32	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	267	678		114	214		199	1022		77	727	
v/s Ratio Prot	c0.10	0.10			0.12		c0.11	0.19		0.02	c0.21	
v/s Ratio Perm	c0.19			0.01								
v/c Ratio	0.83	0.29		0.06	0.69		0.68	0.44		0.25	0.65	
Uniform Delay, d1	27.8	23.6		34.7	39.0		39.4	20.4		44.5	28.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.10	1.02	
Incremental Delay, d2	19.3	0.2		0.2	9.4		9.3	1.4		1.2	3.2	
Delay (s)	47.1	23.8		35.0	48.4		48.7	21.8		50.1	32.7	
Level of Service	D	C		C	D		D	C		D	C	
Approach Delay (s)		33.4			47.8			28.0			33.3	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	90.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

EXISTING 2015 (NO PROJECT)
WITH SF GIANTS GAME AT AT&T PARK
WEEKDAY EVENING

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	618	425	132	313	481	52	26	509	71	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.92		1.00	0.97			1.00	0.68			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00			
Frt	1.00	0.96		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	2745		2987	2938			5477	938			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	2745		2987	2938			5477	938			
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	702	483	150	356	547	59	30	578	81	0	0	0
RTOR Reduction (vph)	0	22	0	0	2	0	0	0	66	0	0	0
Lane Group Flow (vph)	702	611	0	356	604	0	0	608	15	0	0	0
Confl. Peds. (#/hr)			400			400	400		400			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	28.5	50.8		20.4	42.7			19.9	19.9			
Effective Green, g (s)	28.5	50.8		20.4	42.7			19.9	19.9			
Actuated g/C Ratio	0.26	0.46		0.19	0.39			0.18	0.18			
Clearance Time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	1160	1267		553	1140			990	169			
v/s Ratio Prot	c0.16	0.22		c0.12	c0.21							
v/s Ratio Perm								0.11	0.02			
v/c Ratio	0.61	0.48		0.64	0.53			0.61	0.09			
Uniform Delay, d1	35.8	20.5		41.4	25.9			41.5	37.5			
Progression Factor	1.00	1.00		1.11	0.27			1.12	1.00			
Incremental Delay, d2	0.9	1.3		0.8	0.1			1.0	0.2			
Delay (s)	36.7	21.8		46.8	7.2			47.5	37.7			
Level of Service	D	C		D	A			D	D			
Approach Delay (s)		29.6			21.9			46.4			0.0	
Approach LOS		C			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	31.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.9
Intersection Capacity Utilization	89.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	126	985	22	33	431	43	10	140	76	114	603	357
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.94			1.00	0.65	1.00	0.95	0.51
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00	0.73	1.00	1.00
Frt	1.00	1.00		1.00	0.99			1.00	0.85	1.00	0.98	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	4373		1296	2408			1598	878	1123	2761	627
Flt Permitted	0.95	1.00		0.95	1.00			0.93	1.00	0.64	1.00	1.00
Satd. Flow (perm)	1540	4373		1296	2408			1499	878	758	2761	627
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	134	1048	23	35	459	46	11	149	81	121	641	380
RTOR Reduction (vph)	0	2	0	0	6	0	0	0	53	0	7	153
Lane Group Flow (vph)	134	1069	0	35	499	0	0	160	28	121	706	155
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	13.8	51.8		7.3	43.7			41.0	41.0	42.0	42.0	42.0
Effective Green, g (s)	13.8	51.8		7.3	43.7			41.0	41.0	42.0	42.0	42.0
Actuated g/C Ratio	0.12	0.43		0.06	0.36			0.34	0.34	0.35	0.35	0.35
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	177	1887		78	876			512	299	265	966	219
v/s Ratio Prot	0.09	c0.24		0.03	c0.21						c0.26	
v/s Ratio Perm								0.11	0.03	0.16		0.25
v/c Ratio	0.76	0.57		0.45	0.57			0.31	0.09	0.46	0.73	0.71
Uniform Delay, d1	51.5	25.7		54.4	30.6			29.1	26.9	30.2	34.1	33.7
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.8	1.2		4.1	0.9			0.4	0.1	1.2	2.9	10.0
Delay (s)	68.2	26.9		58.5	31.5			29.5	27.0	31.4	36.9	43.8
Level of Service	E	C		E	C			C	C	C	D	D
Approach Delay (s)		31.5			33.2			28.6			38.2	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	34.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	140.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1111	131	2	796	87	22
Ideal Flow (vphpl)	1200	1200	1200	1200	1200	1200
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.98			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	1908			1944	972	857
Flt Permitted	1.00			0.95	0.95	1.00
Satd. Flow (perm)	1908			1853	972	857
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	1145	135	2	821	90	23
RTOR Reduction (vph)	8	0	0	0	0	15
Lane Group Flow (vph)	1272	0	0	823	90	8
Confl. Peds. (#/hr)		37	37		1	3
Confl. Bikes (#/hr)		1				
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	1077			1046	323	285
v/s Ratio Prot	c0.67				c0.09	
v/s Ratio Perm				0.44		0.01
v/c Ratio	1.18			0.79	0.28	0.03
Uniform Delay, d1	23.9			18.8	27.0	24.7
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	91.1			6.0	2.1	0.2
Delay (s)	115.1			24.7	29.1	24.9
Level of Service	F			C	C	C
Approach Delay (s)	115.1			24.7	28.3	
Approach LOS	F			C	C	

Intersection Summary			
HCM 2000 Control Delay	77.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	101.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

4/22/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	114	935	103	43	245	586	279	247	667	218
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		3.5			3.0	3.0			3.0	3.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.99	1.00
Flpb, ped/bikes		0.99			1.00	1.00			1.00	1.00
Frt		0.99			1.00	0.95			1.00	0.85
Flt Protected		1.00			0.99	1.00			0.95	1.00
Satd. Flow (prot)		5800			2858	2445			4091	1122
Flt Permitted		1.00			0.68	1.00			0.95	1.00
Satd. Flow (perm)		5800			1962	2445			4091	1122
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	119	974	107	45	255	610	291	257	695	227
RTOR Reduction (vph)	0	24	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	1176	0	0	300	898	0	0	975	204
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Prot
Protected Phases		6			4	4		7	7	7
Permitted Phases	6			4						
Actuated Green, G (s)		20.0			22.0	22.0			15.5	15.5
Effective Green, g (s)		22.0			25.0	25.0			18.5	18.5
Actuated g/C Ratio		0.29			0.33	0.33			0.25	0.25
Clearance Time (s)		5.5			6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1701			654	815			1009	276
v/s Ratio Prot						c0.37			c0.24	0.18
v/s Ratio Perm		0.20			0.15					
v/c Ratio		0.69			0.46	1.10			0.97	0.74
Uniform Delay, d1		23.5			19.7	25.0			27.9	26.0
Progression Factor		1.00			1.00	1.00			1.00	1.00
Incremental Delay, d2		1.2			0.5	63.0			20.4	9.9
Delay (s)		24.7			20.2	88.0			48.4	35.9
Level of Service		C			C	F			D	D
Approach Delay (s)		24.7			20.2	88.0			46.2	
Approach LOS		C			C	F			D	

Intersection Summary			
HCM 2000 Control Delay	47.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	96.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

5: Fifth St. & Bryant St. & I-80 EB On-Ramp

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	39	417	673	91	249	240	54	174	124	649
Ideal Flow (vphpl)	1000	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)	2.0	4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor	1.00	0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes	1.00	1.00	0.99		0.86		0.98		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00		1.00		1.00	1.00
Frt	1.00	1.00	0.98		0.93		0.85		1.00	1.00
Flt Protected	0.95	0.95	1.00		1.00		1.00		0.95	1.00
Satd. Flow (prot)	810	1313	1889		2193		1161		1327	2554
Flt Permitted	0.95	0.95	1.00		1.00		1.00		0.23	0.94
Satd. Flow (perm)	810	1313	1889		2193		1161		326	2410
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	43	458	740	100	274	264	59	191	136	713
RTOR Reduction (vph)	0	0	17	0	1	0	42	0	0	0
Lane Group Flow (vph)	43	412	869	0	543	0	11	0	300	740
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	8	0	5	0	0	0	0	5
Parking (#/hr)			10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)	18.5	18.5	18.5		16.0		16.0		31.0	31.0
Effective Green, g (s)	21.0	18.5	21.0		17.5		16.0		32.5	32.5
Actuated g/C Ratio	0.27	0.24	0.27		0.23		0.21		0.42	0.42
Clearance Time (s)	4.5	4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)	220	315	515		498		241		300	1040
v/s Ratio Prot	0.05	0.31	c0.46		c0.25				c0.16	0.12
v/s Ratio Perm							0.01		0.26	0.18
v/c Ratio	0.20	1.31	1.69		1.14dr		0.05		1.00	0.71
Uniform Delay, d1	21.5	29.2	28.0		29.8		24.4		26.1	18.4
Progression Factor	1.00	1.00	1.00		1.00		1.00		1.00	1.00
Incremental Delay, d2	2.0	159.6	317.3		67.3		0.4		52.0	4.1
Delay (s)	23.5	188.9	345.3		97.0		24.8		78.0	22.5
Level of Service	C	F	F		F		C		E	C
Approach Delay (s)			286.9		90.6					38.5
Approach LOS			F		F					D

Intersection Summary			
HCM 2000 Control Delay	160.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	87.7%	ICU Level of Service	E
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

6: Third St. & Channel St.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	137	59	1	2	1	71	447	162	204	162	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1700	1700	1700	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.99		1.00	0.97		1.00	0.99	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.97		1.00	0.96		1.00	0.97	
Flt Protected		0.99	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1604	1352		1535		1377	2554		1540	2980	
Flt Permitted		0.96	1.00		0.97		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1553	1352		1501		1377	2554		1540	2980	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	28	147	63	1	2	1	76	481	174	219	174	38
RTOR Reduction (vph)	0	0	44	0	1	0	0	30	0	0	17	0
Lane Group Flow (vph)	0	175	19	0	3	0	76	625	0	219	195	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		32.2	32.2		32.2		11.7	36.3		22.0	46.9	
Effective Green, g (s)		32.2	32.2		32.2		11.7	36.3		22.0	46.9	
Actuated g/C Ratio		0.30	0.30		0.30		0.11	0.34		0.21	0.44	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		469	409		454		151	871		318	1313	
v/s Ratio Prot							0.06	c0.24		c0.14	0.07	
v/s Ratio Perm		c0.11	0.01		0.00							
v/c Ratio		0.37	0.05		0.01		0.50	0.72		0.69	0.15	
Uniform Delay, d1		29.2	26.2		25.9		44.6	30.6		39.0	17.8	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.5	0.0		0.0		2.6	2.9		6.1	0.1	
Delay (s)		29.7	26.3		25.9		47.2	33.4		45.1	17.9	
Level of Service		C	C		C		D	C		D	B	
Approach Delay (s)		28.8			25.9			34.9			31.7	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	106.4	Sum of lost time (s)	15.9
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	11	13	7	8	93	21	106	16	195	168	33
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00	1.00	1.00	0.99		1.00	0.96	
Flpb, ped/bikes		0.99			1.00	1.00	0.84	1.00		1.00	1.00	
Frt		0.95			1.00	0.85	1.00	0.98		1.00	0.98	
Flt Protected		0.98			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2381			1415	1227	1160	1412		1377	1360	
Flt Permitted		0.95			1.00	1.00	0.62	1.00		0.95	1.00	
Satd. Flow (perm)		2312			1448	1227	757	1412		1377	1360	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	13	12	14	8	9	102	23	116	18	214	185	36
RTOR Reduction (vph)	0	13	0	0	0	54	0	9	0	0	7	0
Lane Group Flow (vph)	0	26	0	0	17	48	23	125	0	214	214	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Parking (#/hr)		2										
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		2.2			2.2	20.0	7.4	7.4		17.8	30.2	
Effective Green, g (s)		2.2			2.2	20.0	7.4	7.4		17.8	30.2	
Actuated g/C Ratio		0.05			0.05	0.47	0.17	0.17		0.42	0.71	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		119			75	723	132	246		578	968	
v/s Ratio Prot						0.03		c0.09		c0.16	0.16	
v/s Ratio Perm		0.01			c0.01	0.01	0.03					
v/c Ratio		0.22			0.23	0.07	0.17	0.51		0.37	0.22	
Uniform Delay, d1		19.3			19.3	6.1	14.9	15.9		8.4	2.1	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.9			1.5	0.0	0.6	1.6		0.4	0.1	
Delay (s)		20.2			20.8	6.1	15.5	17.5		8.9	2.2	
Level of Service		C			C	A	B	B		A	A	
Approach Delay (s)		20.2			8.2			17.2			5.5	
Approach LOS		C			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	42.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.

4/22/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	42	216	496	28	94	243
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1743	1535	847	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1743	1535	847	1134	1194
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	54	277	636	36	121	312
RTOR Reduction (vph)	0	246	0	8	0	0
Lane Group Flow (vph)	54	31	636	28	121	312
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	9.8	9.8	47.3	42.3	14.6	66.9
Effective Green, g (s)	9.8	9.8	47.3	42.3	14.6	66.9
Actuated g/C Ratio	0.11	0.11	0.55	0.49	0.17	0.77
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	128	197	837	462	190	921
v/s Ratio Prot	c0.05		c0.41	0.01	c0.11	0.26
v/s Ratio Perm		0.02		0.02		
v/c Ratio	0.42	0.16	0.76	0.06	0.64	0.34
Uniform Delay, d1	35.8	34.7	15.3	11.7	33.6	3.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.2	0.4	4.0	0.1	6.8	0.2
Delay (s)	38.0	35.1	19.3	11.8	40.4	3.3
Level of Service	D	D	B	B	D	A
Approach Delay (s)	35.6		18.9			13.7
Approach LOS	D		B			B

Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	86.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	37	33	19	287	82	43
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	44	39	23	342	98	51
Pedestrians	50			50	50	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	4			4	4	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	439	174	199			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	439	174	199			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	95	98			
cM capacity (veh/h)	496	776	1319			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	44	39	137	228	65	84
Volume Left	44	0	23	0	0	0
Volume Right	0	39	0	0	0	51
cSH	496	776	1319	1700	1700	1700
Volume to Capacity	0.09	0.05	0.02	0.13	0.04	0.05
Queue Length 95th (ft)	7	4	1	0	0	0
Control Delay (s)	13.0	9.9	1.4	0.0	0.0	0.0
Lane LOS	B	A	A			
Approach Delay (s)	11.5		0.5		0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	40.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	123	50	800	82	20	371
Ideal Flow (vphpl)	1200	1200	1200	1200	1200	1200
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.95	1.00		1.00	1.00
Flpb, ped/bikes	0.91	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	984	920	2122		1080	2161
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	984	920	2122		1080	2161
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	137	56	889	91	22	412
RTOR Reduction (vph)	0	43	5	0	0	0
Lane Group Flow (vph)	137	13	975	0	22	412
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	28.7	28.7	71.7		4.3	81.1
Effective Green, g (s)	28.7	28.7	71.7		4.3	81.1
Actuated g/C Ratio	0.24	0.24	0.60		0.04	0.68
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	235	220	1267		38	1460
v/s Ratio Prot			c0.46		c0.02	0.19
v/s Ratio Perm	c0.14	0.01				
v/c Ratio	0.58	0.06	0.77		0.58	0.28
Uniform Delay, d1	40.4	35.2	18.0		57.0	7.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.7	0.1	4.5		19.6	0.1
Delay (s)	44.0	35.4	22.5		76.6	7.9
Level of Service	D	D	C		E	A
Approach Delay (s)	41.5		22.5			11.4
Approach LOS	D		C			B

Intersection Summary			
HCM 2000 Control Delay	21.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	0	0	0	306	115	0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	0	360	135	0

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	0	120	240	90	45
Volume Left (vph)	0	0	0	0	0
Volume Right (vph)	0	0	0	0	0
Hadj (s)	0.00	0.03	0.03	0.03	0.03
Departure Headway (s)	4.9	4.6	4.6	4.8	4.8
Degree Utilization, x	0.00	0.15	0.31	0.12	0.06
Capacity (veh/h)	681	766	768	734	735
Control Delay (s)	7.9	7.3	8.5	7.2	6.9
Approach Delay (s)	0.0	8.1		7.1	
Approach LOS	A	A		A	

Intersection Summary			
Delay	7.8		
Level of Service	A		
Intersection Capacity Utilization	19.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	9	70	22	18	0	108	0	3	0	0	0
Peak Hour Factor	0.92	0.77	0.77	0.77	0.77	0.92	0.77	0.92	0.77	0.92	0.92	0.92
Hourly flow rate (vph)	0	12	91	29	23	0	140	0	4	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	103	52	144	0
Volume Left (vph)	0	29	140	0
Volume Right (vph)	91	0	4	0
Hadj (s)	-0.50	0.14	0.21	0.00
Departure Headway (s)	3.8	4.5	4.4	4.4
Degree Utilization, x	0.11	0.06	0.18	0.00
Capacity (veh/h)	906	760	781	792
Control Delay (s)	7.3	7.8	8.4	7.4
Approach Delay (s)	7.3	7.8	8.4	0.0
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.9		
Level of Service	A		
Intersection Capacity Utilization	31.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰↰	↑↑↱		↰	↑↑↱	
Volume (vph)	187	46	260	4	82	40	175	655	22	11	308	174
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.97	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1255	1365	1126	1282	1365	1099	2515	2577		1296	2428	
Flt Permitted	0.70	1.00	1.00	0.73	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	928	1365	1126	980	1365	1099	2515	2577		1296	2428	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	191	47	265	4	84	41	179	668	22	11	314	178
RTOR Reduction (vph)	0	0	174	0	0	27	0	2	0	0	79	0
Lane Group Flow (vph)	191	47	91	4	84	14	179	688	0	11	413	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Effective Green, g (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Actuated g/C Ratio	0.34	0.34	0.34	0.34	0.34	0.34	0.14	0.38		0.12	0.36	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Grp Cap (vph)	320	470	388	338	470	379	352	974		155	869	
v/s Ratio Prot		0.03			0.06		0.07	c0.27		0.01	c0.17	
v/s Ratio Perm	c0.21		0.08	0.00		0.01						
v/c Ratio	0.60	0.10	0.24	0.01	0.18	0.04	0.51	0.71		0.07	0.48	
Uniform Delay, d1	27.0	22.2	23.3	21.5	22.9	21.7	39.8	26.4		39.1	24.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.92	0.78		1.00	1.00	
Incremental Delay, d2	8.0	0.4	1.4	0.1	0.8	0.2	3.3	2.8		0.9	1.9	
Delay (s)	35.0	22.6	24.8	21.6	23.7	21.9	39.9	23.3		39.9	26.7	
Level of Service	C	C	C	C	C	C	D	C		D	C	
Approach Delay (s)		28.5			23.1			26.7			27.0	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	102.5%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↱		↰	↑↱	
Volume (vph)	116	424	10	17	367	47	20	13	27	41	11	117
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.86	1.00	1.00		1.00	0.94	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1244	1621	1531		1492	1378	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.67	1.00		0.73	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1244	1147	1531		1147	1378	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	120	437	10	18	378	48	21	13	28	42	11	121
RTOR Reduction (vph)	0	0	5	0	0	27	0	21	0	0	90	0
Lane Group Flow (vph)	120	437	5	18	378	21	21	20	0	42	42	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	10.7	45.0	45.0	2.6	36.9	36.9	21.4	21.4		21.4	21.4	
Effective Green, g (s)	10.7	45.0	45.0	2.6	36.9	36.9	21.4	21.4		21.4	21.4	
Actuated g/C Ratio	0.13	0.54	0.54	0.03	0.44	0.44	0.25	0.25		0.25	0.25	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	206	913	776	50	749	546	292	390		292	351	
v/s Ratio Prot	c0.07	c0.26		0.01	0.22			0.01			0.03	
v/s Ratio Perm			0.00			0.02	0.02			c0.04		
v/c Ratio	0.58	0.48	0.01	0.36	0.50	0.04	0.07	0.05		0.14	0.12	
Uniform Delay, d1	34.5	12.2	9.1	39.9	17.0	13.4	23.8	23.6		24.2	24.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.2	1.8	0.0	4.4	0.5	0.0	0.1	0.1		0.2	0.2	
Delay (s)	38.7	14.0	9.1	44.3	17.5	13.5	23.9	23.7		24.4	24.2	
Level of Service	D	B	A	D	B	B	C	C		C	C	
Approach Delay (s)		19.1			18.2			23.8			24.3	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	56	413	32	55	409	41	31	102	37	100	124	116
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.98	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1048	1540	2956			3012	1072
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.59	1.00			0.77	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1048	963	2956			2360	1072
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	64	469	36	62	465	47	35	116	42	114	141	132
RTOR Reduction (vph)	0	0	16	0	0	23	0	33	0	0	0	106
Lane Group Flow (vph)	64	469	20	62	465	24	35	125	0	0	255	26
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	7.2	40.7	40.7	5.1	37.6	37.6	15.8	15.8			14.8	14.8
Effective Green, g (s)	7.2	40.7	40.7	5.1	37.6	37.6	15.8	15.8			14.8	14.8
Actuated g/C Ratio	0.10	0.55	0.55	0.07	0.50	0.50	0.21	0.21			0.20	0.20
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	117	662	751	105	612	528	203	626			468	212
v/s Ratio Prot	c0.05	c0.39		0.04	c0.38			0.04				
v/s Ratio Perm			0.01			0.02	0.04				c0.11	0.02
v/c Ratio	0.55	0.71	0.03	0.59	0.76	0.04	0.17	0.20			0.54	0.12
Uniform Delay, d1	32.1	12.6	7.8	33.7	14.9	9.4	24.1	24.2			26.9	24.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	5.1	3.5	0.0	8.6	5.4	0.0	0.4	0.2			1.3	0.3
Delay (s)	37.3	16.0	7.8	42.3	20.3	9.4	24.5	24.4			28.2	24.8
Level of Service	D	B	A	D	C	A	C	C			C	C
Approach Delay (s)		17.9			21.8			24.4			27.0	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	74.6	Sum of lost time (s)	15.0
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	349	68	42	314	200	64	198	40	113	122	32
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.90	1.00	1.00	0.96	1.00	0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1328	927		1335	1126	865	1070	957	917	1070	1075	
Flt Permitted	0.30	1.00		0.28	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	425	927		400	1126	865	1070	957	917	1070	1075	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	34	401	78	48	361	230	74	228	46	130	140	37
RTOR Reduction (vph)	0	6	0	0	0	95	0	0	36	0	9	0
Lane Group Flow (vph)	34	473	0	48	361	135	74	228	10	130	168	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	51.1	51.1		52.8	52.8	64.8	14.0	23.0	23.0	12.0	21.0	
Effective Green, g (s)	51.1	51.1		52.8	52.8	64.8	14.0	23.0	23.0	12.0	21.0	
Actuated g/C Ratio	0.46	0.46		0.48	0.48	0.59	0.13	0.21	0.21	0.11	0.19	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	216	429		226	539	547	135	199	191	116	204	
v/s Ratio Prot	0.00	c0.51		0.01	c0.32	0.03	0.07	c0.24		c0.12	0.16	
v/s Ratio Perm	0.07			0.09		0.13			0.01			
v/c Ratio	0.16	1.10		0.21	0.67	0.25	0.55	1.15	0.05	1.12	0.82	
Uniform Delay, d1	18.0	29.6		27.3	22.0	10.9	45.1	43.6	34.9	49.1	42.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	73.9		0.5	3.2	0.2	4.5	108.5	0.1	119.7	22.8	
Delay (s)	18.4	103.4		27.8	25.2	11.2	49.6	152.1	35.0	168.8	65.7	
Level of Service	B	F		C	C	B	D	F	C	F	E	
Approach Delay (s)		97.8			20.3			114.9			109.3	
Approach LOS		F			C			F			F	

Intersection Summary			
HCM 2000 Control Delay	75.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	110.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	70.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	13	295	27	35	141	7	35	100	69	5	48	24
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	13	304	28	36	145	7	36	103	71	5	49	25

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	345	36	153	139	71	79
Volume Left (vph)	13	36	0	36	0	5
Volume Right (vph)	28	0	7	0	71	25
Hadj (s)	-0.01	0.53	0.00	0.16	-0.67	-0.14
Departure Headway (s)	5.7	6.4	5.8	6.3	5.5	6.3
Degree Utilization, x	0.54	0.06	0.25	0.24	0.11	0.14
Capacity (veh/h)	613	531	581	531	604	516
Control Delay (s)	15.1	8.6	9.5	10.1	7.9	10.3
Approach Delay (s)	15.1	9.4		9.4		10.3
Approach LOS	C	A		A		B

Intersection Summary			
Delay	11.9		
Level of Service	B		
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	286	290	46	11	144	45	51	522	20	26	344	202
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1300	1300	1300	1300	1300	1300
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.97	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.96		1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1491	2984		1509	2918		1170	2324		1170	2183	
Flt Permitted	0.62	1.00		0.48	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	980	2984		766	2918		1170	2324		1170	2183	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	308	312	49	12	155	48	55	561	22	28	370	217
RTOR Reduction (vph)	0	13	0	0	30	0	0	3	0	0	85	0
Lane Group Flow (vph)	308	348	0	12	173	0	55	580	0	28	502	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	29.7	29.7		29.7	29.7		16.9	39.9		14.9	37.9	
Effective Green, g (s)	29.7	29.7		29.7	29.7		16.9	39.9		14.9	37.9	
Actuated g/C Ratio	0.30	0.30		0.30	0.30		0.17	0.40		0.15	0.38	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Grp Cap (vph)	291	886		227	866		197	927		174	827	
v/s Ratio Prot		0.12			0.06		0.05	c0.25		0.02	c0.23	
v/s Ratio Perm	c0.31			0.02								
v/c Ratio	1.06	0.39		0.05	0.20		0.28	0.63		0.16	0.61	
Uniform Delay, d1	35.1	28.0		25.1	26.3		36.2	24.1		37.1	25.0	
Progression Factor	1.00	1.00		1.00	1.00		0.83	0.74		1.41	0.65	
Incremental Delay, d2	69.0	1.3		0.4	0.5		2.3	2.1		1.8	3.0	
Delay (s)	104.1	29.3		25.5	26.8		32.4	19.9		54.0	19.2	
Level of Service	F	C		C	C		C	B		D	B	
Approach Delay (s)		63.7			26.7			21.0			20.8	
Approach LOS		E			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	34.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	112.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	636	55	6	419	9	36	0	5	17	1	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00			0.98		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3380		1711	3410			1698		1711	1541	
Flt Permitted	0.48	1.00		0.31	1.00			0.81		0.73	1.00	
Satd. Flow (perm)	867	3380		555	3410			1441		1312	1541	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	691	60	7	455	10	39	0	5	18	1	24
RTOR Reduction (vph)	0	11	0	0	3	0	0	22	0	0	15	0
Lane Group Flow (vph)	22	740	0	7	462	0	0	22	0	18	10	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	27.0	27.0		27.0	27.0			23.0		23.0	23.0	
Effective Green, g (s)	27.0	27.0		27.0	27.0			23.0		23.0	23.0	
Actuated g/C Ratio	0.45	0.45		0.45	0.45			0.38		0.38	0.38	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Grp Cap (vph)	390	1521		249	1534			552		502	590	
v/s Ratio Prot		c0.22			0.14						0.01	
v/s Ratio Perm	0.03			0.01				c0.02		0.01		
v/c Ratio	0.06	0.49		0.03	0.30			0.04		0.04	0.02	
Uniform Delay, d1	9.3	11.6		9.2	10.5			11.6		11.6	11.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.3	1.1		0.2	0.5			0.1		0.1	0.1	
Delay (s)	9.6	12.7		9.4	11.0			11.7		11.7	11.5	
Level of Service	A	B		A	B			B		B	B	
Approach Delay (s)		12.6			11.0			11.7			11.6	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	102	0	0	509	19	253	129	615	0	0	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frt		1.00			0.99		1.00	0.88				0.85
Flt Protected		1.00			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3406			5104		1711	2997				2694
Flt Permitted		0.92			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3151			5104		1711	2997				2694
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	111	0	0	553	21	275	140	668	0	0	80
RTOR Reduction (vph)	0	0	0	0	4	0	0	393	0	0	0	75
Lane Group Flow (vph)	0	122	0	0	570	0	275	415	0	0	0	5
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		43.5			32.5		37.0	37.0				6.0
Effective Green, g (s)		43.5			32.5		37.0	37.0				6.0
Actuated g/C Ratio		0.48			0.36		0.41	0.41				0.07
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1539			1843		703	1232				179
v/s Ratio Prot		c0.01			c0.11		c0.16	0.14				0.00
v/s Ratio Perm		0.03										
v/c Ratio		0.08			0.31		0.39	0.34				0.03
Uniform Delay, d1		12.5			20.7		18.6	18.1				39.3
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			0.4		1.6	0.7				0.3
Delay (s)		12.6			21.1		20.2	18.9				39.6
Level of Service		B			C		C	B				D
Approach Delay (s)		12.6			21.1			19.2			39.6	
Approach LOS		B			C			B			D	

Intersection Summary			
HCM 2000 Control Delay	20.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	112	498	407	428	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.90	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1528	1428	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1528	1428	3319	1801		
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	127	566	462	486	0	0
RTOR Reduction (vph)	76	76	0	0	0	0
Lane Group Flow (vph)	277	264	462	486	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	36.4	36.4	13.6	60.0		
Effective Green, g (s)	36.4	36.4	13.6	60.0		
Actuated g/C Ratio	0.61	0.61	0.23	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	926	866	752	1801		
v/s Ratio Prot	0.18		c0.14	c0.27		
v/s Ratio Perm		0.18				
v/c Ratio	0.30	0.30	0.61	0.27		
Uniform Delay, d1	5.7	5.7	20.8	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.2	0.2	1.5	0.1		
Delay (s)	5.9	5.9	22.3	0.1		
Level of Service	A	A	C	A		
Approach Delay (s)	5.9			10.9	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	8.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	41.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	206	154	144	3	120	9	127	336	9	8	305	100
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.94		1.00	0.99		1.00	1.00		1.00	0.97	
Flpb, ped/bikes	0.97	1.00		0.94	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.99		1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1173	1996		1139	1254		1215	2414		1215	2278	
Flt Permitted	0.44	1.00		0.55	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	545	1996		659	1254		1215	2414		1215	2278	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	231	173	162	3	135	10	143	378	10	9	343	112
RTOR Reduction (vph)	0	103	0	0	3	0	0	2	0	0	34	0
Lane Group Flow (vph)	231	232	0	3	142	0	143	386	0	9	421	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	36.4	36.4		16.5	16.5		17.5	43.9		3.4	29.8	
Effective Green, g (s)	36.4	36.4		16.5	16.5		17.5	43.9		3.4	29.8	
Actuated g/C Ratio	0.36	0.36		0.16	0.16		0.18	0.44		0.03	0.30	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	290	726		108	206		212	1059		41	678	
v/s Ratio Prot	c0.12	0.12			0.11		c0.12	0.16		0.01	c0.18	
v/s Ratio Perm	c0.17			0.00								
v/c Ratio	0.80	0.32		0.03	0.69		0.67	0.36		0.22	0.62	
Uniform Delay, d1	26.0	22.9		35.0	39.3		38.6	18.7		47.0	30.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.21	1.07	
Incremental Delay, d2	14.0	0.3		0.1	9.2		8.2	1.0		1.9	3.1	
Delay (s)	40.0	23.1		35.1	48.5		46.8	19.7		58.9	35.3	
Level of Service	D	C		D	D		D	B		E	D	
Approach Delay (s)		30.0			48.2			27.0			35.8	
Approach LOS		C			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	32.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	91.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

EXISTING 2015 (NO PROJECT)
NO SF GIANTS GAME AT AT&T PARK
WEEKDAY LATE EVENING

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	478	420	8	83	764	52	37	263	82	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.89			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	1.00		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00			
Satd. Flow (prot)	4480	3064		2987	3028			5482	1226			
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00			
Satd. Flow (perm)	4480	3064		2987	3028			5482	1226			
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	576	506	10	100	920	63	45	317	99	0	0	0
RTOR Reduction (vph)	0	1	0	0	3	0	0	0	87	0	0	0
Lane Group Flow (vph)	576	515	0	100	980	0	0	362	12	0	0	0
Confl. Peds. (#/hr)			100			100	100		100			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.2	68.7		9.0	59.5			13.4	13.4			
Effective Green, g (s)	18.2	68.7		9.0	59.5			13.4	13.4			
Actuated g/C Ratio	0.17	0.62		0.08	0.54			0.12	0.12			
Clearance Time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	741	1913		244	1637			667	149			
v/s Ratio Prot	c0.13	0.17		0.03	c0.32							
v/s Ratio Perm								0.07	0.01			
v/c Ratio	0.78	0.27		0.41	0.60			0.54	0.08			
Uniform Delay, d1	44.0	9.3		48.0	17.1			45.4	42.8			
Progression Factor	0.55	0.25		1.51	0.22			1.00	1.00			
Incremental Delay, d2	4.5	0.3		0.3	0.2			0.9	0.2			
Delay (s)	28.7	2.6		72.9	4.0			46.3	43.1			
Level of Service	C	A		E	A			D	D			
Approach Delay (s)		16.3			10.3			45.6			0.0	
Approach LOS		B			B			D			A	

Intersection Summary			
HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.9
Intersection Capacity Utilization	85.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	78	837	21	40	725	36	12	30	30	39	157	171
Ideal Flow (vphpl)	1400	1400	1400	1400	1400	1400	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.97			1.00	0.63	1.00	0.84	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.90	1.00	0.67	1.00	1.00
Frt	1.00	1.00		1.00	0.99			1.00	0.85	1.00	0.95	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1134	3218		1134	2186			1443	853	1027	2352	580
Flt Permitted	0.95	1.00		0.95	1.00			0.82	1.00	0.72	1.00	1.00
Satd. Flow (perm)	1134	3218		1134	2186			1204	853	783	2352	580
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	93	996	25	48	863	43	14	36	36	46	187	204
RTOR Reduction (vph)	0	2	0	0	2	0	0	0	31	0	56	102
Lane Group Flow (vph)	93	1019	0	48	904	0	0	50	5	46	215	18
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.5	62.9		11.9	58.7			15.3	15.3	16.3	16.3	16.3
Effective Green, g (s)	14.5	62.9		11.9	58.7			15.3	15.3	16.3	16.3	16.3
Actuated g/C Ratio	0.13	0.57		0.11	0.53			0.14	0.14	0.15	0.15	0.15
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	149	1840		122	1166			167	118	116	348	85
v/s Ratio Prot	0.08	c0.32		0.04	c0.41						c0.09	
v/s Ratio Perm								0.04	0.01	0.06		0.03
v/c Ratio	0.62	0.55		0.39	0.78			0.30	0.04	0.40	0.62	0.21
Uniform Delay, d1	45.2	14.8		45.7	20.4			42.5	41.0	42.4	43.9	41.2
Progression Factor	0.87	1.08		0.89	0.71			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.1	0.8		1.7	2.7			1.0	0.1	2.2	3.2	1.2
Delay (s)	44.4	16.7		42.4	17.1			43.5	41.2	44.6	47.2	42.4
Level of Service	D	B		D	B			D	D	D	D	D
Approach Delay (s)		19.0			18.4			42.5			45.6	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	24.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	112.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↱			↑↑	↰	↱
Volume (vph)	925	62	0	908	28	11
Ideal Flow (vphpl)	1100	1100	1000	1000	1000	1000
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	1764			1621	810	714
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	1764			1621	810	714
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	1101	74	0	1081	33	13
RTOR Reduction (vph)	2	0	0	0	0	12
Lane Group Flow (vph)	1173	0	0	1081	33	1
Confl. Peds. (#/hr)		10	10			3
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	91.2			91.2	7.5	7.5
Effective Green, g (s)	91.2			91.2	7.5	7.5
Actuated g/C Ratio	0.83			0.83	0.07	0.07
Clearance Time (s)	4.9			4.9	6.4	6.4
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1462			1343	55	48
v/s Ratio Prot	0.67			c0.67	c0.04	
v/s Ratio Perm						0.00
v/c Ratio	0.80			0.80	0.60	0.02
Uniform Delay, d1	4.8			4.8	49.8	47.8
Progression Factor	1.00			1.54	1.00	1.00
Incremental Delay, d2	4.7			2.6	16.4	0.2
Delay (s)	9.6			10.1	66.2	48.0
Level of Service	A			B	E	D
Approach Delay (s)	9.6			10.1	61.0	
Approach LOS	A			B	E	

Intersection Summary			
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

4/22/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations		↰↑↑↑↱			↰↑	↑↱			↰↰↰	↱
Volume (vph)	143	771	99	35	123	323	194	76	182	92
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		3.5			3.0	3.0			3.0	3.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.99	1.00
Flpb, ped/bikes		0.99			0.99	1.00			1.00	1.00
Frt		0.99			1.00	0.94			0.99	0.85
Flt Protected		0.99			0.99	1.00			0.95	1.00
Satd. Flow (prot)		5762			2834	2410			4058	1122
Flt Permitted		0.99			0.77	1.00			0.95	1.00
Satd. Flow (perm)		5762			2209	2410			4058	1122
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	168	907	116	41	145	380	228	89	214	108
RTOR Reduction (vph)	0	24	0	0	0	28	0	0	0	0
Lane Group Flow (vph)	0	1167	0	0	186	580	0	0	316	95
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Prot
Protected Phases		6			4	4		7	7	7
Permitted Phases	6			4						
Actuated Green, G (s)		24.6			21.2	21.2			11.7	11.7
Effective Green, g (s)		26.6			24.2	24.2			14.7	14.7
Actuated g/C Ratio		0.35			0.32	0.32			0.20	0.20
Clearance Time (s)		5.5			6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		2043			712	777			795	219
v/s Ratio Prot						c0.24			0.08	c0.08
v/s Ratio Perm		0.20			0.08					
v/c Ratio		0.57			0.26	0.75			0.40	0.43
Uniform Delay, d1		19.6			18.8	22.7			26.3	26.5
Progression Factor		1.00			0.51	1.00			1.00	1.00
Incremental Delay, d2		0.4			0.2	3.9			0.3	1.4
Delay (s)		20.0			9.8	26.6			26.6	27.9
Level of Service		B			A	C			C	C
Approach Delay (s)		20.0			9.8	26.6			26.9	
Approach LOS		B			A	C			C	

Intersection Summary			
HCM 2000 Control Delay	22.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	68.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

4/22/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	27	203	210	22	131	112	14	170	20	352
Ideal Flow (vphpl)	1000	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.87		1.00		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.99		0.93		0.85		1.00	1.00
Flt Protected		0.95	0.99		1.00		1.00		0.95	1.00
Satd. Flow (prot)		1214	1895		2248		1188		1327	2553
Flt Permitted		0.95	0.99		1.00		1.00		0.52	0.95
Satd. Flow (perm)		1214	1895		2248		1188		720	2431
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	28	214	221	23	138	118	15	179	21	371
RTOR Reduction (vph)	0	0	12	0	1	0	10	0	0	0
Lane Group Flow (vph)	0	191	283	0	257	0	3	0	181	390
Confl. Peds. (#/hr)	25			60		200				
Bus Blockages (#/hr)	0	0	8	0	5	0	0	0	0	5
Parking (#/hr)		10	10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		18.5	18.5		16.0		16.0		31.0	31.0
Effective Green, g (s)		18.5	21.0		17.5		16.0		32.5	32.5
Actuated g/C Ratio		0.25	0.28		0.23		0.21		0.43	0.43
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		299	530		524		253		413	1073
v/s Ratio Prot		c0.16	0.15		c0.11				c0.07	0.06
v/s Ratio Perm							0.00		0.12	0.10
v/c Ratio		0.64	0.53		0.49		0.01		0.44	0.36
Uniform Delay, d1		25.3	22.9		24.9		23.3		17.3	14.3
Progression Factor		1.00	1.00		1.00		1.00		1.05	1.06
Incremental Delay, d2		10.0	3.8		3.3		0.1		2.6	0.7
Delay (s)		35.3	26.7		28.2		23.3		20.8	15.8
Level of Service		D	C		C		C		C	B
Approach Delay (s)			30.1		27.9					17.4
Approach LOS			C		C					B

Intersection Summary			
HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	10	13	3	1	12	5	188	4	1	50	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.90		1.00	1.00		1.00	0.99	
Flt Protected		0.98	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1580	1347		1420		1272	2532		1540	3029	
Flt Permitted		1.00	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1618	1347		1434		1272	2532		1540	3029	
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	11	12	16	4	1	15	6	229	5	1	61	6
RTOR Reduction (vph)	0	0	15	0	14	0	0	2	0	0	5	0
Lane Group Flow (vph)	0	23	1	0	6	0	6	232	0	1	62	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		0.7	0.7		0.7		0.5	3.4		0.5	3.7	
Effective Green, g (s)		0.7	0.7		0.7		0.5	3.4		0.5	3.7	
Actuated g/C Ratio		0.03	0.03		0.03		0.02	0.17		0.02	0.18	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Vehicle Extension (s)		3.0	3.0		3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		55	45		48		31	419		37	546	
v/s Ratio Prot							0.00	c0.09		0.00	c0.02	
v/s Ratio Perm		c0.01	0.00		0.00							
v/c Ratio		0.42	0.01		0.11		0.19	0.55		0.03	0.11	
Uniform Delay, d1		9.7	9.6		9.6		9.8	7.9		9.8	7.0	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		5.1	0.1		1.1		1.1	1.6		0.1	0.1	
Delay (s)		14.8	9.7		10.7		10.9	9.4		9.9	7.1	
Level of Service		B	A		B		B	A		A	A	
Approach Delay (s)		12.7			10.7			9.5			7.2	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	20.5	Sum of lost time (s)	15.9
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	2	3	1	1	9	2	20	5	24	47	8
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00	1.00	1.00	0.97		1.00	0.97	
Flpb, ped/bikes		0.99			1.00	1.00	0.83	1.00		1.00	1.00	
Frt		0.95			1.00	0.85	1.00	0.97		1.00	0.98	
Flt Protected		0.98			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2381			1413	1230	1142	1369		1377	1376	
Flt Permitted		0.95			1.00	1.00	1.00	1.00		0.95	1.00	
Satd. Flow (perm)		2327			1448	1230	1202	1369		1377	1376	
Peak-hour factor, PHF	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Adj. Flow (vph)	6	3	4	1	1	11	3	25	6	30	59	10
RTOR Reduction (vph)	0	4	0	0	0	5	0	6	0	0	3	0
Lane Group Flow (vph)	0	9	0	0	2	6	3	25	0	30	66	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Parking (#/hr)		2										
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		1.1			1.1	20.9	1.2	1.2		19.8	26.0	
Effective Green, g (s)		1.1			1.1	20.9	1.2	1.2		19.8	26.0	
Actuated g/C Ratio		0.03			0.03	0.56	0.03	0.03		0.53	0.70	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	2.0	3.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		68			42	858	38	44		734	964	
v/s Ratio Prot						0.00		c0.02		0.02	c0.05	
v/s Ratio Perm		c0.00			0.00	0.00	0.00					
v/c Ratio		0.13			0.05	0.01	0.08	0.57		0.04	0.07	
Uniform Delay, d1		17.5			17.5	3.6	17.4	17.7		4.1	1.7	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.9			0.5	0.0	0.9	16.7		0.0	0.0	
Delay (s)		18.4			18.0	3.6	18.3	34.4		4.1	1.8	
Level of Service		B			B	A	B	C		A	A	
Approach Delay (s)		18.4			5.8			33.0			2.5	
Approach LOS		B			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	10.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.11		
Actuated Cycle Length (s)	37.1	Sum of lost time (s)	15.0
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.
4/22/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	6	74	112	11	39	52
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1745	1535	840	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1745	1535	840	1134	1194
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	7	88	133	13	46	62
RTOR Reduction (vph)	0	77	0	9	0	0
Lane Group Flow (vph)	7	11	133	4	46	62
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	5.2	5.2	18.2	13.2	2.8	26.0
Effective Green, g (s)	5.2	5.2	18.2	13.2	2.8	26.0
Actuated g/C Ratio	0.13	0.13	0.44	0.32	0.07	0.63
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	143	220	678	371	77	753
v/s Ratio Prot	0.01		c0.09	0.00	c0.04	0.05
v/s Ratio Perm		c0.01		0.00		
v/c Ratio	0.05	0.05	0.20	0.01	0.60	0.08
Uniform Delay, d1	15.8	15.8	7.0	9.5	18.7	3.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.1	0.1	0.0	11.9	0.0
Delay (s)	16.0	15.9	7.2	9.6	30.5	3.0
Level of Service	B	B	A	A	C	A
Approach Delay (s)	15.9		7.4			14.7
Approach LOS	B		A			B

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	41.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	25.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
9: Terry A Francois Blvd/Terry A Francois Blvd. & South St.

4/22/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	2	3	2	46	27	6
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.67	0.67	0.67	0.67	0.67	0.67
Hourly flow rate (vph)	3	4	3	69	40	9
Pedestrians	50			50	50	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	4			4	4	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	185	125	99			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	185	125	99			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	726	835	1434			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	3	4	26	46	27	22
Volume Left	3	0	3	0	0	0
Volume Right	0	4	0	0	0	9
cSH	726	835	1434	1700	1700	1700
Volume to Capacity	0.00	0.01	0.00	0.03	0.02	0.01
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	10.0	9.3	0.9	0.0	0.0	0.0
Lane LOS	A	A	A			
Approach Delay (s)	9.6		0.3		0.0	
Approach LOS	A					

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	29.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
10: Third St. & South St.

4/22/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	19	4	191	5	3	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.92	1.00		1.00	1.00
Flpb, ped/bikes	0.94	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1614	1402	3400		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1614	1402	3400		1711	3421
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	22	5	220	6	3	218
RTOR Reduction (vph)	0	5	1	0	0	0
Lane Group Flow (vph)	22	0	225	0	3	218
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	3.0	3.0	56.7		1.2	63.0
Effective Green, g (s)	3.0	3.0	56.7		1.2	63.0
Actuated g/C Ratio	0.04	0.04	0.74		0.02	0.83
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	63	55	2529		26	2828
v/s Ratio Prot			c0.07		0.00	c0.06
v/s Ratio Perm	c0.01	0.00				
v/c Ratio	0.35	0.00	0.09		0.12	0.08
Uniform Delay, d1	35.6	35.2	2.7		37.0	1.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.3	0.0	0.1		2.0	0.1
Delay (s)	39.0	35.2	2.7		39.0	1.3
Level of Service	D	D	A		D	A
Approach Delay (s)	38.3		2.7			1.8
Approach LOS	D		A			A

Intersection Summary			
HCM 2000 Control Delay	4.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.10		
Actuated Cycle Length (s)	76.2	Sum of lost time (s)	15.3
Intersection Capacity Utilization	40.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
11: Terry A Francois Blvd./Terry A Francois Blvd & 16th

4/22/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	48	30	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	0	56	35	0
Pedestrians	25			1	1	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	2			0	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	90	44	60			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	90	44	60			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	883	997	1512			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	0	19	38	24	12
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1700	1512	1700	1700	1700
Volume to Capacity	0.00	0.00	0.02	0.01	0.01
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	0.0	0.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	19.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
12: Illinois St & 16th

4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1	12	7	1	23	1
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	1	14	8	1	28	1
Pedestrians	50			50	50	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	4			4	4	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	499					
pX, platoon unblocked						
vC, conflicting volume			66		127	108
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			66		127	108
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		97	100
cM capacity (veh/h)			1478		799	874

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	16	10	29
Volume Left	0	8	28
Volume Right	14	0	1
cSH	1700	1478	801
Volume to Capacity	0.01	0.01	0.04
Queue Length 95th (ft)	0	0	3
Control Delay (s)	0.0	6.5	9.7
Lane LOS		A	A
Approach Delay (s)	0.0	6.5	9.7
Approach LOS			A

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	29.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰↰	↑↑↱		↰	↑↑↱	
Volume (vph)	46	10	68	1	13	10	51	140	0	3	149	57
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1280	1365	1129	1291	1365	1118	2515	2593		1296	2467	
Flt Permitted	0.75	1.00	1.00	0.75	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1008	1365	1129	1019	1365	1118	2515	2593		1296	2467	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	54	12	80	1	15	12	60	165	0	4	175	67
RTOR Reduction (vph)	0	0	65	0	0	10	0	0	0	0	45	0
Lane Group Flow (vph)	54	12	15	1	15	2	60	165	0	4	197	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	6.1	6.1	6.1	6.1	6.1	6.1	2.1	9.2		1.2	8.3	
Effective Green, g (s)	6.1	6.1	6.1	6.1	6.1	6.1	2.1	9.2		1.2	8.3	
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.19	0.19	0.07	0.29		0.04	0.26	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	190	258	213	193	258	211	164	740		48	635	
v/s Ratio Prot		0.01			0.01		0.02	c0.06		0.00	c0.08	
v/s Ratio Perm	c0.05		0.01	0.00		0.00						
v/c Ratio	0.28	0.05	0.07	0.01	0.06	0.01	0.37	0.22		0.08	0.31	
Uniform Delay, d1	11.2	10.7	10.7	10.6	10.7	10.6	14.4	8.8		15.0	9.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	0.1	0.1	0.0	0.1	0.0	1.4	0.2		0.7	0.3	
Delay (s)	12.0	10.7	10.9	10.6	10.8	10.6	15.8	8.9		15.7	9.9	
Level of Service	B	B	B	B	B	B	B	A		B	A	
Approach Delay (s)		11.3			10.7			10.8			10.0	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	10.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	32.2	Sum of lost time (s)	15.7
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↱		↰	↑↱	
Volume (vph)	42	112	3	4	106	10	5	6	1	11	2	38
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.87	1.00	1.00		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1255	1621	1674		1493	1364	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.73	1.00		0.75	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1255	1241	1674		1183	1364	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	47	126	3	4	119	11	6	7	1	12	2	43
RTOR Reduction (vph)	0	0	1	0	0	5	0	1	0	0	35	0
Lane Group Flow (vph)	47	126	2	4	119	6	6	7	0	12	10	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	7.4	47.2	47.2	2.4	42.2	42.2	14.9	14.9		14.9	14.9	
Effective Green, g (s)	7.4	47.2	47.2	2.4	42.2	42.2	14.9	14.9		14.9	14.9	
Actuated g/C Ratio	0.09	0.59	0.59	0.03	0.53	0.53	0.19	0.19		0.19	0.19	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	150	1012	860	48	905	666	232	313		221	255	
v/s Ratio Prot	c0.03	c0.07		0.00	0.07			0.00			0.01	
v/s Ratio Perm			0.00			0.00	0.00			c0.01		
v/c Ratio	0.31	0.12	0.00	0.08	0.13	0.01	0.03	0.02		0.05	0.04	
Uniform Delay, d1	33.7	7.1	6.6	37.5	9.4	8.8	26.4	26.4		26.5	26.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	0.3	0.0	0.7	0.1	0.0	0.0	0.0		0.1	0.1	
Delay (s)	34.9	7.3	6.6	38.2	9.5	8.8	26.4	26.4		26.6	26.5	
Level of Service	C	A	A	D	A	A	C	C		C	C	
Approach Delay (s)		14.7			10.3			26.4			26.5	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.13		
Actuated Cycle Length (s)	79.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↱			↰↑	↱
Volume (vph)	23	113	6	11	125	13	12	33	14	29	25	49
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.97	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1033	1540	2941			2998	1074
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00			0.95	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1033	1473	2941			2941	1074
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	28	138	7	13	152	16	15	40	17	35	30	60
RTOR Reduction (vph)	0	0	5	0	0	12	0	14	0	0	0	52
Lane Group Flow (vph)	28	138	2	13	152	4	15	43	0	0	65	8
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	0.8	6.5	6.5	0.8	5.5	5.5	4.4	4.4			3.4	3.4
Effective Green, g (s)	0.8	6.5	6.5	0.8	5.5	5.5	4.4	4.4			3.4	3.4
Actuated g/C Ratio	0.03	0.26	0.26	0.03	0.22	0.22	0.18	0.18			0.14	0.14
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	39	319	362	49	270	230	262	523			404	147
v/s Ratio Prot	c0.02	0.11		0.01	c0.13			0.01				
v/s Ratio Perm			0.00			0.00	0.01				c0.02	0.01
v/c Ratio	0.72	0.43	0.01	0.27	0.56	0.02	0.06	0.08			0.16	0.06
Uniform Delay, d1	11.8	7.6	6.7	11.7	8.5	7.5	8.4	8.5			9.4	9.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	47.4	0.9	0.0	2.9	2.7	0.0	0.1	0.1			0.2	0.2
Delay (s)	59.2	8.5	6.7	14.6	11.2	7.5	8.5	8.5			9.6	9.4
Level of Service	E	A	A	B	B	A	A	A			A	A
Approach Delay (s)		16.6			11.1			8.5			9.5	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	24.7	Sum of lost time (s)	15.0
Intersection Capacity Utilization	46.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑	↱	↰	↑	↱	↰	↑↱	
Volume (vph)	20	109	56	14	121	50	15	29	12	21	23	6
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.93	1.00	1.00	0.92	1.00	0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1327	898		1334	1126	892	1070	957	884	1070	1078	
Flt Permitted	0.40	1.00		0.61	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	560	898		850	1126	892	1070	957	884	1070	1078	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	24	131	67	17	146	60	18	35	14	25	28	7
RTOR Reduction (vph)	0	21	0	0	0	35	0	0	13	0	6	0
Lane Group Flow (vph)	24	177	0	17	146	25	18	35	1	25	29	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	14.3	14.3		13.7	13.7	18.0	1.0	3.4	3.4	4.3	6.7	
Effective Green, g (s)	14.3	14.3		13.7	13.7	18.0	1.0	3.4	3.4	4.3	6.7	
Actuated g/C Ratio	0.34	0.34		0.32	0.32	0.42	0.02	0.08	0.08	0.10	0.16	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	206	302		279	363	483	25	76	70	108	170	
v/s Ratio Prot	0.00	c0.20		0.00	c0.13	0.01	0.02	c0.04		0.02	c0.03	
v/s Ratio Perm	0.04			0.02		0.02			0.00			
v/c Ratio	0.12	0.59		0.06	0.40	0.05	0.72	0.46	0.02	0.23	0.17	
Uniform Delay, d1	9.8	11.6		9.9	11.2	7.2	20.6	18.6	18.0	17.5	15.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	2.9		0.1	0.7	0.0	67.0	4.4	0.1	1.1	0.5	
Delay (s)	10.0	14.5		10.0	11.9	7.2	87.5	23.0	18.1	18.6	15.9	
Level of Service	B	B		B	B	A	F	C	B	B	B	
Approach Delay (s)		14.0			10.5			39.3			17.1	
Approach LOS		B			B			D			B	

Intersection Summary			
HCM 2000 Control Delay	15.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	42.4	Sum of lost time (s)	20.0
Intersection Capacity Utilization	42.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	3	25	19	11	47	1	5	17	9	0	11	6
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	4	32	24	14	60	1	6	22	12	0	14	8

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	60	14	62	28	12	22
Volume Left (vph)	4	14	0	6	0	0
Volume Right (vph)	24	0	1	0	12	8
Hadj (s)	-0.20	0.53	0.02	0.15	-0.67	-0.18
Departure Headway (s)	4.5	5.2	4.7	5.0	4.2	4.7
Degree Utilization, x	0.08	0.02	0.08	0.04	0.01	0.03
Capacity (veh/h)	777	668	744	695	826	732
Control Delay (s)	7.9	7.1	6.9	7.0	6.0	7.8
Approach Delay (s)	7.9	7.0		6.7		7.8
Approach LOS	A	A		A		A

Intersection Summary			
Delay	7.3		
Level of Service	A		
Intersection Capacity Utilization	33.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	38	22	7	37	14	12	142	3	6	141	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.97	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	0.96		1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1662	3190		1677	3238		1260	2510		1260	2370	
Flt Permitted	0.71	1.00		0.71	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1250	3190		1248	3238		1260	2510		1260	2370	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	42	46	27	8	45	17	14	171	4	7	170	86
RTOR Reduction (vph)	0	20	0	0	13	0	0	1	0	0	40	0
Lane Group Flow (vph)	42	53	0	8	49	0	14	174	0	7	216	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	23.8	23.8		23.8	23.8		3.0	47.7		3.0	47.7	
Effective Green, g (s)	23.8	23.8		23.8	23.8		3.0	47.7		3.0	47.7	
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.03	0.53		0.03	0.53	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	330	843		330	856		42	1330		42	1256	
v/s Ratio Prot		0.02			0.02		c0.01	0.07		0.01	c0.09	
v/s Ratio Perm	c0.03			0.01								
v/c Ratio	0.13	0.06		0.02	0.06		0.33	0.13		0.17	0.17	
Uniform Delay, d1	25.2	24.8		24.5	24.7		42.5	10.7		42.3	10.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.0		0.0	0.0		4.6	0.2		1.9	0.1	
Delay (s)	25.4	24.8		24.5	24.8		47.2	10.9		44.2	11.0	
Level of Service	C	C		C	C		D	B		D	B	
Approach Delay (s)		25.0			24.7			13.6			11.9	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.16		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	101	11	3	205	3	13	0	4	3	0	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00			0.97		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3371		1711	3414			1681		1711	1531	
Flt Permitted	0.61	1.00		0.67	1.00			0.84		0.75	1.00	
Satd. Flow (perm)	1100	3371		1215	3414			1472		1343	1531	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	110	12	3	223	3	14	0	4	3	0	11
RTOR Reduction (vph)	0	8	0	0	2	0	0	12	0	0	7	0
Lane Group Flow (vph)	7	114	0	3	224	0	0	6	0	3	4	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	9.0	9.0		9.0	9.0			10.5		10.5	10.5	
Effective Green, g (s)	9.0	9.0		9.0	9.0			10.5		10.5	10.5	
Actuated g/C Ratio	0.31	0.31		0.31	0.31			0.36		0.36	0.36	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	335	1028		370	1041			523		478	544	
v/s Ratio Prot		0.03			c0.07						0.00	
v/s Ratio Perm	0.01			0.00				c0.00		0.00		
v/c Ratio	0.02	0.11		0.01	0.22			0.01		0.01	0.01	
Uniform Delay, d1	7.2	7.4		7.1	7.6			6.1		6.1	6.1	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.0		0.0	0.1			0.0		0.0	0.0	
Delay (s)	7.2	7.4		7.1	7.7			6.2		6.1	6.1	
Level of Service	A	A		A	A			A		A	A	
Approach Delay (s)		7.4			7.7			6.2			6.1	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.11		
Actuated Cycle Length (s)	29.5	Sum of lost time (s)	10.0
Intersection Capacity Utilization	21.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	75	0	0	146	4	65	31	79	0	0	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frt		1.00			1.00		1.00	0.89				0.85
Flt Protected		1.00			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3417			5110		1711	3052				2694
Flt Permitted		0.95			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3262			5110		1711	3052				2694
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	2	87	0	0	170	5	76	36	92	0	0	35
RTOR Reduction (vph)	0	0	0	0	3	0	0	54	0	0	0	33
Lane Group Flow (vph)	0	89	0	0	172	0	76	74	0	0	0	2
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		35.5			26.5		31.0	31.0				4.0
Effective Green, g (s)		35.5			26.5		31.0	31.0				4.0
Actuated g/C Ratio		0.47			0.35		0.41	0.41				0.05
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1531			1781		697	1244				141
v/s Ratio Prot		c0.00			c0.03		c0.04	0.02				0.00
v/s Ratio Perm		0.02										
v/c Ratio		0.06			0.10		0.11	0.06				0.01
Uniform Delay, d1		11.1			16.7		13.9	13.7				34.1
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			0.1		0.3	0.1				0.2
Delay (s)		11.2			16.8		14.3	13.7				34.3
Level of Service		B			B		B	B				C
Approach Delay (s)		11.2			16.8			13.9			34.3	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	15.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.10		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	32.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St. 4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	77	144	126	114	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.95	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1615	1428	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1615	1428	3319	1801		
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	92	171	150	136	0	0
RTOR Reduction (vph)	13	35	0	0	0	0
Lane Group Flow (vph)	125	90	150	136	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	43.1	43.1	6.9	60.0		
Effective Green, g (s)	43.1	43.1	6.9	60.0		
Actuated g/C Ratio	0.72	0.72	0.12	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	1160	1025	381	1801		
v/s Ratio Prot	c0.08		c0.05	0.08		
v/s Ratio Perm		0.06				
v/c Ratio	0.11	0.09	0.39	0.08		
Uniform Delay, d1	2.6	2.5	24.6	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.0	0.0	0.7	0.0		
Delay (s)	2.6	2.6	25.3	0.0		
Level of Service	A	A	C	A		
Approach Delay (s)	2.6			13.3	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.15		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	20.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez 4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	38	69	111	4	66	3	120	111	2	5	145	69
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	6.7	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.95		1.00	1.00		1.00	1.00		1.00	0.97	
Flpb, ped/bikes	0.98	1.00		0.95	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.99		1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1186	1965		1156	1267		1215	2422		1215	2253	
Flt Permitted	0.43	1.00		0.63	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	541	1965		762	1267		1215	2422		1215	2253	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	42	77	123	4	73	3	133	123	2	6	161	77
RTOR Reduction (vph)	0	82	0	0	2	0	0	1	0	0	50	0
Lane Group Flow (vph)	42	118	0	4	74	0	133	124	0	6	188	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	21.8	21.8		10.6	10.6		10.1	23.6		3.3	16.8	
Effective Green, g (s)	21.8	21.8		10.6	10.6		10.1	23.6		3.3	16.8	
Actuated g/C Ratio	0.34	0.34		0.16	0.16		0.16	0.36		0.05	0.26	
Clearance Time (s)	6.7	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	226	659		124	206		188	879		61	582	
v/s Ratio Prot	0.01	c0.06			c0.06		c0.11	0.05		0.00	c0.08	
v/s Ratio Perm	0.05			0.01								
v/c Ratio	0.19	0.18		0.03	0.36		0.71	0.14		0.10	0.32	
Uniform Delay, d1	15.2	15.3		22.9	24.2		26.0	13.9		29.4	19.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.1		0.1	1.1		11.5	0.1		0.7	0.3	
Delay (s)	15.6	15.4		23.0	25.3		37.5	14.0		30.1	19.8	
Level of Service	B	B		C	C		D	B		C	B	
Approach Delay (s)		15.4			25.2			26.1			20.1	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	21.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

EXISTING 2015 (NO PROJECT)
WITH SF GIANTS GAME AT AT&T PARK
WEEKDAY LATE EVENING

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	406	140	8	29	439	109	107	594	76	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00	0.90			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	0.99		1.00	0.97			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00			
Satd. Flow (prot)	4480	3036		2987	2920			5461	1236			
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00			
Satd. Flow (perm)	4480	3036		2987	2920			5461	1236			
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	489	169	10	35	529	131	129	716	92	0	0	0
RTOR Reduction (vph)	0	3	0	0	20	0	0	0	70	0	0	0
Lane Group Flow (vph)	489	176	0	35	640	0	0	845	22	0	0	0
Confl. Peds. (#/hr)			100			100	100		100			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	28.5	60.0		4.5	36.0			26.6	26.6			
Effective Green, g (s)	28.5	60.0		4.5	36.0			26.6	26.6			
Actuated g/C Ratio	0.26	0.55		0.04	0.33			0.24	0.24			
Clearance Time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	1160	1656		122	955			1320	298			
v/s Ratio Prot	c0.11	0.06		0.01	c0.22							
v/s Ratio Perm								0.15	0.02			
v/c Ratio	0.42	0.11		0.29	0.67			0.64	0.07			
Uniform Delay, d1	33.9	12.1		51.2	31.9			37.4	32.2			
Progression Factor	1.00	1.00		1.23	0.29			1.29	37.37			
Incremental Delay, d2	0.2	0.1		0.4	0.6			1.0	0.1			
Delay (s)	34.1	12.2		63.4	9.7			49.2	1203.2			
Level of Service	C	B		E	A			D	F			
Approach Delay (s)		28.3			12.4			162.5			0.0	
Approach LOS		C			B			F			A	

Intersection Summary			
HCM 2000 Control Delay	78.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.9
Intersection Capacity Utilization	84.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	87	489	41	56	473	17	13	102	22	43	173	436
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.97		1.00	0.98			1.00	0.62	1.00	0.70	0.46
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.97	1.00	0.70	1.00	1.00
Frt	1.00	0.99		1.00	0.99			1.00	0.85	1.00	0.92	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	4239		1296	2523			1568	842	1077	1885	562
Flt Permitted	0.95	1.00		0.95	1.00			0.84	1.00	0.65	1.00	1.00
Satd. Flow (perm)	1540	4239		1296	2523			1317	842	732	1885	562
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	104	582	49	67	563	20	15	121	26	51	206	519
RTOR Reduction (vph)	0	5	0	0	1	0	0	0	21	0	203	203
Lane Group Flow (vph)	104	626	0	67	582	0	0	136	5	51	263	56
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	12.5	65.1		9.9	60.9			25.1	25.1	26.1	26.1	26.1
Effective Green, g (s)	12.5	65.1		9.9	60.9			25.1	25.1	26.1	26.1	26.1
Actuated g/C Ratio	0.10	0.54		0.08	0.51			0.21	0.21	0.22	0.22	0.22
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	160	2299		106	1280			275	176	159	409	122
v/s Ratio Prot	c0.07	0.15		c0.05	c0.23						c0.14	
v/s Ratio Perm								0.10	0.01	0.07		0.10
v/c Ratio	0.65	0.27		0.63	0.45			0.49	0.03	0.32	0.64	0.46
Uniform Delay, d1	51.6	14.7		53.3	18.9			41.9	37.8	39.5	42.7	40.8
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.1	0.3		11.7	0.3			1.4	0.1	1.2	3.4	2.8
Delay (s)	60.7	15.0		65.0	19.2			43.3	37.8	40.7	46.1	43.6
Level of Service	E	B		E	B			D	D	D	D	D
Approach Delay (s)		21.5			23.9			42.4			44.9	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	31.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	112.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	597	80	2	920	99	20
Ideal Flow (vphpl)	1400	1400	1000	1000	1400	1400
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.98			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2224			1620	1134	1000
Flt Permitted	1.00			0.95	0.95	1.00
Satd. Flow (perm)	2224			1546	1134	1000
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	711	95	2	1095	118	24
RTOR Reduction (vph)	6	0	0	0	0	20
Lane Group Flow (vph)	800	0	0	1097	118	4
Confl. Peds. (#/hr)		10	10			3
Confl. Bikes (#/hr)		1				
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Actuated Green, G (s)	81.8			81.8	16.9	16.9
Effective Green, g (s)	81.8			81.8	16.9	16.9
Actuated g/C Ratio	0.74			0.74	0.15	0.15
Clearance Time (s)	4.9			4.9	6.4	6.4
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1653			1149	174	153
v/s Ratio Prot	0.36				c0.10	
v/s Ratio Perm				c0.71		0.00
v/c Ratio	0.48			0.95	0.68	0.02
Uniform Delay, d1	5.6			12.5	44.0	39.5
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	1.0			16.7	10.0	0.1
Delay (s)	6.7			29.2	54.0	39.6
Level of Service	A			C	D	D
Approach Delay (s)	6.7			29.2	51.6	
Approach LOS	A			C	D	

Intersection Summary			
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	19	302	53	13	179	395	159	85	209	116
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		3.5			3.0	3.0			3.0	3.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.98			1.00	0.97			0.98	1.00
Flpb, ped/bikes		1.00			1.00	1.00			1.00	1.00
Frt		0.98			1.00	0.96			0.99	0.85
Flt Protected		1.00			1.00	1.00			0.96	1.00
Satd. Flow (prot)		5746			2872	2470			4028	1122
Flt Permitted		1.00			0.90	1.00			0.96	1.00
Satd. Flow (perm)		5746			2600	2470			4028	1122
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	22	355	62	15	211	465	187	100	246	136
RTOR Reduction (vph)	0	39	0	0	0	53	0	0	0	0
Lane Group Flow (vph)	0	400	0	0	226	599	0	0	370	112
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Prot
Protected Phases		6			4	4		7	7	7
Permitted Phases	6			4						
Actuated Green, G (s)		21.4			22.6	22.6			13.5	13.5
Effective Green, g (s)		23.4			25.6	25.6			16.5	16.5
Actuated g/C Ratio		0.31			0.34	0.34			0.22	0.22
Clearance Time (s)		5.5			6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1792			887	843			886	246
v/s Ratio Prot						c0.24			0.09	c0.10
v/s Ratio Perm		0.07			0.09					
v/c Ratio		0.22			0.25	0.71			0.42	0.46
Uniform Delay, d1		19.1			17.8	21.5			25.1	25.4
Progression Factor		1.00			0.79	1.00			1.00	1.00
Incremental Delay, d2		0.1			0.1	2.8			0.3	1.3
Delay (s)		19.1			14.2	24.3			25.4	26.7
Level of Service		B			B	C			C	C
Approach Delay (s)		19.1			14.2	24.3			25.7	
Approach LOS		B			B	C			C	

Intersection Summary			
HCM 2000 Control Delay	22.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

4/22/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	37	270	196	35	155	125	25	166	48	285
Ideal Flow (vphpl)	1000	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.87		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.98		0.93		0.85		1.00	1.00
Flt Protected		0.95	0.99		1.00		1.00		0.95	0.99
Satd. Flow (prot)		1214	1869		2249		1161		1327	2542
Flt Permitted		0.95	0.99		1.00		1.00		0.47	0.91
Satd. Flow (perm)		1214	1869		2249		1161		658	2324
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	39	284	206	37	163	132	26	175	51	300
RTOR Reduction (vph)	0	0	17	0	1	0	18	0	0	0
Lane Group Flow (vph)	0	224	325	0	297	0	5	0	180	346
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	8	0	5	0	0	0	0	5
Parking (#/hr)		10	10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		18.5	18.5		16.0		16.0		31.0	31.0
Effective Green, g (s)		18.5	21.0		17.5		16.0		32.5	32.5
Actuated g/C Ratio		0.25	0.28		0.23		0.21		0.43	0.43
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		299	523		524		247		396	1043
v/s Ratio Prot		c0.18	0.17		c0.13				c0.08	0.06
v/s Ratio Perm							0.00		0.12	0.09
v/c Ratio		0.75	0.62		0.57		0.02		0.45	0.33
Uniform Delay, d1		26.1	23.5		25.4		23.3		18.1	14.1
Progression Factor		1.00	1.00		1.00		1.00		0.69	0.70
Incremental Delay, d2		15.8	5.5		4.4		0.1		2.9	0.7
Delay (s)		41.9	29.0		29.8		23.5		15.5	10.5
Level of Service		D	C		C		C		B	B
Approach Delay (s)			34.1		29.4					12.2
Approach LOS			C		C					B

Intersection Summary			
HCM 2000 Control Delay	24.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	1	51	181	19	319	10	378	4	4	426	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1700	1700	1700	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.91		1.00	1.00		1.00	0.99	
Flt Protected		0.96	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1545	1356		2711		1377	2748		1540	3042	
Flt Permitted		0.65	1.00		0.85		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1053	1356		2339		1377	2748		1540	3042	
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	11	1	62	221	23	389	12	461	5	5	520	38
RTOR Reduction (vph)	0	0	43	0	271	0	0	1	0	0	5	0
Lane Group Flow (vph)	0	12	19	0	362	0	12	465	0	5	553	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		14.0	14.0		14.0		0.8	15.2		0.9	15.6	
Effective Green, g (s)		14.0	14.0		14.0		0.8	15.2		0.9	15.6	
Actuated g/C Ratio		0.30	0.30		0.30		0.02	0.33		0.02	0.34	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Vehicle Extension (s)		3.0	3.0		3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		320	412		711		23	908		30	1031	
v/s Ratio Prot							0.01	c0.17		0.00	c0.18	
v/s Ratio Perm		0.01	0.01		c0.15							
v/c Ratio		0.04	0.05		0.51		0.52	0.51		0.17	0.54	
Uniform Delay, d1		11.3	11.3		13.2		22.4	12.4		22.2	12.3	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.0	0.0		0.6		9.5	0.5		1.0	0.5	
Delay (s)		11.3	11.3		13.8		31.9	12.9		23.1	12.8	
Level of Service		B	B		B		C	B		C	B	
Approach Delay (s)		11.3			13.8			13.4			12.9	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	46.0	Sum of lost time (s)	15.9
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↱			↰↑	↱	↰	↑↱		↰	↑↱	
Volume (vph)	17	14	20	5	11	44	4	28	6	40	71	12
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00	1.00	1.00	0.99		1.00	0.97	
Flpb, ped/bikes		0.99			1.00	1.00	0.84	1.00		1.00	1.00	
Frt		0.94			1.00	0.85	1.00	0.97		1.00	0.98	
Flt Protected		0.98			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2372			1428	1227	1160	1389		1377	1378	
Flt Permitted		0.95			1.00	1.00	1.00	1.00		0.95	1.00	
Satd. Flow (perm)		2304			1449	1227	1221	1389		1377	1378	
Peak-hour factor, PHF	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Adj. Flow (vph)	22	18	25	6	14	56	5	35	8	51	90	15
RTOR Reduction (vph)	0	23	0	0	0	27	0	7	0	0	5	0
Lane Group Flow (vph)	0	42	0	0	20	29	5	36	0	51	100	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Parking (#/hr)		2										
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		2.3			2.3	18.7	2.4	2.4		16.4	23.8	
Effective Green, g (s)		2.3			2.3	18.7	2.4	2.4		16.4	23.8	
Actuated g/C Ratio		0.06			0.06	0.52	0.07	0.07		0.45	0.66	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	2.0	3.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		146			92	805	81	92		625	908	
v/s Ratio Prot						0.02		c0.03		0.04	c0.07	
v/s Ratio Perm		c0.02			0.01	0.01	0.00					
v/c Ratio		0.28			0.22	0.04	0.06	0.39		0.08	0.11	
Uniform Delay, d1		16.1			16.0	4.3	15.8	16.1		5.6	2.3	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.1			1.2	0.0	0.3	2.7		0.0	0.1	
Delay (s)		17.2			17.2	4.3	16.1	18.8		5.6	2.3	
Level of Service		B			B	A	B	B		A	A	
Approach Delay (s)		17.2			7.7			18.5			3.4	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	36.1	Sum of lost time (s)	15.0
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.
4/22/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱↱	↑↑	↱	↰	↑
Volume (vph)	15	89	491	12	38	95
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.97	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1740	1535	849	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1740	1535	849	1134	1194
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	18	106	585	14	45	113
RTOR Reduction (vph)	0	98	0	3	0	0
Lane Group Flow (vph)	18	8	585	11	45	113
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	5.7	5.7	48.3	43.3	5.3	58.6
Effective Green, g (s)	5.7	5.7	48.3	43.3	5.3	58.6
Actuated g/C Ratio	0.08	0.08	0.65	0.58	0.07	0.79
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	86	133	997	551	80	941
v/s Ratio Prot	c0.02		c0.38	0.01	c0.04	0.09
v/s Ratio Perm		0.00		0.01		
v/c Ratio	0.21	0.06	0.59	0.02	0.56	0.12
Uniform Delay, d1	32.2	31.8	7.4	6.5	33.4	1.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	0.2	0.9	0.0	8.8	0.1
Delay (s)	33.4	32.0	8.2	6.6	42.1	1.9
Level of Service	C	C	A	A	D	A
Approach Delay (s)	32.2		8.2			13.4
Approach LOS	C		A			B

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	74.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	47.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
9: Terry A Francois Blvd/Terry A Francois Blvd. & South St.

4/22/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	2	4	4	21	334	84
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.67	0.67	0.67	0.67	0.67	0.67
Hourly flow rate (vph)	3	6	6	31	499	125
Pedestrians	50			50	50	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	4			4	4	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	689	412	674			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	689	412	674			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	349	545	878			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	3	6	16	21	332	292
Volume Left	3	0	6	0	0	0
Volume Right	0	6	0	0	0	125
cSH	349	545	878	1700	1700	1700
Volume to Capacity	0.01	0.01	0.01	0.01	0.20	0.17
Queue Length 95th (ft)	1	1	1	0	0	0
Control Delay (s)	15.4	11.7	3.4	0.0	0.0	0.0
Lane LOS	C	B	A			
Approach Delay (s)	12.9		1.5		0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	31.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
10: Third St. & South St.

4/22/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	79	33	203	7	5	383
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.94	1.00		1.00	1.00
Flpb, ped/bikes	0.91	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1558	1439	3400		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1558	1439	3400		1711	3421
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	91	38	233	8	6	440
RTOR Reduction (vph)	0	34	1	0	0	0
Lane Group Flow (vph)	91	4	240	0	6	440
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	12.4	12.4	90.9		1.4	97.4
Effective Green, g (s)	12.4	12.4	90.9		1.4	97.4
Actuated g/C Ratio	0.10	0.10	0.76		0.01	0.81
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	160	148	2575		19	2776
v/s Ratio Prot			0.07		0.00	c0.13
v/s Ratio Perm	c0.06	0.00				
v/c Ratio	0.57	0.03	0.09		0.32	0.16
Uniform Delay, d1	51.3	48.4	3.8		58.8	2.4
Progression Factor	1.00	1.00	1.03		1.00	1.00
Incremental Delay, d2	4.6	0.1	0.1		9.3	0.1
Delay (s)	55.8	48.4	4.0		68.2	2.6
Level of Service	E	D	A		E	A
Approach Delay (s)	53.7		4.0			3.4
Approach LOS	D		A			A

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
11: Terry A Francois Blvd./Terry A Francois Blvd & 16th

4/22/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	25	338	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	0	29	398	0
Pedestrians	25			1	1	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	2			0	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	438	225	423			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	438	225	423			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	536	763	1111			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	0	10	20	265	133
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1700	1111	1700	1700	1700
Volume to Capacity	0.00	0.00	0.01	0.16	0.08
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	0.0	0.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	22.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
12: Illinois St & 16th

4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	0	13	1	1	28	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83
Hourly flow rate (vph)	0	16	1	1	34	0
Pedestrians	50			50	50	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	4			4	4	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	499					
pX, platoon unblocked						
vC, conflicting volume			66		111	108
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			66		111	108
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		96	100
cM capacity (veh/h)			1478		818	875

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	16	2	34
Volume Left	0	1	34
Volume Right	16	0	0
cSH	1700	1478	818
Volume to Capacity	0.01	0.00	0.04
Queue Length 95th (ft)	0	0	3
Control Delay (s)	0.0	3.7	9.6
Lane LOS		A	A
Approach Delay (s)	0.0	3.7	9.6
Approach LOS			A

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	29.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰↰	↑↱		↰	↑↱	
Volume (vph)	48	10	72	7	17	5	70	157	0	3	318	141
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.95	1.00	1.00	0.93	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.96	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1243	1365	1108	1278	1365	1074	2515	2593		1296	2457	
Flt Permitted	0.74	1.00	1.00	0.75	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	974	1365	1108	1008	1365	1074	2515	2593		1296	2457	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	56	12	85	8	20	6	82	185	0	4	374	166
RTOR Reduction (vph)	0	0	76	0	0	5	0	0	0	0	24	0
Lane Group Flow (vph)	56	12	9	8	20	1	82	185	0	4	516	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	12.5	12.5	12.5	12.5	12.5	12.5	8.0	90.4		1.4	83.8	
Effective Green, g (s)	12.5	12.5	12.5	12.5	12.5	12.5	8.0	90.4		1.4	83.8	
Actuated g/C Ratio	0.10	0.10	0.10	0.10	0.10	0.10	0.07	0.75		0.01	0.70	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	101	142	115	105	142	111	167	1953		15	1715	
v/s Ratio Prot		0.01			0.01		c0.03	0.07		0.00	c0.21	
v/s Ratio Perm	c0.06		0.01	0.01		0.00						
v/c Ratio	0.55	0.08	0.08	0.08	0.14	0.01	0.49	0.09		0.27	0.30	
Uniform Delay, d1	51.1	48.6	48.5	48.5	48.9	48.2	54.0	3.9		58.8	6.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.06	0.80	
Incremental Delay, d2	6.4	0.3	0.3	0.3	0.5	0.0	2.3	0.1		9.3	0.1	
Delay (s)	57.5	48.8	48.8	48.8	49.3	48.2	56.3	4.0		71.7	5.6	
Level of Service	E	D	D	D	D	D	E	A		E	A	
Approach Delay (s)		52.0			49.0			20.1			6.1	
Approach LOS		D			D			C			A	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	90.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↱		↰	↑↱	
Volume (vph)	44	104	2	3	210	14	4	6	1	25	2	64
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.87	1.00	1.00		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1261	1621	1674		1498	1361	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.71	1.00		0.75	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1261	1209	1674		1187	1361	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	49	117	2	3	236	16	4	7	1	28	2	72
RTOR Reduction (vph)	0	0	1	0	0	8	0	1	0	0	59	0
Lane Group Flow (vph)	49	117	1	3	236	8	4	7	0	28	15	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	7.1	44.8	44.8	2.3	40.0	40.0	14.3	14.3		14.3	14.3	
Effective Green, g (s)	7.1	44.8	44.8	2.3	40.0	40.0	14.3	14.3		14.3	14.3	
Actuated g/C Ratio	0.09	0.59	0.59	0.03	0.52	0.52	0.19	0.19		0.19	0.19	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	150	1000	850	48	893	660	226	313		222	254	
v/s Ratio Prot	c0.03	c0.07		0.00	c0.14			0.00			0.01	
v/s Ratio Perm			0.00			0.01	0.00			c0.02		
v/c Ratio	0.33	0.12	0.00	0.06	0.26	0.01	0.02	0.02		0.13	0.06	
Uniform Delay, d1	32.4	7.0	6.5	36.0	10.1	8.7	25.3	25.3		25.8	25.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.3	0.2	0.0	0.5	0.2	0.0	0.0	0.0		0.3	0.1	
Delay (s)	33.7	7.3	6.5	36.6	10.2	8.7	25.4	25.4		26.1	25.6	
Level of Service	C	A	A	D	B	A	C	C		C	C	
Approach Delay (s)		15.0			10.4			25.4			25.8	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	76.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	119	6	11	259	8	12	33	14	16	25	40
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.98	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1049	1540	2941			3019	1074
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.91	1.00			0.93	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1049	1473	2941			2857	1074
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	15	145	7	13	316	10	15	40	17	20	30	49
RTOR Reduction (vph)	0	0	4	0	0	6	0	15	0	0	0	44
Lane Group Flow (vph)	15	145	3	13	316	4	15	42	0	0	50	5
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	0.7	13.5	13.5	0.5	12.3	12.3	4.4	4.4			3.4	3.4
Effective Green, g (s)	0.7	13.5	13.5	0.5	12.3	12.3	4.4	4.4			3.4	3.4
Actuated g/C Ratio	0.02	0.43	0.43	0.02	0.39	0.39	0.14	0.14			0.11	0.11
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	27	522	592	24	475	410	206	412			309	116
v/s Ratio Prot	c0.01	0.12		0.01	c0.26			0.01				
v/s Ratio Perm			0.00			0.00	0.01				c0.02	0.00
v/c Ratio	0.56	0.28	0.01	0.54	0.67	0.01	0.07	0.10			0.16	0.05
Uniform Delay, d1	15.2	5.8	5.1	15.3	7.9	5.8	11.7	11.8			12.7	12.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	22.5	0.3	0.0	22.7	3.5	0.0	0.2	0.1			0.2	0.2
Delay (s)	37.7	6.1	5.1	38.0	11.4	5.8	11.9	11.9			13.0	12.7
Level of Service	D	A	A	D	B	A	B	B			B	B
Approach Delay (s)		8.9			12.2			11.9			12.8	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	31.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	106	59	25	159	126	19	44	9	22	51	13
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.94	1.00	1.00	0.95	1.00	0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1328	893		1333	1126	897	1070	957	908	1070	1079	
Flt Permitted	0.34	1.00		0.60	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	482	893		849	1126	897	1070	957	908	1070	1079	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	18	128	71	30	192	152	23	53	11	27	61	16
RTOR Reduction (vph)	0	26	0	0	0	87	0	0	9	0	11	0
Lane Group Flow (vph)	18	173	0	30	192	65	23	53	2	27	66	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	12.5	12.5		13.8	13.8	20.3	0.9	6.9	6.9	6.5	12.5	
Effective Green, g (s)	12.5	12.5		13.8	13.8	20.3	0.9	6.9	6.9	6.5	12.5	
Actuated g/C Ratio	0.26	0.26		0.29	0.29	0.43	0.02	0.14	0.14	0.14	0.26	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	135	234		263	325	475	20	138	131	145	282	
v/s Ratio Prot	0.00	c0.19		0.00	c0.17	0.02	0.02	c0.06		0.03	c0.06	
v/s Ratio Perm	0.03			0.03		0.05			0.00			
v/c Ratio	0.13	0.74		0.11	0.59	0.14	1.15	0.38	0.01	0.19	0.23	
Uniform Delay, d1	13.5	16.1		12.5	14.5	8.4	23.4	18.5	17.5	18.3	13.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	11.9		0.2	2.9	0.1	252.2	1.8	0.0	0.6	0.4	
Delay (s)	13.9	28.0		12.7	17.4	8.5	275.6	20.3	17.5	18.9	14.3	
Level of Service	B	C		B	B	A	F	C	B	B	B	
Approach Delay (s)		26.8			13.4			87.4			15.5	
Approach LOS		C			B			F			B	

Intersection Summary			
HCM 2000 Control Delay	25.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	47.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	2	36	10	205	154	12	5	17	13	2	10	6
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	3	46	13	263	197	15	6	22	17	3	13	8

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	62	263	213	28	17	23
Volume Left (vph)	3	263	0	6	0	3
Volume Right (vph)	13	0	15	0	17	8
Hadj (s)	-0.08	0.53	-0.02	0.15	-0.67	-0.14
Departure Headway (s)	5.1	5.3	4.7	5.9	5.1	5.6
Degree Utilization, x	0.09	0.39	0.28	0.05	0.02	0.04
Capacity (veh/h)	690	668	747	563	645	592
Control Delay (s)	8.6	10.4	8.4	8.0	7.0	8.8
Approach Delay (s)	8.6	9.5		7.7		8.8
Approach LOS	A	A		A		A

Intersection Summary			
Delay	9.2		
Level of Service	A		
Intersection Capacity Utilization	33.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	36	17	13	145	7	21	183	6	6	188	203
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	0.97	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.99		1.00	1.00		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1665	3220		1673	3391		1260	2506		1260	2283	
Flt Permitted	0.64	1.00		0.71	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1115	3220		1257	3391		1260	2506		1260	2283	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	45	43	20	16	175	8	25	220	7	7	227	245
RTOR Reduction (vph)	0	14	0	0	4	0	0	2	0	0	152	0
Lane Group Flow (vph)	45	49	0	16	179	0	25	225	0	7	320	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	29.7	29.7		29.7	29.7		16.9	39.9		14.9	37.9	
Effective Green, g (s)	29.7	29.7		29.7	29.7		16.9	39.9		14.9	37.9	
Actuated g/C Ratio	0.30	0.30		0.30	0.30		0.17	0.40		0.15	0.38	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Grp Cap (vph)	331	956		373	1007		212	999		187	865	
v/s Ratio Prot		0.02			c0.05		0.02	c0.09		0.01	c0.14	
v/s Ratio Perm	0.04			0.01								
v/c Ratio	0.14	0.05		0.04	0.18		0.12	0.22		0.04	0.37	
Uniform Delay, d1	25.8	25.1		25.0	26.1		35.2	19.8		36.4	22.4	
Progression Factor	1.00	1.00		1.00	1.00		0.87	0.76		1.00	1.00	
Incremental Delay, d2	0.9	0.1		0.2	0.4		0.7	0.3		0.4	1.2	
Delay (s)	26.6	25.2		25.2	26.5		31.2	15.4		36.8	23.6	
Level of Service	C	C		C	C		C	B		D	C	
Approach Delay (s)		25.8			26.4			17.0			23.8	
Approach LOS		C			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	22.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	72.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	86	11	3	455	3	13	0	4	3	0	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00			0.97		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3363		1711	3418			1681		1711	1531	
Flt Permitted	0.47	1.00		0.69	1.00			0.80		0.75	1.00	
Satd. Flow (perm)	846	3363		1235	3418			1406		1343	1531	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	93	12	3	495	3	14	0	4	3	0	11
RTOR Reduction (vph)	0	7	0	0	1	0	0	13	0	0	8	0
Lane Group Flow (vph)	7	98	0	3	497	0	0	5	0	3	3	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	10.9	10.9		10.9	10.9			7.8		7.8	7.8	
Effective Green, g (s)	10.9	10.9		10.9	10.9			7.8		7.8	7.8	
Actuated g/C Ratio	0.38	0.38		0.38	0.38			0.27		0.27	0.27	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	321	1277		469	1298			382		364	416	
v/s Ratio Prot		0.03			c0.15						0.00	
v/s Ratio Perm	0.01			0.00				c0.00		0.00		
v/c Ratio	0.02	0.08		0.01	0.38			0.01		0.01	0.01	
Uniform Delay, d1	5.6	5.7		5.5	6.5			7.6		7.6	7.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.0		0.0	0.2			0.0		0.0	0.0	
Delay (s)	5.6	5.7		5.5	6.6			7.6		7.6	7.6	
Level of Service	A	A		A	A			A		A	A	
Approach Delay (s)		5.7			6.6			7.6			7.6	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	28.7	Sum of lost time (s)	10.0
Intersection Capacity Utilization	28.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	43	0	0	395	4	70	31	84	0	0	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frt		1.00			1.00		1.00	0.89				0.85
Flt Protected		1.00			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3415			5124		1711	3046				2694
Flt Permitted		0.95			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3250			5124		1711	3046				2694
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	2	50	0	0	459	5	81	36	98	0	0	35
RTOR Reduction (vph)	0	0	0	0	1	0	0	58	0	0	0	33
Lane Group Flow (vph)	0	52	0	0	463	0	81	76	0	0	0	2
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		35.5			26.5		31.0	31.0				4.0
Effective Green, g (s)		35.5			26.5		31.0	31.0				4.0
Actuated g/C Ratio		0.47			0.35		0.41	0.41				0.05
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1526			1786		697	1242				141
v/s Ratio Prot		c0.00			c0.09		c0.05	0.02				0.00
v/s Ratio Perm		0.01										
v/c Ratio		0.03			0.26		0.12	0.06				0.01
Uniform Delay, d1		11.0			17.7		14.0	13.7				34.1
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.0			0.4		0.3	0.1				0.2
Delay (s)		11.0			18.1		14.3	13.8				34.3
Level of Service		B			B		B	B				C
Approach Delay (s)		11.0			18.1			14.0			34.3	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	32.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.

4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	45	196	366	128	0	0
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	*0.85	*0.85	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.91	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1081	1008	2620	1422		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1081	1008	2620	1422		
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	54	233	436	152	0	0
RTOR Reduction (vph)	39	59	0	0	0	0
Lane Group Flow (vph)	108	81	436	152	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	34.9	34.9	15.1	60.0		
Effective Green, g (s)	34.9	34.9	15.1	60.0		
Actuated g/C Ratio	0.58	0.58	0.25	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	628	586	659	1422		
v/s Ratio Prot	c0.10		c0.17	0.11		
v/s Ratio Perm		0.08				
v/c Ratio	0.17	0.14	0.66	0.11		
Uniform Delay, d1	5.8	5.7	20.2	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.1	0.1	2.5	0.0		
Delay (s)	6.0	5.8	22.7	0.0		
Level of Service	A	A	C	A		
Approach Delay (s)	5.9			16.8	0.0	
Approach LOS	A			B	A	

Intersection Summary

HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	42	85	6	191	1	105	85	5	0	126	263
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5			5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95			0.95	
Frpb, ped/bikes	1.00	0.91		1.00	1.00		1.00	0.99			0.91	
Flpb, ped/bikes	0.97	1.00		0.90	1.00		1.00	1.00			1.00	
Frt	1.00	0.90		1.00	1.00		1.00	0.99			0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1183	1866		1096	1278		1215	2390			1998	
Flt Permitted	0.36	1.00		0.66	1.00		0.95	1.00			1.00	
Satd. Flow (perm)	452	1866		764	1278		1215	2390			1998	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	26	47	94	7	212	1	117	94	6	0	140	292
RTOR Reduction (vph)	0	66	0	0	0	0	0	2	0	0	168	0
Lane Group Flow (vph)	26	75	0	7	213	0	117	98	0	0	264	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	36.1	36.1		25.1	25.1		16.7	73.1			50.9	
Effective Green, g (s)	36.1	36.1		25.1	25.1		16.7	73.1			50.9	
Actuated g/C Ratio	0.30	0.30		0.21	0.21		0.14	0.61			0.42	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5			5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	170	561		159	267		169	1455			847	
v/s Ratio Prot	0.01	c0.04			c0.17		c0.10	0.04			c0.13	
v/s Ratio Perm	0.04			0.01								
v/c Ratio	0.15	0.13		0.04	0.80		0.69	0.07			0.31	
Uniform Delay, d1	30.7	30.6		37.9	45.0		49.2	9.6			22.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.4	0.1		0.1	15.2		11.6	0.1			1.0	
Delay (s)	31.1	30.7		38.0	60.2		60.8	9.6			23.9	
Level of Service	C	C		D	E		E	A			C	
Approach Delay (s)		30.7			59.5			37.2			23.9	
Approach LOS		C			E			D			C	

Intersection Summary

HCM 2000 Control Delay	35.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

EXISTING 2015 (NO PROJECT)

NO SF GIANTS GAME AT AT&T PARK

SATURDAY EVENING

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	637	670	58	133	569	78	43	483	154	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	0.89			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	0.99		1.00	0.98			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	3018		2987	2982			5514	1233			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	3018		2987	2982			5514	1233			
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	708	744	64	148	632	87	48	537	171	0	0	0
RTOR Reduction (vph)	0	4	0	0	8	0	0	0	140	0	0	0
Lane Group Flow (vph)	708	804	0	148	711	0	0	585	31	0	0	0
Confl. Peds. (#/hr)			100			100	100		100			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	25.6	60.4		10.8	45.6			19.9	19.9			
Effective Green, g (s)	25.6	60.4		10.8	45.6			19.9	19.9			
Actuated g/C Ratio	0.23	0.55		0.10	0.41			0.18	0.18			
Clearance Time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	1042	1657		293	1236			997	223			
v/s Ratio Prot	c0.16	0.27		0.05	c0.24							
v/s Ratio Perm								0.11	0.03			
v/c Ratio	0.68	0.49		0.51	0.58			0.59	0.14			
Uniform Delay, d1	38.5	15.2		47.1	24.8			41.3	37.8			
Progression Factor	0.58	0.25		1.36	0.25			1.12	3.29			
Incremental Delay, d2	1.6	0.9		0.4	0.2			0.8	0.3			
Delay (s)	23.7	4.7		64.2	6.3			47.1	124.7			
Level of Service	C	A		E	A			D	F			
Approach Delay (s)		13.6			16.2			64.7			0.0	
Approach LOS		B			B			E			A	

Intersection Summary			
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.9
Intersection Capacity Utilization	88.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	152	1277	79	51	517	44	7	49	28	60	207	97
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.98		1.00	0.95			1.00	0.63	1.00	0.98	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.96	1.00	0.67	1.00	1.00
Frt	1.00	0.99		1.00	0.99			1.00	0.85	1.00	0.99	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	4288		1296	2437			1539	852	1033	2863	580
Flt Permitted	0.95	1.00		0.95	1.00			0.94	1.00	0.72	1.00	1.00
Satd. Flow (perm)	1540	4288		1296	2437			1452	852	781	2863	580
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	162	1359	84	54	550	47	7	52	30	64	220	103
RTOR Reduction (vph)	0	4	0	0	4	0	0	0	26	0	3	79
Lane Group Flow (vph)	162	1439	0	54	593	0	0	59	4	64	227	14
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	17.5	66.0		8.9	55.8			15.2	15.2	16.2	16.2	16.2
Effective Green, g (s)	17.5	66.0		8.9	55.8			15.2	15.2	16.2	16.2	16.2
Actuated g/C Ratio	0.16	0.60		0.08	0.51			0.14	0.14	0.15	0.15	0.15
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	245	2572		104	1236			200	117	115	421	85
v/s Ratio Prot	0.11	c0.34		0.04	c0.24						0.08	
v/s Ratio Perm								0.04	0.00	c0.08		0.02
v/c Ratio	0.66	0.56		0.52	0.48			0.29	0.04	0.56	0.54	0.16
Uniform Delay, d1	43.5	13.2		48.5	17.6			42.6	41.1	43.6	43.4	41.0
Progression Factor	0.90	1.29		0.84	0.51			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.1	0.7		3.6	0.2			0.8	0.1	5.7	1.3	0.9
Delay (s)	44.4	17.8		44.2	9.2			43.4	41.2	49.3	44.8	41.9
Level of Service	D	B		D	A			D	D	D	D	D
Approach Delay (s)		20.5			12.1			42.7			44.8	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	110.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1458	80	3	618	30	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3052			3078	1540	1357
Flt Permitted	1.00			0.95	0.95	1.00
Satd. Flow (perm)	3052			2922	1540	1357
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	1602	88	3	679	33	55
RTOR Reduction (vph)	1	0	0	0	0	21
Lane Group Flow (vph)	1689	0	0	682	33	35
Confl. Peds. (#/hr)		10	10			3
Confl. Bikes (#/hr)		1				
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Actuated Green, G (s)	91.2			91.2	7.5	7.5
Effective Green, g (s)	91.2			91.2	7.5	7.5
Actuated g/C Ratio	0.83			0.83	0.07	0.07
Clearance Time (s)	4.9			4.9	6.4	6.4
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	2530			2422	105	92
v/s Ratio Prot	c0.55				0.02	
v/s Ratio Perm				0.23		c0.03
v/c Ratio	0.67			0.28	0.31	0.38
Uniform Delay, d1	3.6			2.1	48.8	49.0
Progression Factor	1.00			0.55	1.00	1.00
Incremental Delay, d2	1.4			0.1	1.7	2.6
Delay (s)	5.0			1.2	50.5	51.6
Level of Service	A			A	D	D
Approach Delay (s)	5.0			1.2	51.2	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	5.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

4/22/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	262	1267	145	34	172	356	188	134	443	262
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		3.5			3.0	3.0			3.0	3.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.97	1.00
Flpb, ped/bikes		0.99			0.99	1.00			1.00	1.00
Frt		0.99			1.00	0.95			0.98	0.85
Flt Protected		0.99			0.99	1.00			0.96	1.00
Satd. Flow (prot)		5770			2846	2429			3976	1122
Flt Permitted		0.99			0.83	1.00			0.96	1.00
Satd. Flow (perm)		5770			2373	2429			3976	1122
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	270	1306	149	35	177	367	194	138	457	270
RTOR Reduction (vph)	0	22	0	0	0	6	0	0	0	0
Lane Group Flow (vph)	0	1703	0	0	212	555	0	0	665	200
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Prot
Protected Phases		6			4	4		7	7	7
Permitted Phases	6			4						
Actuated Green, G (s)		22.4			20.4	20.4			14.7	14.7
Effective Green, g (s)		24.4			23.4	23.4			17.7	17.7
Actuated g/C Ratio		0.33			0.31	0.31			0.24	0.24
Clearance Time (s)		5.5			6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1877			740	757			938	264
v/s Ratio Prot						c0.23			0.17	c0.18
v/s Ratio Perm		0.30			0.09					
v/c Ratio		0.91			0.29	0.73			0.71	0.76
Uniform Delay, d1		24.2			19.5	23.0			26.3	26.7
Progression Factor		1.00			0.71	1.00			1.00	1.00
Incremental Delay, d2		6.8			0.2	3.7			2.5	11.7
Delay (s)		31.0			14.0	26.7			28.8	38.4
Level of Service		C			B	C			C	D
Approach Delay (s)		31.0			14.0	26.7			31.0	
Approach LOS		C			B	C			C	

Intersection Summary			
HCM 2000 Control Delay	29.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	84.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

4/22/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	51	301	276	49	155	105	14	231	55	466
Ideal Flow (vphpl)	1400	1400	1400	1400	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.88		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.98		0.94		0.85		1.00	1.00
Flt Protected		0.95	0.99		1.00		1.00		0.95	1.00
Satd. Flow (prot)		1700	2621		2297		1161		1327	2547
Flt Permitted		0.95	0.99		1.00		1.00		0.44	0.91
Satd. Flow (perm)		1700	2621		2297		1161		621	2321
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	63	372	341	60	191	130	17	285	68	575
RTOR Reduction (vph)	0	0	19	0	1	0	12	0	0	0
Lane Group Flow (vph)	0	331	486	0	322	0	3	0	292	636
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	8	0	5	0	0	0	0	5
Parking (#/hr)		10	10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		18.5	18.5		16.0		16.0		31.0	31.0
Effective Green, g (s)		18.5	21.0		17.5		16.0		32.5	32.5
Actuated g/C Ratio		0.25	0.28		0.23		0.21		0.43	0.43
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		419	733		535		247		386	1043
v/s Ratio Prot		c0.19	0.19		0.14				c0.13	0.10
v/s Ratio Perm							0.00		c0.20	0.16
v/c Ratio		0.79	0.66		0.60		0.01		0.76	0.61
Uniform Delay, d1		26.4	23.9		25.6		23.3		20.1	16.4
Progression Factor		1.00	1.00		1.00		1.00		0.88	0.89
Incremental Delay, d2		14.1	4.7		5.0		0.1		10.1	2.0
Delay (s)		40.5	28.5		30.6		23.4		27.9	16.7
Level of Service		D	C		C		C		C	B
Approach Delay (s)			33.3		30.3					20.2
Approach LOS			C		C					C

Intersection Summary			
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	2	39	8	4	14	9	321	2	7	72	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.93		1.00	1.00		1.00	0.99	
Flt Protected		0.96	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1550	1350		1464		1272	2541		1540	3032	
Flt Permitted		1.00	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1614	1350		1486		1272	2541		1540	3032	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	10	2	40	8	4	14	9	331	2	7	74	7
RTOR Reduction (vph)	0	0	37	0	13	0	0	1	0	0	5	0
Lane Group Flow (vph)	0	12	3	0	13	0	9	332	0	7	76	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		1.9	1.9		1.9		0.6	9.0		0.6	9.3	
Effective Green, g (s)		1.9	1.9		1.9		0.6	9.0		0.6	9.3	
Actuated g/C Ratio		0.07	0.07		0.07		0.02	0.33		0.02	0.34	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Vehicle Extension (s)		3.0	3.0		3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		111	93		103		27	834		33	1029	
v/s Ratio Prot							0.01	c0.13		0.00	c0.03	
v/s Ratio Perm		0.01	0.00		c0.01							
v/c Ratio		0.11	0.03		0.13		0.33	0.40		0.21	0.07	
Uniform Delay, d1		12.0	11.9		12.0		13.2	7.1		13.2	6.1	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4	0.1		0.6		2.6	0.3		1.2	0.0	
Delay (s)		12.4	12.0		12.5		15.8	7.4		14.3	6.2	
Level of Service		B	B		B		B	A		B	A	
Approach Delay (s)		12.1			12.5			7.6			6.8	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	27.4	Sum of lost time (s)	15.9
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	5	7	2	2	16	5	29	1	44	59	10
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00	1.00	1.00	1.00		1.00	0.97	
Flpb, ped/bikes		0.99			1.00	1.00	0.83	1.00		1.00	1.00	
Frt		0.95			1.00	0.85	1.00	1.00		1.00	0.98	
Flt Protected		0.98			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2372			1413	1230	1148	1438		1377	1379	
Flt Permitted		0.95			1.00	1.00	1.00	1.00		0.95	1.00	
Satd. Flow (perm)		2306			1448	1230	1208	1438		1377	1379	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	8	6	8	2	2	18	6	33	1	51	68	11
RTOR Reduction (vph)	0	8	0	0	0	8	0	1	0	0	3	0
Lane Group Flow (vph)	0	14	0	0	4	10	6	33	0	51	76	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Parking (#/hr)		2										
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		1.1			1.1	20.5	1.2	1.2		19.4	25.6	
Effective Green, g (s)		1.1			1.1	20.5	1.2	1.2		19.4	25.6	
Actuated g/C Ratio		0.03			0.03	0.56	0.03	0.03		0.53	0.70	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	2.0	3.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		69			43	854	39	47		727	961	
v/s Ratio Prot						0.01		c0.02		0.04	c0.05	
v/s Ratio Perm		c0.01			0.00	0.00	0.00					
v/c Ratio		0.21			0.09	0.01	0.15	0.70		0.07	0.08	
Uniform Delay, d1		17.4			17.3	3.6	17.3	17.6		4.2	1.8	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.5			0.9	0.0	1.8	38.1		0.0	0.0	
Delay (s)		18.9			18.3	3.6	19.1	55.6		4.2	1.8	
Level of Service		B			B	A	B	E		A	A	
Approach Delay (s)		18.9			6.3			50.2			2.8	
Approach LOS		B			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.13		
Actuated Cycle Length (s)	36.7	Sum of lost time (s)	15.0
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.
4/22/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	20	88	184	25	39	76
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1744	1535	846	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1744	1535	846	1134	1194
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	23	101	211	29	45	87
RTOR Reduction (vph)	0	89	0	17	0	0
Lane Group Flow (vph)	23	12	211	12	45	87
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	5.9	5.9	25.2	20.2	3.1	33.3
Effective Green, g (s)	5.9	5.9	25.2	20.2	3.1	33.3
Actuated g/C Ratio	0.12	0.12	0.51	0.41	0.06	0.68
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	135	209	786	433	71	808
v/s Ratio Prot	c0.02		c0.14	0.01	c0.04	0.07
v/s Ratio Perm		0.01		0.01		
v/c Ratio	0.17	0.06	0.27	0.03	0.63	0.11
Uniform Delay, d1	19.5	19.2	6.8	8.6	22.5	2.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.1	0.2	0.0	17.0	0.1
Delay (s)	20.1	19.3	7.0	8.7	39.5	2.8
Level of Service	C	B	A	A	D	A
Approach Delay (s)	19.4		7.2			15.3
Approach LOS	B		A			B

Intersection Summary			
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	49.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	32.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
9: Terry A Francois Blvd/Terry A Francois Blvd. & South St.

4/22/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	3	1	7	57	33	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	4	1	8	68	39	4
Pedestrians	50			50	50	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	4			4	4	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	192	121	93			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	192	121	93			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	99			
cM capacity (veh/h)	717	839	1442			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	4	1	31	45	26	17
Volume Left	4	0	8	0	0	0
Volume Right	0	1	0	0	0	4
cSH	717	839	1442	1700	1700	1700
Volume to Capacity	0.00	0.00	0.01	0.03	0.02	0.01
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	10.0	9.3	2.1	0.0	0.0	0.0
Lane LOS	B	A	A			
Approach Delay (s)	9.9		0.8		0.0	
Approach LOS	A					

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	29.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
10: Third St. & South St.

4/22/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	10	4	287	7	2	226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.85	1.00		1.00	1.00
Flpb, ped/bikes	0.94	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1613	1304	3401		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1613	1304	3401		1711	3421
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	11	4	309	8	2	243
RTOR Reduction (vph)	0	4	1	0	0	0
Lane Group Flow (vph)	11	0	316	0	2	243
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	1.4	1.4	59.1		1.2	65.4
Effective Green, g (s)	1.4	1.4	59.1		1.2	65.4
Actuated g/C Ratio	0.02	0.02	0.77		0.02	0.85
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	29	23	2610		26	2905
v/s Ratio Prot			c0.09		0.00	c0.07
v/s Ratio Perm	c0.01	0.00				
v/c Ratio	0.38	0.00	0.12		0.08	0.08
Uniform Delay, d1	37.4	37.1	2.3		37.4	0.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	8.1	0.1	0.1		1.3	0.1
Delay (s)	45.5	37.2	2.4		38.6	1.0
Level of Service	D	D	A		D	A
Approach Delay (s)	43.3		2.4			1.3
Approach LOS	D		A			A

Intersection Summary			
HCM 2000 Control Delay	3.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.13		
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	40.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
11: Terry A Francois Blvd./Terry A Francois Blvd & 16th

4/22/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	64	34	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	0	75	40	0
Pedestrians	25			1	1	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	2			0	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	104	46	65			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	104	46	65			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	866	993	1506			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	0	25	50	27	13
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1700	1506	1700	1700	1700
Volume to Capacity	0.00	0.00	0.03	0.02	0.01
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	0.0	0.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	19.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
12: Illinois St & 16th

4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	1	20	2	2	28	1
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79
Hourly flow rate (vph)	1	25	3	3	35	1
Pedestrians	50			50	50	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	4			4	4	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	499					
pX, platoon unblocked						
vC, conflicting volume			77		122	114
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			77		122	114
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		96	100
cM capacity (veh/h)			1464		807	868

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	27	5	37
Volume Left	0	3	35
Volume Right	25	0	1
cSH	1700	1464	809
Volume to Capacity	0.02	0.00	0.05
Queue Length 95th (ft)	0	0	4
Control Delay (s)	0.0	3.7	9.7
Lane LOS		A	A
Approach Delay (s)	0.0	3.7	9.7
Approach LOS			A

Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	29.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰↰	↑↱		↰	↑↱	
Volume (vph)	46	18	99	1	23	6	62	242	2	1	163	71
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1280	1365	1128	1291	1365	1116	2515	2590		1296	2454	
Flt Permitted	0.74	1.00	1.00	0.74	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	997	1365	1128	1011	1365	1116	2515	2590		1296	2454	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	52	20	111	1	26	7	70	272	2	1	183	80
RTOR Reduction (vph)	0	0	92	0	0	6	0	1	0	0	59	0
Lane Group Flow (vph)	52	20	19	1	26	1	70	273	0	1	204	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	5.9	5.9	5.9	5.9	5.9	5.9	3.4	11.3		1.0	8.9	
Effective Green, g (s)	5.9	5.9	5.9	5.9	5.9	5.9	3.4	11.3		1.0	8.9	
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.17	0.17	0.10	0.33		0.03	0.26	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	173	237	196	175	237	194	252	863		38	644	
v/s Ratio Prot		0.01			0.02		0.03	c0.11		0.00	c0.08	
v/s Ratio Perm	c0.05		0.02	0.00		0.00						
v/c Ratio	0.30	0.08	0.10	0.01	0.11	0.01	0.28	0.32		0.03	0.32	
Uniform Delay, d1	12.2	11.7	11.8	11.6	11.8	11.6	14.1	8.4		16.0	10.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	0.2	0.2	0.0	0.2	0.0	0.6	0.2		0.3	0.3	
Delay (s)	13.2	11.9	12.0	11.6	12.0	11.6	14.7	8.6		16.3	10.3	
Level of Service	B	B	B	B	B	B	B	A		B	B	
Approach Delay (s)		12.3			11.9			9.9			10.4	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	33.9	Sum of lost time (s)	15.7
Intersection Capacity Utilization	58.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↱		↰	↱	
Volume (vph)	39	144	1	2	141	12	3	5	1	17	1	44
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.87	1.00	1.00		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1255	1621	1663		1493	1356	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.73	1.00		0.75	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1255	1239	1663		1185	1356	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	41	150	1	2	147	12	3	5	1	18	1	46
RTOR Reduction (vph)	0	0	0	0	0	6	0	1	0	0	37	0
Lane Group Flow (vph)	41	150	1	2	147	6	3	5	0	18	10	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	7.4	47.2	47.2	2.4	42.2	42.2	14.9	14.9		14.9	14.9	
Effective Green, g (s)	7.4	47.2	47.2	2.4	42.2	42.2	14.9	14.9		14.9	14.9	
Actuated g/C Ratio	0.09	0.59	0.59	0.03	0.53	0.53	0.19	0.19		0.19	0.19	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	150	1012	860	48	905	666	232	311		222	254	
v/s Ratio Prot	c0.03	c0.09		0.00	c0.09			0.00			0.01	
v/s Ratio Perm			0.00			0.01	0.00			c0.02		
v/c Ratio	0.27	0.15	0.00	0.04	0.16	0.01	0.01	0.02		0.08	0.04	
Uniform Delay, d1	33.5	7.2	6.6	37.4	9.6	8.8	26.3	26.3		26.7	26.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	0.3	0.0	0.4	0.1	0.0	0.0	0.0		0.2	0.1	
Delay (s)	34.5	7.5	6.6	37.8	9.7	8.8	26.3	26.4		26.8	26.5	
Level of Service	C	A	A	D	A	A	C	C		C	C	
Approach Delay (s)		13.3			9.9			26.3			26.6	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.15		
Actuated Cycle Length (s)	79.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	151	3	5	179	4	11	42	13	21	14	39
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.97	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1044	1540	2967			2989	1074
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.95	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1044	1543	2967			2941	1074
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	16	170	3	6	201	4	12	47	15	24	16	44
RTOR Reduction (vph)	0	0	2	0	0	3	0	13	0	0	0	39
Lane Group Flow (vph)	16	170	1	6	201	1	12	49	0	0	40	5
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	0.8	10.3	10.3	0.6	9.1	9.1	4.2	4.2			3.2	3.2
Effective Green, g (s)	0.8	10.3	10.3	0.6	9.1	9.1	4.2	4.2			3.2	3.2
Actuated g/C Ratio	0.03	0.37	0.37	0.02	0.32	0.32	0.15	0.15			0.11	0.11
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	34	445	505	32	393	338	230	443			334	122
v/s Ratio Prot	c0.01	0.14		0.00	c0.17			c0.02				
v/s Ratio Perm			0.00			0.00	0.01				0.01	0.00
v/c Ratio	0.47	0.38	0.00	0.19	0.51	0.00	0.05	0.11			0.12	0.04
Uniform Delay, d1	13.4	6.6	5.6	13.5	7.7	6.4	10.2	10.3			11.2	11.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	9.9	0.5	0.0	2.8	1.1	0.0	0.1	0.1			0.2	0.1
Delay (s)	23.4	7.1	5.6	16.3	8.8	6.4	10.3	10.4			11.3	11.2
Level of Service	C	A	A	B	A	A	B	B			B	B
Approach Delay (s)		8.5			9.0			10.4			11.3	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	9.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	28.1	Sum of lost time (s)	15.0
Intersection Capacity Utilization	44.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	140	60	8	174	47	31	91	8	20	40	24
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.92	1.00	1.00	0.96	1.00	0.98	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1329	1129		1333	1407	1101	1337	1196	1147	1337	1302	
Flt Permitted	0.36	1.00		0.61	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	501	1129		859	1407	1101	1337	1196	1147	1337	1302	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	24	165	71	9	205	55	36	107	9	24	47	28
RTOR Reduction (vph)	0	20	0	0	0	37	0	0	7	0	22	0
Lane Group Flow (vph)	24	216	0	9	205	18	36	107	2	24	53	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	12.0	12.0		12.0	12.0	15.3	3.1	9.8	9.8	3.3	10.0	
Effective Green, g (s)	12.0	12.0		12.0	12.0	15.3	3.1	9.8	9.8	3.3	10.0	
Actuated g/C Ratio	0.26	0.26		0.26	0.26	0.34	0.07	0.22	0.22	0.07	0.22	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	139	297		230	371	491	91	257	247	96	286	
v/s Ratio Prot	0.00	c0.19		0.00	c0.15	0.00	0.03	c0.09		0.02	c0.04	
v/s Ratio Perm	0.04			0.01		0.01			0.00			
v/c Ratio	0.17	0.73		0.04	0.55	0.04	0.40	0.42	0.01	0.25	0.19	
Uniform Delay, d1	14.2	15.3		12.5	14.4	10.2	20.3	15.4	14.0	19.9	14.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	8.6		0.1	1.8	0.0	2.8	1.1	0.0	1.4	0.3	
Delay (s)	14.8	23.9		12.5	16.2	10.2	23.1	16.5	14.0	21.3	14.8	
Level of Service	B	C		B	B	B	C	B	B	C	B	
Approach Delay (s)		23.0			14.9			17.9			16.3	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	45.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	42.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣		↰	↱			↰	↱		✣	
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	2	39	27	26	54	7	22	24	30	5	24	7
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	2	49	34	32	68	9	28	30	38	6	30	9

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	85	33	76	58	38	45
Volume Left (vph)	3	33	0	28	0	6
Volume Right (vph)	34	0	9	0	38	9
Hadj (s)	-0.20	0.53	-0.05	0.27	-0.67	-0.05
Departure Headway (s)	4.8	5.5	4.9	5.3	4.4	5.0
Degree Utilization, x	0.11	0.05	0.10	0.08	0.05	0.06
Capacity (veh/h)	727	632	709	650	784	675
Control Delay (s)	8.4	7.5	7.2	7.6	6.4	8.4
Approach Delay (s)	8.4	7.3		7.1		8.4
Approach LOS	A	A		A		A

Intersection Summary			
Delay	7.7		
Level of Service	A		
Intersection Capacity Utilization	33.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱		↰	↑↱		↰	↑↱	
Volume (vph)	46	42	21	11	59	13	16	247	14	12	179	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.97	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.97		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1664	3212		1677	3300		1260	2495		1260	2391	
Flt Permitted	0.70	1.00		0.71	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1227	3212		1249	3300		1260	2495		1260	2391	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	53	48	24	13	68	15	18	284	16	14	206	83
RTOR Reduction (vph)	0	18	0	0	11	0	0	3	0	0	35	0
Lane Group Flow (vph)	53	54	0	13	72	0	18	297	0	14	254	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	22.5	22.5		22.5	22.5		6.5	48.9		2.5	44.9	
Effective Green, g (s)	22.5	22.5		22.5	22.5		6.5	48.9		2.5	44.9	
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.07	0.55		0.03	0.50	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	308	808		314	830		91	1364		35	1200	
v/s Ratio Prot		0.02			0.02		0.01	c0.12		0.01	c0.11	
v/s Ratio Perm	c0.04			0.01								
v/c Ratio	0.17	0.07		0.04	0.09		0.20	0.22		0.40	0.21	
Uniform Delay, d1	26.2	25.5		25.3	25.6		39.0	10.4		42.7	12.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.0		0.1	0.0		1.1	0.4		7.3	0.1	
Delay (s)	26.4	25.5		25.3	25.6		40.1	10.8		50.1	12.5	
Level of Service	C	C		C	C		D	B		D	B	
Approach Delay (s)		25.9			25.6			12.4			14.2	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	89.4	Sum of lost time (s)	15.5
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	132	11	2	142	1	13	0	1	2	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00			0.99		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3382		1711	3418			1705		1711	1621	
Flt Permitted	0.75	1.00		0.75	1.00			0.85		0.75	1.00	
Satd. Flow (perm)	1359	3382		1359	3418			1514		1346	1621	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	143	12	2	154	1	14	0	1	2	1	2
RTOR Reduction (vph)	0	10	0	0	1	0	0	8	0	0	1	0
Lane Group Flow (vph)	2	145	0	2	154	0	0	7	0	2	2	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	5.3	5.3		5.3	5.3			12.9		12.9	12.9	
Effective Green, g (s)	5.3	5.3		5.3	5.3			12.9		12.9	12.9	
Actuated g/C Ratio	0.19	0.19		0.19	0.19			0.46		0.46	0.46	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	255	635		255	642			692		615	741	
v/s Ratio Prot		0.04			c0.05						0.00	
v/s Ratio Perm	0.00			0.00				c0.00		0.00		
v/c Ratio	0.01	0.23		0.01	0.24			0.01		0.00	0.00	
Uniform Delay, d1	9.3	9.7		9.3	9.7			4.2		4.2	4.2	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.2		0.0	0.2			0.0		0.0	0.0	
Delay (s)	9.3	9.9		9.3	9.9			4.2		4.2	4.2	
Level of Service	A	A		A	A			A		A	A	
Approach Delay (s)		9.9			9.9			4.2			4.2	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.08		
Actuated Cycle Length (s)	28.2	Sum of lost time (s)	10.0
Intersection Capacity Utilization	19.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	85	0	0	212	2	155	43	68	0	0	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frt		1.00			1.00		1.00	0.91				0.85
Flt Protected		1.00			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3420			5126		1711	3107				2694
Flt Permitted		0.95			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3265			5126		1711	3107				2694
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	1	106	0	0	265	2	194	54	85	0	0	31
RTOR Reduction (vph)	0	0	0	0	1	0	0	50	0	0	0	29
Lane Group Flow (vph)	0	107	0	0	266	0	194	89	0	0	0	2
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		35.5			26.5		31.0	31.0				4.0
Effective Green, g (s)		35.5			26.5		31.0	31.0				4.0
Actuated g/C Ratio		0.47			0.35		0.41	0.41				0.05
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1533			1787		697	1267				141
v/s Ratio Prot		c0.00			c0.05		c0.11	0.03				0.00
v/s Ratio Perm		0.03										
v/c Ratio		0.07			0.15		0.28	0.07				0.01
Uniform Delay, d1		11.2			17.0		15.0	13.7				34.1
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			0.2		1.0	0.1				0.1
Delay (s)		11.2			17.2		16.0	13.8				34.3
Level of Service		B			B		B	B				C
Approach Delay (s)		11.2			17.2			15.1			34.3	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	32.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	86	169	153	239	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.95	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1609	1428	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1609	1428	3319	1801		
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	105	206	187	291	0	0
RTOR Reduction (vph)	18	46	0	0	0	0
Lane Group Flow (vph)	145	102	187	291	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	41.3	41.3	8.7	60.0		
Effective Green, g (s)	41.3	41.3	8.7	60.0		
Actuated g/C Ratio	0.69	0.69	0.14	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	1107	982	481	1801		
v/s Ratio Prot	0.09		c0.06	c0.16		
v/s Ratio Perm		0.07				
v/c Ratio	0.13	0.10	0.39	0.16		
Uniform Delay, d1	3.2	3.1	23.2	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.1	0.0	0.5	0.0		
Delay (s)	3.3	3.2	23.8	0.0		
Level of Service	A	A	C	A		
Approach Delay (s)	3.2			9.3	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	6.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	49	33	105	2	25	0	85	164	0	6	154	53
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.94		1.00	1.00		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	0.98	1.00		0.95	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	1.00		1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1190	1903		1160	1279		1215	2431		1215	2295	
Flt Permitted	0.40	1.00		0.83	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	496	1903		1018	1279		1215	2431		1215	2295	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	55	37	118	2	28	0	96	184	0	7	173	60
RTOR Reduction (vph)	0	87	0	0	0	0	0	0	0	0	26	0
Lane Group Flow (vph)	55	68	0	2	28	0	96	184	0	7	207	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	14.9	14.9		4.8	4.8		6.0	23.2		2.2	19.4	
Effective Green, g (s)	14.9	14.9		4.8	4.8		6.0	23.2		2.2	19.4	
Actuated g/C Ratio	0.26	0.26		0.08	0.08		0.11	0.41		0.04	0.34	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	189	500		86	108		128	996		47	786	
v/s Ratio Prot	c0.02	0.04			0.02		c0.08	0.08		0.01	c0.09	
v/s Ratio Perm	c0.05			0.00								
v/c Ratio	0.29	0.14		0.02	0.26		0.75	0.18		0.15	0.26	
Uniform Delay, d1	16.4	15.9		23.8	24.2		24.6	10.7		26.3	13.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	0.1		0.1	1.3		21.6	0.1		1.5	0.2	
Delay (s)	17.2	16.1		23.9	25.5		46.2	10.8		27.8	13.6	
Level of Service	B	B		C	C		D	B		C	B	
Approach Delay (s)		16.4			25.4			22.9			14.0	
Approach LOS		B			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	56.6	Sum of lost time (s)	21.6
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

EXISTING 2015 (NO PROJECT)
WITH SF GIANTS GAME AT AT&T PARK
SATURDAY EVENING

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	462	634	95	176	575	87	26	419	83	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	0.89			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00			
Frt	1.00	0.98		1.00	0.98			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	2979		2987	2974			5531	1231			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	2979		2987	2974			5531	1231			
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	570	783	117	217	710	107	32	517	102	0	0	0
RTOR Reduction (vph)	0	8	0	0	9	0	0	0	85	0	0	0
Lane Group Flow (vph)	570	892	0	217	808	0	0	549	17	0	0	0
Confl. Peds. (#/hr)			100			100	100		100			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	22.8	59.8		13.2	50.2			18.1	18.1			
Effective Green, g (s)	22.8	59.8		13.2	50.2			18.1	18.1			
Actuated g/C Ratio	0.21	0.54		0.12	0.46			0.16	0.16			
Clearance Time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	928	1619		358	1357			910	202			
v/s Ratio Prot	0.13	c0.30		0.07	c0.27							
v/s Ratio Perm								0.10	0.01			
v/c Ratio	0.61	0.55		0.61	0.60			0.60	0.08			
Uniform Delay, d1	39.6	16.4		45.9	22.3			42.6	38.9			
Progression Factor	1.00	1.00		1.36	0.23			1.08	8.40			
Incremental Delay, d2	1.2	1.4		0.9	0.2			1.0	0.2			
Delay (s)	40.8	17.7		63.1	5.4			47.1	327.0			
Level of Service	D	B		E	A			D	F			
Approach Delay (s)		26.7			17.5			91.0			0.0	
Approach LOS		C			B			F			A	

Intersection Summary			
HCM 2000 Control Delay	36.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.9
Intersection Capacity Utilization	85.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	108	972	45	50	492	59	11	72	40	179	368	241
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.98		1.00	0.93			1.00	0.62	1.00	0.93	0.46
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.97	1.00	0.68	1.00	1.00
Frt	1.00	0.99		1.00	0.98			1.00	0.85	1.00	0.98	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	4319		1296	2376			1559	843	1043	2686	563
Flt Permitted	0.95	1.00		0.95	1.00			0.92	1.00	0.70	1.00	1.00
Satd. Flow (perm)	1540	4319		1296	2376			1438	843	764	2686	563
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	123	1105	51	57	559	67	12	82	45	203	418	274
RTOR Reduction (vph)	0	3	0	0	7	0	0	0	31	0	11	143
Lane Group Flow (vph)	123	1153	0	57	619	0	0	94	14	203	470	68
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	13.5	52.0		10.3	47.2			37.8	37.8	38.8	38.8	38.8
Effective Green, g (s)	13.5	52.0		10.3	47.2			37.8	37.8	38.8	38.8	38.8
Actuated g/C Ratio	0.11	0.43		0.09	0.39			0.31	0.31	0.32	0.32	0.32
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	173	1871		111	934			452	265	247	868	182
v/s Ratio Prot	0.08	c0.27		0.04	c0.26						0.18	
v/s Ratio Perm								0.07	0.02	c0.27		0.12
v/c Ratio	0.71	0.62		0.51	0.66			0.21	0.05	0.82	0.54	0.37
Uniform Delay, d1	51.4	26.3		52.5	29.9			30.1	28.6	37.4	33.3	31.3
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.9	1.5		4.0	1.8			0.2	0.1	19.3	0.7	1.3
Delay (s)	64.3	27.8		56.4	31.7			30.4	28.7	56.7	34.0	32.6
Level of Service	E	C		E	C			C	C	E	C	C
Approach Delay (s)		31.3			33.7			29.8			38.8	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	34.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	110.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1088	105	0	744	48	37
Ideal Flow (vphpl)	1000	1000	1000	1000	1000	1000
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	1597			1621	810	714
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	1597			1621	810	714
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	1196	115	0	818	53	41
RTOR Reduction (vph)	4	0	0	0	0	35
Lane Group Flow (vph)	1307	0	0	818	53	6
Confl. Peds. (#/hr)		10	10			3
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	83.8			83.8	14.9	14.9
Effective Green, g (s)	83.8			83.8	14.9	14.9
Actuated g/C Ratio	0.76			0.76	0.14	0.14
Clearance Time (s)	4.9			4.9	6.4	6.4
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1216			1234	109	96
v/s Ratio Prot	c0.82			0.50	c0.07	
v/s Ratio Perm						0.01
v/c Ratio	1.08			0.66	0.49	0.06
Uniform Delay, d1	13.1			6.3	44.0	41.4
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	48.6			1.4	3.4	0.3
Delay (s)	61.7			7.7	47.4	41.7
Level of Service	E			A	D	D
Approach Delay (s)	61.7			7.7	44.9	
Approach LOS	E			A	D	

Intersection Summary			
HCM 2000 Control Delay	41.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	88.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

4/22/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	31	352	98	28	284	654	209	193	562	249
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		3.5			3.0	3.0			3.0	3.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.97			1.00	0.97			0.99	1.00
Flpb, ped/bikes		1.00			1.00	1.00			1.00	1.00
Frt		0.97			1.00	0.96			1.00	0.85
Flt Protected		1.00			1.00	1.00			0.95	1.00
Satd. Flow (prot)		5634			2870	2501			4086	1122
Flt Permitted		1.00			0.78	1.00			0.95	1.00
Satd. Flow (perm)		5634			2244	2501			4086	1122
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	33	371	103	29	299	688	220	203	592	262
RTOR Reduction (vph)	0	70	0	0	0	32	0	0	0	0
Lane Group Flow (vph)	0	437	0	0	328	876	0	0	821	236
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Prot
Protected Phases		6			4	4		7	7	7
Permitted Phases	6			4						
Actuated Green, G (s)		13.3			23.3	23.3			20.9	20.9
Effective Green, g (s)		15.3			26.3	26.3			23.9	23.9
Actuated g/C Ratio		0.20			0.35	0.35			0.32	0.32
Clearance Time (s)		5.5			6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1149			786	877			1302	357
v/s Ratio Prot						c0.35			0.20	c0.21
v/s Ratio Perm		0.08			0.15					
v/c Ratio		0.38			0.42	1.00			0.63	0.66
Uniform Delay, d1		25.8			18.5	24.3			21.8	22.1
Progression Factor		1.00			0.91	1.00			1.00	1.00
Incremental Delay, d2		0.2			0.1	29.7			1.0	4.5
Delay (s)		26.0			16.9	54.1			22.8	26.6
Level of Service		C			B	D			C	C
Approach Delay (s)		26.0			16.9	54.1			23.6	
Approach LOS		C			B	D			C	

Intersection Summary			
HCM 2000 Control Delay	33.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	81.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

4/22/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	70	392	558	56	242	215	40	322	61	495
Ideal Flow (vphpl)	1400	1400	1400	1400	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.87		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.99		0.93		0.85		1.00	1.00
Flt Protected		0.95	1.00		1.00		1.00		0.95	0.99
Satd. Flow (prot)		1700	2661		2224		1161		1327	2546
Flt Permitted		0.95	1.00		1.00		1.00		0.29	0.89
Satd. Flow (perm)		1700	2661		2224		1161		401	2277
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	74	417	594	60	257	229	43	343	65	527
RTOR Reduction (vph)	0	0	13	0	1	0	31	0	0	0
Lane Group Flow (vph)	0	449	683	0	489	0	8	0	349	586
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	8	0	5	0	0	0	0	5
Parking (#/hr)		10	10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		18.5	18.5		16.0		16.0		31.0	31.0
Effective Green, g (s)		18.5	21.0		17.5		16.0		32.5	32.5
Actuated g/C Ratio		0.25	0.28		0.23		0.21		0.43	0.43
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		419	745		518		247		328	1031
v/s Ratio Prot		c0.26	0.26		0.22				c0.18	0.09
v/s Ratio Perm							0.01		c0.28	0.15
v/c Ratio		1.07	0.92		0.94		0.03		1.06	0.57
Uniform Delay, d1		28.2	26.2		28.3		23.4		24.1	16.0
Progression Factor		1.00	1.00		1.00		1.00		0.84	0.91
Incremental Delay, d2		64.4	18.0		27.9		0.3		51.5	1.0
Delay (s)		92.6	44.1		56.2		23.6		71.9	15.6
Level of Service		F	D		E		C		E	B
Approach Delay (s)			63.2		53.8					36.6
Approach LOS			E		D					D

Intersection Summary			
HCM 2000 Control Delay	51.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	75.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	28	55	0	3	3	20	401	25	99	132	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1700	1700	1700	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.98		1.00	0.99		1.00	0.99	
Flpb, ped/bikes		0.99	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.93		1.00	0.99		1.00	0.97	
Flt Protected		0.98	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1567	1346		1485		1377	2700		1540	2981	
Flt Permitted		0.84	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1353	1346		1485		1377	2700		1540	2981	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	29	31	62	0	3	3	22	451	28	111	148	31
RTOR Reduction (vph)	0	0	57	0	3	0	0	2	0	0	5	0
Lane Group Flow (vph)	0	60	5	0	3	0	22	477	0	111	174	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm		NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		9.3	9.3		9.3		4.6	79.7		15.1	90.5	
Effective Green, g (s)		9.3	9.3		9.3		4.6	79.7		15.1	90.5	
Actuated g/C Ratio		0.08	0.08		0.08		0.04	0.66		0.13	0.75	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Vehicle Extension (s)		3.0	3.0		3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		104	104		115		52	1793		193	2248	
v/s Ratio Prot					0.00		0.02	c0.18		c0.07	0.06	
v/s Ratio Perm		c0.04	0.00									
v/c Ratio		0.58	0.05		0.03		0.42	0.27		0.58	0.08	
Uniform Delay, d1		53.5	51.2		51.2		56.4	8.2		49.4	3.9	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		7.5	0.2		0.1		2.0	0.4		2.6	0.0	
Delay (s)		61.0	51.4		51.3		58.4	8.6		52.0	3.9	
Level of Service		E	D		D		E	A		D	A	
Approach Delay (s)		56.1			51.3			10.8			22.3	
Approach LOS		E			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.9
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	3	9	3	4	44	1	36	5	100	109	8
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.98			1.00	1.00	1.00	0.99		1.00	0.98	
Flpb, ped/bikes		1.00			1.00	1.00	0.84	1.00		1.00	1.00	
Frt		0.91			1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected		0.99			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2285			1417	1230	1160	1408		1377	1413	
Flt Permitted		0.95			1.00	1.00	1.00	1.00		0.95	1.00	
Satd. Flow (perm)		2204			1448	1230	1221	1408		1377	1413	
Peak-hour factor, PHF	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Adj. Flow (vph)	4	4	12	4	5	59	1	48	7	133	145	11
RTOR Reduction (vph)	0	12	0	0	0	27	0	7	0	0	2	0
Lane Group Flow (vph)	0	8	0	0	9	32	1	48	0	133	154	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Parking (#/hr)		2										
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		1.0			1.0	20.9	2.7	2.7		19.9	27.6	
Effective Green, g (s)		1.0			1.0	20.9	2.7	2.7		19.9	27.6	
Actuated g/C Ratio		0.03			0.03	0.54	0.07	0.07		0.52	0.72	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	2.0	3.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		57			37	825	85	98		709	1010	
v/s Ratio Prot						0.02		c0.03		c0.10	0.11	
v/s Ratio Perm		0.00			c0.01	0.01	0.00					
v/c Ratio		0.15			0.24	0.04	0.01	0.49		0.19	0.15	
Uniform Delay, d1		18.4			18.4	4.1	16.7	17.3		5.0	1.8	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.2			3.4	0.0	0.1	3.9		0.0	0.1	
Delay (s)		19.6			21.8	4.2	16.8	21.2		5.1	1.8	
Level of Service		B			C	A	B	C		A	A	
Approach Delay (s)		19.6			6.5			21.1			3.3	
Approach LOS		B			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	6.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	38.6	Sum of lost time (s)	15.0
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.

4/22/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	26	120	303	19	68	114
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1744	1535	851	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1744	1535	851	1134	1194
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	33	154	388	24	87	146
RTOR Reduction (vph)	0	134	0	11	0	0
Lane Group Flow (vph)	33	20	388	13	87	146
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	8.6	8.6	31.9	26.9	9.2	46.1
Effective Green, g (s)	8.6	8.6	31.9	26.9	9.2	46.1
Actuated g/C Ratio	0.13	0.13	0.49	0.42	0.14	0.71
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	150	231	756	419	161	850
v/s Ratio Prot	c0.03		c0.25	0.01	c0.08	0.12
v/s Ratio Perm		0.01		0.01		
v/c Ratio	0.22	0.09	0.51	0.03	0.54	0.17
Uniform Delay, d1	25.1	24.6	11.1	11.2	25.8	3.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.2	0.6	0.0	3.7	0.1
Delay (s)	25.8	24.8	11.7	11.2	29.5	3.1
Level of Service	C	C	B	B	C	A
Approach Delay (s)	25.0		11.7			13.0
Approach LOS	C		B			B

Intersection Summary			
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	64.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	39.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	6	3	11	83	53	12
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.66	0.66	0.66	0.66	0.66	0.66
Hourly flow rate (vph)	9	5	17	126	80	18
Pedestrians	50			50	50	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	4			4	4	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	286	149	148			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	286	149	148			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	99	99			
cM capacity (veh/h)	623	805	1376			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	9	5	59	84	54	45
Volume Left	9	0	17	0	0	0
Volume Right	0	5	0	0	0	18
cSH	623	805	1376	1700	1700	1700
Volume to Capacity	0.01	0.01	0.01	0.05	0.03	0.03
Queue Length 95th (ft)	1	0	1	0	0	0
Control Delay (s)	10.9	9.5	2.2	0.0	0.0	0.0
Lane LOS	B	A	A			
Approach Delay (s)	10.4		0.9		0.0	
Approach LOS	B					

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	29.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	15	10	354	17	15	279
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.91	1.00		1.00	1.00
Flpb, ped/bikes	0.91	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1558	1390	3391		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1558	1390	3391		1711	3421
Peak-hour factor, PHF	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	19	13	460	22	19	362
RTOR Reduction (vph)	0	12	1	0	0	0
Lane Group Flow (vph)	19	1	481	0	19	362
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	4.8	4.8	96.6		3.3	105.0
Effective Green, g (s)	4.8	4.8	96.6		3.3	105.0
Actuated g/C Ratio	0.04	0.04	0.80		0.03	0.88
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	62	55	2729		47	2993
v/s Ratio Prot			c0.14		c0.01	0.11
v/s Ratio Perm	c0.01	0.00				
v/c Ratio	0.31	0.01	0.18		0.40	0.12
Uniform Delay, d1	56.0	55.3	2.7		57.4	1.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.8	0.1	0.1		5.6	0.1
Delay (s)	58.8	55.4	2.8		63.0	1.1
Level of Service	E	E	A		E	A
Approach Delay (s)	57.4		2.8			4.2
Approach LOS	E		A			A

Intersection Summary			
HCM 2000 Control Delay	5.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
11: Terry A Francois Blvd./Terry A Francois Blvd & 16th

4/22/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	0	0	94	56	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	0	0	111	66	0
Pedestrians	25			1	1	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	2			0	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	147	59	91			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	147	59	91			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	814	975	1473			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	0	37	74	44	22
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1700	1473	1700	1700	1700
Volume to Capacity	0.00	0.00	0.04	0.03	0.01
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS	A				
Approach Delay (s)	0.0	0.0		0.0	
Approach LOS	A				

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	19.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
12: Illinois St & 16th

4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	2	56	3	2	46	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	2	62	3	2	51	2
Pedestrians	50			50	50	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	4			4	4	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	499					
pX, platoon unblocked						
vC, conflicting volume			114		142	133
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			114		142	133
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		94	100
cM capacity (veh/h)			1419		785	848

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	64	5	53
Volume Left	0	3	51
Volume Right	62	0	2
cSH	1700	1419	788
Volume to Capacity	0.04	0.00	0.07
Queue Length 95th (ft)	0	0	5
Control Delay (s)	0.0	4.5	9.9
Lane LOS		A	A
Approach Delay (s)	0.0	4.5	9.9
Approach LOS			A

Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	30.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	65	41	112	1	27	20	111	286	9	8	194	91
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1274	1365	1125	1289	1365	1110	2515	2578		1296	2450	
Flt Permitted	0.74	1.00	1.00	0.72	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	986	1365	1125	983	1365	1110	2515	2578		1296	2450	
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	79	50	137	1	33	24	135	349	11	10	237	111
RTOR Reduction (vph)	0	0	115	0	0	20	0	2	0	0	53	0
Lane Group Flow (vph)	79	50	22	1	33	4	135	358	0	10	295	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	7.5	7.5	7.5	7.5	7.5	7.5	6.0	21.5		1.4	16.9	
Effective Green, g (s)	7.5	7.5	7.5	7.5	7.5	7.5	6.0	21.5		1.4	16.9	
Actuated g/C Ratio	0.16	0.16	0.16	0.16	0.16	0.16	0.13	0.47		0.03	0.37	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	160	222	183	159	222	180	327	1202		39	898	
v/s Ratio Prot		0.04			0.02		0.05	c0.14		0.01	c0.12	
v/s Ratio Perm	c0.08		0.02	0.00		0.00						
v/c Ratio	0.49	0.23	0.12	0.01	0.15	0.02	0.41	0.30		0.26	0.33	
Uniform Delay, d1	17.6	16.8	16.5	16.2	16.6	16.2	18.4	7.6		21.8	10.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.4	0.5	0.3	0.0	0.3	0.0	0.8	0.1		3.5	0.2	
Delay (s)	20.0	17.3	16.8	16.2	16.9	16.3	19.3	7.8		25.3	10.7	
Level of Service	B	B	B	B	B	B	B	A		C	B	
Approach Delay (s)		17.8			16.6			10.9			11.1	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	46.1	Sum of lost time (s)	15.7
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	188	1	1	202	25	3	5	1	28	1	56
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.87	1.00	1.00		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1260	1621	1669		1497	1357	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.72	1.00		0.75	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1260	1220	1669		1187	1357	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	53	211	1	1	227	28	3	6	1	31	1	63
RTOR Reduction (vph)	0	0	0	0	0	13	0	1	0	0	51	0
Lane Group Flow (vph)	53	211	1	1	227	15	3	6	0	31	13	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	7.2	45.0	45.0	2.4	40.2	40.2	14.3	14.3		14.3	14.3	
Effective Green, g (s)	7.2	45.0	45.0	2.4	40.2	40.2	14.3	14.3		14.3	14.3	
Actuated g/C Ratio	0.09	0.59	0.59	0.03	0.52	0.52	0.19	0.19		0.19	0.19	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	152	1000	850	50	894	660	227	311		221	253	
v/s Ratio Prot	c0.03	c0.12		0.00	c0.13			0.00			0.01	
v/s Ratio Perm			0.00			0.01	0.00			c0.03		
v/c Ratio	0.35	0.21	0.00	0.02	0.25	0.02	0.01	0.02		0.14	0.05	
Uniform Delay, d1	32.6	7.5	6.6	36.0	10.0	8.8	25.4	25.5		26.1	25.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	0.5	0.0	0.2	0.2	0.0	0.0	0.0		0.3	0.1	
Delay (s)	33.9	8.0	6.6	36.2	10.2	8.8	25.5	25.5		26.4	25.7	
Level of Service	C	A	A	D	B	A	C	C		C	C	
Approach Delay (s)		13.1			10.1			25.5			25.9	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	76.7	Sum of lost time (s)	15.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↑↱			↰↑↑	↱
Volume (vph)	22	209	9	5	242	14	11	42	13	15	14	20
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.97	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1048	1540	2970			3002	1074
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00			0.95	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1048	1621	2970			2941	1074
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	28	261	11	6	302	18	14	52	16	19	18	25
RTOR Reduction (vph)	0	0	6	0	0	11	0	14	0	0	0	23
Lane Group Flow (vph)	28	261	5	6	302	7	14	54	0	0	37	2
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	1.8	14.8	14.8	0.6	12.6	12.6	4.0	4.0			3.0	3.0
Effective Green, g (s)	1.8	14.8	14.8	0.6	12.6	12.6	4.0	4.0			3.0	3.0
Actuated g/C Ratio	0.06	0.46	0.46	0.02	0.39	0.39	0.12	0.12			0.09	0.09
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	67	555	629	28	472	407	200	366			272	99
v/s Ratio Prot	c0.02	0.21		0.00	c0.25			c0.02				
v/s Ratio Perm			0.00			0.01	0.01				0.01	0.00
v/c Ratio	0.42	0.47	0.01	0.21	0.64	0.02	0.07	0.15			0.14	0.02
Uniform Delay, d1	14.8	6.1	4.8	15.7	8.1	6.1	12.6	12.7			13.5	13.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	4.2	0.6	0.0	3.8	2.8	0.0	0.1	0.2			0.2	0.1
Delay (s)	19.0	6.7	4.8	19.5	10.9	6.1	12.7	12.9			13.7	13.5
Level of Service	B	A	A	B	B	A	B	B			B	B
Approach Delay (s)		7.8			10.8			12.8			13.6	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	32.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	47.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑	↱	↰	↑	↱	↰	↑↱	
Volume (vph)	15	188	58	7	171	95	48	158	3	49	45	20
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.91	1.00	1.00	0.96	1.00	0.98	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1321	915		1333	1126	875	1070	957	921	1070	1052	
Flt Permitted	0.43	1.00		0.53	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	604	915		748	1126	875	1070	957	921	1070	1052	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	17	219	67	8	199	110	56	184	3	57	52	23
RTOR Reduction (vph)	0	12	0	0	0	61	0	0	2	0	19	0
Lane Group Flow (vph)	17	274	0	8	199	49	56	184	1	57	56	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	26.4	26.4		26.4	26.4	32.2	12.4	19.0	19.0	5.8	12.4	
Effective Green, g (s)	26.4	26.4		26.4	26.4	32.2	12.4	19.0	19.0	5.8	12.4	
Actuated g/C Ratio	0.37	0.37		0.37	0.37	0.45	0.17	0.26	0.26	0.08	0.17	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	228	336		279	414	453	184	253	243	86	181	
v/s Ratio Prot	0.00	c0.30		0.00	c0.18	0.01	0.05	c0.19		c0.05	0.05	
v/s Ratio Perm	0.03			0.01		0.05			0.00			
v/c Ratio	0.07	0.82		0.03	0.48	0.11	0.30	0.73	0.00	0.66	0.31	
Uniform Delay, d1	14.9	20.5		14.9	17.4	11.5	25.9	24.0	19.4	32.1	26.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	14.1		0.0	0.9	0.1	0.9	10.0	0.0	17.6	1.0	
Delay (s)	15.1	34.6		15.0	18.3	11.6	26.9	34.0	19.4	49.6	26.9	
Level of Service	B	C		B	B	B	C	C	B	D	C	
Approach Delay (s)		33.5			15.9			32.2			36.7	
Approach LOS		C			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	28.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	71.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	3	73	34	42	63	9	35	39	60	9	41	7
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	81	38	47	70	10	39	43	67	10	46	8

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	122	47	80	82	67	63
Volume Left (vph)	3	47	0	39	0	10
Volume Right (vph)	38	0	10	0	67	8
Hadj (s)	-0.15	0.53	-0.05	0.27	-0.67	-0.01
Departure Headway (s)	5.1	5.7	5.1	5.5	4.6	5.3
Degree Utilization, x	0.17	0.07	0.11	0.13	0.08	0.09
Capacity (veh/h)	672	600	669	625	747	634
Control Delay (s)	9.1	8.0	7.6	8.1	6.8	8.9
Approach Delay (s)	9.1	7.7		7.5		8.9
Approach LOS	A	A		A		A

Intersection Summary			
Delay	8.2		
Level of Service	A		
Intersection Capacity Utilization	36.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	93	75	45	9	81	15	45	298	14	21	204	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.97	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	0.98		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1665	3183		1680	3313		1260	2494		1260	2391	
Flt Permitted	0.68	1.00		0.66	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1191	3183		1169	3313		1260	2494		1260	2391	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	111	89	54	11	96	18	54	355	17	25	243	98
RTOR Reduction (vph)	0	47	0	0	16	0	0	2	0	0	30	0
Lane Group Flow (vph)	111	96	0	11	98	0	54	370	0	25	311	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	16.8	16.8		16.8	16.8		28.0	84.1		5.6	61.7	
Effective Green, g (s)	16.8	16.8		16.8	16.8		28.0	84.1		5.6	61.7	
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.23	0.69		0.05	0.51	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	164	438		160	456		289	1719		57	1209	
v/s Ratio Prot		0.03			0.03		0.04	c0.15		c0.02	c0.13	
v/s Ratio Perm	c0.09			0.01								
v/c Ratio	0.68	0.22		0.07	0.22		0.19	0.22		0.44	0.26	
Uniform Delay, d1	50.0	46.8		45.8	46.7		37.8	6.9		56.7	17.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.5	0.3		0.2	0.2		0.3	0.3		5.3	0.1	
Delay (s)	60.6	47.0		46.0	47.0		38.2	7.2		62.0	17.2	
Level of Service	E	D		D	D		D	A		E	B	
Approach Delay (s)		52.9			46.9			11.1			20.3	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	26.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	122.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑↱			✣		↰	↱	
Volume (vph)	2	232	11	2	197	1	13	0	1	2	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00			0.99		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3398		1711	3419			1705		1711	1621	
Flt Permitted	0.62	1.00		0.59	1.00			0.82		0.75	1.00	
Satd. Flow (perm)	1111	3398		1060	3419			1465		1346	1621	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	252	12	2	214	1	14	0	1	2	1	2
RTOR Reduction (vph)	0	7	0	0	1	0	0	9	0	0	1	0
Lane Group Flow (vph)	2	257	0	2	214	0	0	6	0	2	2	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	7.2	7.2		7.2	7.2			10.1		10.1	10.1	
Effective Green, g (s)	7.2	7.2		7.2	7.2			10.1		10.1	10.1	
Actuated g/C Ratio	0.26	0.26		0.26	0.26			0.37		0.37	0.37	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	293	896		279	901			541		497	599	
v/s Ratio Prot		c0.08			0.06						0.00	
v/s Ratio Perm	0.00			0.00				c0.00		0.00		
v/c Ratio	0.01	0.29		0.01	0.24			0.01		0.00	0.00	
Uniform Delay, d1	7.4	8.0		7.4	7.9			5.4		5.4	5.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.2		0.0	0.1			0.0		0.0	0.0	
Delay (s)	7.4	8.2		7.4	8.0			5.4		5.4	5.4	
Level of Service	A	A		A	A			A		A	A	
Approach Delay (s)		8.2			8.0			5.4			5.4	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.13		
Actuated Cycle Length (s)	27.3	Sum of lost time (s)	10.0
Intersection Capacity Utilization	22.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑			↑↑↱		↰	↑↱				↱↱
Volume (vph)	1	74	0	0	260	2	209	43	168	0	0	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frt		1.00			1.00		1.00	0.88				0.85
Flt Protected		1.00			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3419			5127		1711	3012				2694
Flt Permitted		0.95			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3265			5127		1711	3012				2694
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	1	81	0	0	286	2	230	47	185	0	0	27
RTOR Reduction (vph)	0	0	0	0	1	0	0	110	0	0	0	26
Lane Group Flow (vph)	0	82	0	0	287	0	230	122	0	0	0	1
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		35.5			26.5		31.0	31.0				4.0
Effective Green, g (s)		35.5			26.5		31.0	31.0				4.0
Actuated g/C Ratio		0.47			0.35		0.41	0.41				0.05
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1533			1787		697	1228				141
v/s Ratio Prot		c0.00			c0.06		c0.13	0.04				0.00
v/s Ratio Perm		0.02										
v/c Ratio		0.05			0.16		0.33	0.10				0.01
Uniform Delay, d1		11.1			17.1		15.4	13.9				34.1
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			0.2		1.3	0.2				0.1
Delay (s)		11.1			17.3		16.7	14.0				34.3
Level of Service		B			B		B	B				C
Approach Delay (s)		11.1			17.3			15.3			34.3	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	35.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.
4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	75	175	269	325	0	0
Ideal Flow (vphpl)	1000	1000	1000	1000	1000	1000
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	*0.85	*0.85	*0.60	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.94	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	748	672	1080	948		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	748	672	1080	948		
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	86	201	309	374	0	0
RTOR Reduction (vph)	36	76	0	0	0	0
Lane Group Flow (vph)	114	61	309	374	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	26.7	26.7	23.3	60.0		
Effective Green, g (s)	26.7	26.7	23.3	60.0		
Actuated g/C Ratio	0.44	0.44	0.39	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	332	299	419	948		
v/s Ratio Prot	0.15		c0.29	c0.39		
v/s Ratio Perm		0.09				
v/c Ratio	0.34	0.20	0.74	0.39		
Uniform Delay, d1	10.9	10.2	15.7	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.6	0.3	6.6	0.3		
Delay (s)	11.5	10.5	22.4	0.3		
Level of Service	B	B	C	A		
Approach Delay (s)	11.0			10.3	0.0	
Approach LOS	B			B	A	

Intersection Summary			
HCM 2000 Control Delay	10.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	37.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	98	79	150	2	84	4	115	237	5	3	194	95
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.91		1.00	0.99		1.00	1.00		1.00	0.96	
Flpb, ped/bikes	0.95	1.00		0.92	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.90		1.00	0.99		1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1157	1872		1116	1260		1215	2417		1215	2215	
Flt Permitted	0.47	1.00		0.58	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	572	1872		684	1260		1215	2417		1215	2215	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	118	95	181	2	101	5	139	286	6	4	234	114
RTOR Reduction (vph)	0	126	0	0	2	0	0	1	0	0	41	0
Lane Group Flow (vph)	118	150	0	2	104	0	139	291	0	4	307	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	36.5	36.5		15.3	15.3		19.1	62.3		4.9	48.1	
Effective Green, g (s)	36.5	36.5		15.3	15.3		19.1	62.3		4.9	48.1	
Actuated g/C Ratio	0.30	0.30		0.13	0.13		0.16	0.52		0.04	0.40	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	251	569		87	160		193	1254		49	887	
v/s Ratio Prot	c0.06	0.08			c0.08		c0.11	0.12		0.00	c0.14	
v/s Ratio Perm	0.08			0.00								
v/c Ratio	0.47	0.26		0.02	0.65		0.72	0.23		0.08	0.35	
Uniform Delay, d1	32.6	31.6		45.8	49.8		47.9	15.8		55.4	25.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	0.2		0.1	9.1		12.4	0.4		0.7	1.1	
Delay (s)	33.9	31.8		45.9	59.0		60.3	16.2		56.1	26.1	
Level of Service	C	C		D	E		E	B		E	C	
Approach Delay (s)		32.5			58.7			30.4			26.4	
Approach LOS		C			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

EXISTING 2015 PLUS PROJECT - NO EVENT
WEEKDAY PM PEAK

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	889	733	12	150	907	36	53	1074	293	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.68			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	1.00		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	3057		2987	3023			5481	942			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	3057		2987	3023			5481	942			
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	916	756	12	155	935	37	55	1107	302	0	0	0
RTOR Reduction (vph)	0	1	0	0	0	0	0	0	202	0	0	0
Lane Group Flow (vph)	916	767	0	155	972	0	0	1162	100	0	0	0
Confl. Peds. (#/hr)			400			400	400		400			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.2	40.1		13.2	36.6			36.3	36.3			
Effective Green, g (s)	18.2	40.1		13.2	36.6			36.3	36.3			
Actuated g/C Ratio	0.17	0.36		0.12	0.33			0.33	0.33			
Clearance Time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	741	1114		358	1005			1808	310			
v/s Ratio Prot	c0.20	0.25		0.05	c0.32							
v/s Ratio Perm								0.21	0.11			
v/c Ratio	1.24	0.69		0.43	0.97			0.64	0.32			
Uniform Delay, d1	45.9	29.6		44.9	36.1			31.3	27.6			
Progression Factor	1.38	1.60		1.54	1.02			0.90	2.85			
Incremental Delay, d2	113.5	2.1		0.3	9.2			0.7	0.6			
Delay (s)	176.8	49.6		69.3	45.9			29.0	79.2			
Level of Service	F	D		E	D			C	E			
Approach Delay (s)		118.8			49.1			39.3			0.0	
Approach LOS		F			D			D			A	

Intersection Summary			
HCM 2000 Control Delay	73.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	151	1521	25	24	917	19	5	69	79	34	285	304
Ideal Flow (vphpl)	1800	1800	1800	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	0.64	1.00	0.84	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00	0.68	1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85	1.00	0.96	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1459	4155		1296	2553			1585	858	1044	2374	581
Flt Permitted	0.95	1.00		0.95	1.00			0.97	1.00	0.71	1.00	1.00
Satd. Flow (perm)	1459	4155		1296	2553			1542	858	778	2374	581
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	154	1552	26	24	936	19	5	70	81	35	291	310
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	53	0	39	120
Lane Group Flow (vph)	154	1577	0	24	954	0	0	75	28	35	376	66
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.4	45.9		6.0	35.9			38.2	38.2	39.2	39.2	39.2
Effective Green, g (s)	14.4	45.9		6.0	35.9			38.2	38.2	39.2	39.2	39.2
Actuated g/C Ratio	0.13	0.42		0.05	0.33			0.35	0.35	0.36	0.36	0.36
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	190	1733		70	833			535	297	277	846	207
v/s Ratio Prot	0.11	c0.38		0.02	c0.37						c0.16	
v/s Ratio Perm								0.05	0.03	0.04		0.11
v/c Ratio	0.81	0.91		0.34	1.14			0.14	0.09	0.13	0.44	0.32
Uniform Delay, d1	46.5	30.1		50.1	37.0			24.6	24.2	23.9	27.1	25.7
Progression Factor	0.58	1.19		0.88	0.90			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.5	0.9		1.0	70.4			0.1	0.1	0.2	0.4	0.9
Delay (s)	29.5	36.9		45.1	103.7			24.8	24.4	24.1	27.4	26.6
Level of Service	C	D		D	F			C	C	C	C	C
Approach Delay (s)		36.2			102.2			24.6			27.0	
Approach LOS		D			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	52.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	115.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1689	138	0	1226	86	8
Ideal Flow (vphpl)	1850	1850	1850	1850	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2957			2998	1540	1357
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	2957			2998	1540	1357
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1759	144	0	1277	90	8
RTOR Reduction (vph)	6	0	0	0	0	5
Lane Group Flow (vph)	1897	0	0	1277	90	3
Confl. Peds. (#/hr)		37	37		1	3
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	1669			1692	512	451
v/s Ratio Prot	c0.64			0.43	c0.06	
v/s Ratio Perm						0.00
v/c Ratio	1.14			0.75	0.18	0.01
Uniform Delay, d1	23.9			18.2	26.0	24.5
Progression Factor	1.00			0.54	1.00	1.00
Incremental Delay, d2	69.5			0.9	0.7	0.0
Delay (s)	93.5			10.7	26.8	24.6
Level of Service	F			B	C	C
Approach Delay (s)	93.5			10.7	26.6	
Approach LOS	F			B	C	

Intersection Summary			
HCM 2000 Control Delay	59.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	98.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

4/27/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	272	1171	161	52	302	537	219	199	735	265
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		2.0			2.0	2.0			2.0	2.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.99	0.87
Flpb, ped/bikes		0.99			1.00	1.00			1.00	1.00
Frt		0.98			1.00	0.96			1.00	0.85
Flt Protected		0.99			0.99	1.00			0.95	1.00
Satd. Flow (prot)		5749			2857	2464			4087	978
Flt Permitted		0.99			0.66	1.00			0.95	1.00
Satd. Flow (perm)		5749			1899	2464			4087	978
Peak-hour factor, PHF	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93
Adj. Flow (vph)	296	1259	173	56	325	577	235	216	790	285
RTOR Reduction (vph)	0	22	0	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	1706	0	0	381	808	0	0	1035	256
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Perm
Protected Phases		6			4	4		7	7	
Permitted Phases	6			4						7
Actuated Green, G (s)		27.0			25.0	25.0			24.0	24.0
Effective Green, g (s)		29.0			28.0	28.0			27.0	27.0
Actuated g/C Ratio		0.32			0.31	0.31			0.30	0.30
Clearance Time (s)		4.0			5.0	5.0			5.0	5.0
Lane Grp Cap (vph)		1852			590	766			1226	293
v/s Ratio Prot						c0.33			0.25	
v/s Ratio Perm		0.30			0.20					c0.26
v/c Ratio		0.92			0.65	1.05			0.84	0.87
Uniform Delay, d1		29.4			26.7	31.0			29.5	29.9
Progression Factor		1.48			0.06	1.00			1.00	1.00
Incremental Delay, d2		6.6			0.5	47.9			7.2	28.4
Delay (s)		50.1			2.1	78.9			36.7	58.2
Level of Service		D			A	E			D	E
Approach Delay (s)		50.1			2.1	78.9			41.0	
Approach LOS		D			A	E			D	

Intersection Summary			
HCM 2000 Control Delay	48.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	109.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

4/27/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	16	506	568	45	338	362	24	255	129	624
Ideal Flow (vphpl)	1000	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.84		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.99		0.92		0.85		1.00	1.00
Flt Protected		0.95	0.99		1.00		1.00		0.95	0.99
Satd. Flow (prot)		1313	1912		2130		1163		1327	2541
Flt Permitted		0.95	0.99		1.00		1.00		0.15	0.63
Satd. Flow (perm)		1313	1912		2130		1163		207	1622
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	17	544	611	48	363	389	26	274	139	671
RTOR Reduction (vph)	0	0	7	0	0	0	17	0	0	0
Lane Group Flow (vph)	0	479	734	0	755	0	6	0	307	777
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	5	0	5	0	0	0	0	5
Parking (#/hr)			10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		22.5	22.5		23.0		23.0		42.0	42.0
Effective Green, g (s)		22.5	25.0		24.5		23.0		43.5	43.5
Actuated g/C Ratio		0.25	0.28		0.27		0.26		0.48	0.48
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		328	531		579		297		305	952
v/s Ratio Prot		0.36	c0.38		c0.35				c0.18	0.15
v/s Ratio Perm							0.01		0.30	0.24
v/c Ratio		1.46	1.38		1.42dr		0.02		1.01	0.82
Uniform Delay, d1		33.8	32.5		32.8		25.1		31.1	19.8
Progression Factor		1.00	1.00		1.00		1.00		1.10	1.15
Incremental Delay, d2		223.3	183.3		149.0		0.1		28.5	2.2
Delay (s)		257.1	215.8		181.8		25.2		62.7	25.1
Level of Service		F	F		F		C		E	C
Approach Delay (s)			232.0		177.1					35.7
Approach LOS			F		F					D

Intersection Summary			
HCM 2000 Control Delay	149.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	102.7%	ICU Level of Service	G
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	15	83	19	10	67	20	951	18	12	174	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		0.99	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.91		1.00	1.00		1.00	0.99	
Flt Protected		0.97	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1569	1353		1426		1272	2531		1540	3040	
Flt Permitted		0.87	1.00		0.95		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1405	1353		1373		1272	2531		1540	3040	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	18	16	87	20	11	71	21	1001	19	13	183	14
RTOR Reduction (vph)	0	0	59	0	48	0	0	1	0	0	6	0
Lane Group Flow (vph)	0	34	28	0	54	0	21	1019	0	13	191	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		32.1	32.1		32.1		13.8	38.5		13.5	38.5	
Effective Green, g (s)		32.1	32.1		32.1		13.8	38.5		13.5	38.5	
Actuated g/C Ratio		0.32	0.32		0.32		0.14	0.38		0.14	0.38	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Grp Cap (vph)		451	434		440		175	974		207	1170	
v/s Ratio Prot							0.02	c0.40		0.01	c0.06	
v/s Ratio Perm		0.02	0.02		c0.04							
v/c Ratio		0.08	0.06		0.12		0.12	1.05		0.06	0.16	
Uniform Delay, d1		23.6	23.5		24.0		37.8	30.8		37.7	20.2	
Progression Factor		1.00	1.00		1.00		1.21	0.23		1.00	1.00	
Incremental Delay, d2		0.3	0.3		0.6		1.0	37.6		0.6	0.3	
Delay (s)		23.9	23.8		24.6		46.7	44.7		38.3	20.5	
Level of Service		C	C		C		D	D		D	C	
Approach Delay (s)		23.9			24.6			44.7			21.6	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	38.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.9
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	12	10	3	10	30	7	84	6	97	114	14
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00	1.00	1.00	1.00		1.00	0.98	
Flpb, ped/bikes		0.99			1.00	1.00	0.84	1.00		1.00	1.00	
Frt		0.96			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.98			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2552			1434	1227	1152	1432		1377	1392	
Flt Permitted		0.95			1.00	1.00	0.80	1.00		0.95	1.00	
Satd. Flow (perm)		2493			1449	1227	970	1432		1377	1392	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	20	13	11	3	11	32	8	90	6	104	123	15
RTOR Reduction (vph)	0	10	0	0	0	16	0	4	0	0	5	0
Lane Group Flow (vph)	0	34	0	0	14	16	8	92	0	104	133	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		2.3			2.3	19.1	5.0	5.0		16.8	26.8	
Effective Green, g (s)		2.3			2.3	19.1	5.0	5.0		16.8	26.8	
Actuated g/C Ratio		0.06			0.06	0.49	0.13	0.13		0.43	0.69	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		146			85	756	124	183		591	954	
v/s Ratio Prot						0.01		c0.06		c0.08	0.10	
v/s Ratio Perm		c0.01			0.01	0.00	0.01					
v/c Ratio		0.23			0.16	0.02	0.06	0.50		0.18	0.14	
Uniform Delay, d1		17.6			17.5	5.2	15.0	15.9		6.9	2.1	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8			0.9	0.0	0.2	2.1		0.1	0.1	
Delay (s)		18.4			18.4	5.2	15.2	18.0		7.0	2.2	
Level of Service		B			B	A	B	B		A	A	
Approach Delay (s)		18.4			9.2			17.8			4.3	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	39.1	Sum of lost time (s)	15.0
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.

4/27/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	34	242	794	29	84	253
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1743	1535	848	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1743	1535	848	1134	1194
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	263	863	32	91	275
RTOR Reduction (vph)	0	235	0	5	0	0
Lane Group Flow (vph)	37	28	863	27	91	275
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	8.7	8.7	47.6	42.6	10.0	62.6
Effective Green, g (s)	8.7	8.7	47.6	42.6	10.0	62.6
Actuated g/C Ratio	0.11	0.11	0.59	0.52	0.12	0.77
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	121	186	898	496	139	919
v/s Ratio Prot	c0.03		c0.56	0.01	c0.08	0.23
v/s Ratio Perm		0.02		0.02		
v/c Ratio	0.31	0.15	0.96	0.05	0.65	0.30
Uniform Delay, d1	33.5	32.9	16.0	9.5	34.0	2.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	0.4	21.0	0.0	10.6	0.2
Delay (s)	34.9	33.3	37.0	9.5	44.6	3.0
Level of Service	C	C	D	A	D	A
Approach Delay (s)	33.5		36.0			13.3
Approach LOS	C		D			B

Intersection Summary			
HCM 2000 Control Delay	30.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	81.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	19	43	13	174	209	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.93		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.98	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1670	1431		3151	3063	
Flt Permitted	0.95	1.00		0.93	1.00	
Satd. Flow (perm)	1670	1431		2949	3063	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	21	48	14	193	232	46
RTOR Reduction (vph)	0	45	0	0	15	0
Lane Group Flow (vph)	21	3	0	207	263	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	10
Turn Type	Perm	Perm	Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4	4	2			
Actuated Green, G (s)	2.3	2.3		20.6	20.6	
Effective Green, g (s)	2.3	2.3		20.6	20.6	
Actuated g/C Ratio	0.07	0.07		0.65	0.65	
Clearance Time (s)	4.0	4.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	120	103		1904	1977	
v/s Ratio Prot					c0.09	
v/s Ratio Perm	c0.01	0.00		0.07		
v/c Ratio	0.17	0.03		0.11	0.13	
Uniform Delay, d1	13.9	13.8		2.2	2.2	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.1		0.0	0.0	
Delay (s)	14.6	13.9		2.2	2.2	
Level of Service	B	B		A	A	
Approach Delay (s)	14.1			2.2	2.2	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	3.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	31.9	Sum of lost time (s)	9.0
Intersection Capacity Utilization	37.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	189	158	860	17	45	487
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.96	1.00		1.00	1.00
Flpb, ped/bikes	0.93	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1584	1466	3408		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1584	1466	3408		1711	3421
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	210	176	956	19	50	541
RTOR Reduction (vph)	0	125	2	0	0	0
Lane Group Flow (vph)	210	51	973	0	50	541
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	28.7	28.7	48.1		7.9	61.1
Effective Green, g (s)	28.7	28.7	48.1		7.9	61.1
Actuated g/C Ratio	0.29	0.29	0.48		0.08	0.61
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	454	420	1639		135	2090
v/s Ratio Prot			c0.29		c0.03	0.16
v/s Ratio Perm	c0.13	0.03				
v/c Ratio	0.46	0.12	0.59		0.37	0.26
Uniform Delay, d1	29.3	26.3	18.9		43.7	9.0
Progression Factor	1.00	1.00	1.90		1.07	1.32
Incremental Delay, d2	0.7	0.1	1.0		1.7	0.1
Delay (s)	30.1	26.5	36.7		48.4	12.0
Level of Service	C	C	D		D	B
Approach Delay (s)	28.4		36.7			15.0
Approach LOS	C		D			B

Intersection Summary			
HCM 2000 Control Delay	28.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	10	10	20	177	192	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.97		1.00	0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.96	
Flt Protected	0.95	1.00		0.99	1.00	
Satd. Flow (prot)	1520	1343		3060	2948	
Flt Permitted	0.95	1.00		0.89	1.00	
Satd. Flow (perm)	1520	1343		2733	2948	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	12	12	24	208	226	71
RTOR Reduction (vph)	0	12	0	0	57	0
Lane Group Flow (vph)	12	0	0	232	240	0
Confl. Peds. (#/hr)	1	1	25			25
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	0.6	0.6		9.1	9.1	
Effective Green, g (s)	0.6	0.6		9.1	9.1	
Actuated g/C Ratio	0.01	0.01		0.20	0.20	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	20	17		552	596	
v/s Ratio Prot	c0.01				0.08	
v/s Ratio Perm		0.00		c0.08		
v/c Ratio	0.60	0.01		0.42	0.40	
Uniform Delay, d1	22.1	21.9		15.7	15.6	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	40.2	0.2		0.5	0.4	
Delay (s)	62.3	22.1		16.2	16.0	
Level of Service	E	C		B	B	
Approach Delay (s)	42.2			16.2	16.0	
Approach LOS	D			B	B	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	34.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	167	8	67	49	28	5	130	45	9	5	197	164
Peak Hour Factor	0.92	0.87	0.87	0.87	0.87	0.92	0.87	0.92	0.87	0.92	0.92	0.92
Hourly flow rate (vph)	182	9	77	56	32	5	149	49	10	5	214	178

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	182	86	56	38	209	220	178
Volume Left (vph)	182	0	56	0	149	5	0
Volume Right (vph)	0	77	0	5	10	0	178
Hadj (s)	0.53	-0.59	0.53	-0.07	0.15	0.05	-0.67
Departure Headway (s)	6.9	5.7	7.2	6.6	6.3	6.0	5.3
Degree Utilization, x	0.35	0.14	0.11	0.07	0.36	0.36	0.26
Capacity (veh/h)	495	586	458	497	548	575	651
Control Delay (s)	12.2	8.4	9.9	8.9	12.8	11.2	8.9
Approach Delay (s)	11.0		9.5		12.8	10.2	
Approach LOS	B		A		B	B	

Intersection Summary			
Delay	10.9		
Level of Service	B		
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	134	168	266	3	272	47	264	696	56	18	472	186
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1269	1365	1126	1285	1365	1099	2515	2555		1296	2464	
Flt Permitted	0.45	1.00	1.00	0.60	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	603	1365	1126	816	1365	1099	2515	2555		1296	2464	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	147	185	292	3	299	52	290	765	62	20	519	204
RTOR Reduction (vph)	0	0	191	0	0	34	0	6	0	0	42	0
Lane Group Flow (vph)	147	185	101	3	299	18	290	821	0	20	681	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Effective Green, g (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Actuated g/C Ratio	0.34	0.34	0.34	0.34	0.34	0.34	0.14	0.38		0.12	0.36	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Grp Cap (vph)	208	470	388	281	470	379	352	965		155	882	
v/s Ratio Prot		0.14			0.22		0.12	c0.32		0.02	c0.28	
v/s Ratio Perm	c0.24		0.09	0.00		0.02						
v/c Ratio	0.71	0.39	0.26	0.01	0.64	0.05	0.82	0.85		0.13	0.77	
Uniform Delay, d1	28.4	24.8	23.6	21.5	27.5	21.8	41.8	28.5		39.3	28.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.63	0.77		1.16	1.19	
Incremental Delay, d2	18.3	2.5	1.6	0.1	6.4	0.2	7.3	3.4		1.7	6.3	
Delay (s)	46.7	27.3	25.2	21.6	33.9	22.0	33.7	25.2		47.3	40.2	
Level of Service	D	C	C	C	C	C	C	C		D	D	
Approach Delay (s)		30.9			32.1			27.4			40.4	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	32.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	116.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	89	493	8	6	686	30	33	25	34	41	3	105
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.85	1.00	0.98		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1411	1621	1706	1238	1621	1527		1491	1355	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.68	1.00		0.72	1.00	
Satd. Flow (perm)	1621	1706	1411	1621	1706	1238	1163	1527		1123	1355	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	536	9	7	746	33	36	27	37	45	3	114
RTOR Reduction (vph)	0	0	4	0	0	18	0	28	0	0	85	0
Lane Group Flow (vph)	97	536	5	7	746	15	36	36	0	45	32	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	10.9	47.6	47.6	2.7	39.4	39.4	21.9	21.9		21.9	21.9	
Effective Green, g (s)	10.9	47.6	47.6	2.7	39.4	39.4	21.9	21.9		21.9	21.9	
Actuated g/C Ratio	0.12	0.55	0.55	0.03	0.45	0.45	0.25	0.25		0.25	0.25	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	202	931	770	50	770	559	292	383		282	340	
v/s Ratio Prot	c0.06	c0.31		0.00	c0.44			0.02			0.02	
v/s Ratio Perm			0.00			0.01	0.03			c0.04		
v/c Ratio	0.48	0.58	0.01	0.14	0.97	0.03	0.12	0.09		0.16	0.09	
Uniform Delay, d1	35.5	13.1	9.0	41.1	23.3	13.3	25.2	25.0		25.5	25.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	2.6	0.0	1.3	24.7	0.0	0.2	0.1		0.3	0.1	
Delay (s)	37.3	15.7	9.0	42.4	48.0	13.3	25.4	25.2		25.7	25.2	
Level of Service	D	B	A	D	D	B	C	C		C	C	
Approach Delay (s)		18.9			46.5			25.3			25.3	
Approach LOS		B			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	87.2	Sum of lost time (s)	15.0
Intersection Capacity Utilization	88.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↱			↰↑	↱
Volume (vph)	118	417	14	21	725	78	49	134	61	112	54	146
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.97	1.00
Satd. Flow (prot)	1215	1279	1378	1540	1279	1049	1540	2934			2978	1072
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.64	1.00			0.69	1.00
Satd. Flow (perm)	1215	1279	1378	1540	1279	1049	1041	2934			2120	1072
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	123	434	15	22	755	81	51	140	64	117	56	152
RTOR Reduction (vph)	0	0	5	0	0	23	0	54	0	0	0	130
Lane Group Flow (vph)	123	434	10	22	755	58	51	150	0	0	173	22
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	9.0	57.6	57.6	1.9	49.5	49.5	13.3	13.3			12.3	12.3
Effective Green, g (s)	9.0	57.6	57.6	1.9	49.5	49.5	13.3	13.3			12.3	12.3
Actuated g/C Ratio	0.10	0.67	0.67	0.02	0.58	0.58	0.16	0.16			0.14	0.14
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	127	858	925	34	737	605	161	454			303	153
v/s Ratio Prot	c0.10	0.34		0.01	c0.59			0.05				
v/s Ratio Perm			0.01			0.06	0.05				c0.08	0.02
v/c Ratio	0.97	0.51	0.01	0.65	1.02	0.10	0.32	0.33			0.57	0.14
Uniform Delay, d1	38.3	7.0	4.7	41.6	18.1	8.1	32.2	32.3			34.3	32.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	69.3	2.1	0.0	35.3	39.5	0.1	1.1	0.4			2.6	0.4
Delay (s)	107.5	9.1	4.7	76.9	57.6	8.2	33.3	32.7			36.9	32.6
Level of Service	F	A	A	E	E	A	C	C			D	C
Approach Delay (s)		30.2			53.5			32.8			34.9	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	41.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	85.8	Sum of lost time (s)	15.0
Intersection Capacity Utilization	95.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑	↱	↰	↑	↱	↰	↑↱	
Volume (vph)	47	410	70	33	509	378	61	249	30	109	138	43
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.90	1.00	1.00	0.96	1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1337	931		1336	1126	861	1070	957	919	1070	1068	
Flt Permitted	0.12	1.00		0.27	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	169	931		374	1126	861	1070	957	919	1070	1068	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	50	436	74	35	541	402	65	265	32	116	147	46
RTOR Reduction (vph)	0	5	0	0	0	121	0	0	25	0	11	0
Lane Group Flow (vph)	50	505	0	35	541	281	65	265	7	116	182	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	52.8	52.8		52.1	52.1	62.1	12.9	25.1	25.1	10.0	22.2	
Effective Green, g (s)	52.8	52.8		52.1	52.1	62.1	12.9	25.1	25.1	10.0	22.2	
Actuated g/C Ratio	0.48	0.48		0.47	0.47	0.56	0.12	0.23	0.23	0.09	0.20	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	113	445		197	531	523	125	217	209	97	214	
v/s Ratio Prot	0.01	c0.54		0.00	c0.48	0.05	0.06	c0.28		c0.11	0.17	
v/s Ratio Perm	0.20			0.08		0.28			0.01			
v/c Ratio	0.44	1.13		0.18	1.02	0.54	0.52	1.22	0.03	1.20	0.85	
Uniform Delay, d1	21.7	28.8		28.3	29.1	15.1	45.8	42.6	33.2	50.1	42.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.8	84.8		0.4	43.9	1.1	3.9	133.6	0.1	153.3	25.6	
Delay (s)	24.4	113.6		28.7	73.0	16.2	49.7	176.2	33.2	203.4	68.1	
Level of Service	C	F		C	E	B	D	F	C	F	E	
Approach Delay (s)		105.6			48.0			140.9			118.9	
Approach LOS		F			D			F			F	

Intersection Summary			
HCM 2000 Control Delay	87.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	110.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	64	74	39	45	162	2	31	116	78	11	51	248
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		0.99		1.00	1.00			1.00	0.98		0.98	
Flpb, ped/bikes		1.00		0.99	1.00			1.00	1.00		1.00	
Frt		0.97		1.00	1.00			1.00	0.85		0.89	
Flt Protected		0.98		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)		1694		1689	1797			1780	1500		1572	
Flt Permitted		0.81		0.66	1.00			0.86	1.00		0.99	
Satd. Flow (perm)		1403		1179	1797			1539	1500		1554	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	71	82	43	50	180	2	34	129	87	12	57	276
RTOR Reduction (vph)	0	13	0	0	1	0	0	0	65	0	202	0
Lane Group Flow (vph)	0	183	0	50	181	0	0	163	22	0	143	0
Confl. Peds. (#/hr)	13		16	16		13	16		19	19		16
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4		4	8		
Actuated Green, G (s)		13.1		13.1	13.1			13.1	13.1		13.1	
Effective Green, g (s)		13.1		13.1	13.1			13.1	13.1		13.1	
Actuated g/C Ratio		0.26		0.26	0.26			0.26	0.26		0.26	
Clearance Time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		361		303	462			396	386		399	
v/s Ratio Prot					0.10							
v/s Ratio Perm		c0.13		0.04				c0.11	0.01		0.09	
v/c Ratio		0.51		0.17	0.39			0.41	0.06		0.36	
Uniform Delay, d1		16.1		14.7	15.6			15.7	14.2		15.5	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		1.1		0.3	0.6			0.7	0.1		0.6	
Delay (s)		17.3		14.9	16.2			16.4	14.3		16.0	
Level of Service		B		B	B			B	B		B	
Approach Delay (s)		17.3			15.9			15.7			16.0	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	50.9	Sum of lost time (s)	14.0
Intersection Capacity Utilization	64.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	146	126	51	86	331	23	40	847	35	16	426	299
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.99		1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1677	3239		1679	3378		1260	2501		1260	2331	
Flt Permitted	0.49	1.00		0.63	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	859	3239		1119	3378		1260	2501		1260	2331	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	155	134	54	91	352	24	43	901	37	17	453	318
RTOR Reduction (vph)	0	35	0	0	5	0	0	3	0	0	127	0
Lane Group Flow (vph)	155	153	0	91	371	0	43	935	0	17	644	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	34.7	34.7		34.7	34.7		11.9	34.9		14.9	37.9	
Effective Green, g (s)	34.7	34.7		34.7	34.7		11.9	34.9		14.9	37.9	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.12	0.35		0.15	0.38	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Grp Cap (vph)	298	1123		388	1172		149	872		187	883	
v/s Ratio Prot		0.05			0.11		0.03	c0.37		0.01	c0.28	
v/s Ratio Perm	c0.18			0.08								
v/c Ratio	0.52	0.14		0.23	0.32		0.29	1.07		0.09	0.73	
Uniform Delay, d1	26.0	22.4		23.2	23.9		40.2	32.5		36.7	26.6	
Progression Factor	1.00	1.00		1.00	1.00		0.91	0.81		1.55	0.62	
Incremental Delay, d2	6.4	0.3		1.4	0.7		3.8	48.7		0.7	3.8	
Delay (s)	32.4	22.6		24.6	24.7		40.5	75.0		57.6	20.3	
Level of Service	C	C		C	C		D	E		E	C	
Approach Delay (s)		27.0			24.7			73.5			21.1	
Approach LOS		C			C			E			C	

Intersection Summary			
HCM 2000 Control Delay	42.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	107.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	277	38	4	723	2	38	0	12	13	0	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00			0.97		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3360		1711	3420			1678		1711	1531	
Flt Permitted	0.27	1.00		0.55	1.00			0.84		0.72	1.00	
Satd. Flow (perm)	483	3360		983	3420			1467		1300	1531	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	301	41	4	786	2	41	0	13	14	0	14
RTOR Reduction (vph)	0	17	0	0	0	0	0	20	0	0	8	0
Lane Group Flow (vph)	7	325	0	4	788	0	0	34	0	14	6	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	24.0	24.0		24.0	24.0			26.0		26.0	26.0	
Effective Green, g (s)	24.0	24.0		24.0	24.0			26.0		26.0	26.0	
Actuated g/C Ratio	0.40	0.40		0.40	0.40			0.43		0.43	0.43	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Grp Cap (vph)	193	1344		393	1368			635		563	663	
v/s Ratio Prot		0.10			c0.23						0.00	
v/s Ratio Perm	0.01			0.00				c0.02		0.01		
v/c Ratio	0.04	0.24		0.01	0.58			0.05		0.02	0.01	
Uniform Delay, d1	11.0	12.0		10.8	14.0			9.9		9.7	9.7	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.4		0.0	1.8			0.2		0.1	0.0	
Delay (s)	11.3	12.4		10.9	15.8			10.0		9.8	9.7	
Level of Service	B	B		B	B			B		A	A	
Approach Delay (s)		12.4			15.8			10.0			9.8	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	37.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	86	0	0	834	6	382	112	239	0	0	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				3.5
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Flpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Frt		1.00			1.00		1.00	0.90				0.85
Flt Protected		1.00			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3416			5126		1711	3071				2694
Flt Permitted		0.95			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3244			5126		1711	3071				2694
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	3	88	0	0	851	6	390	114	244	0	0	130
RTOR Reduction (vph)	0	0	0	0	1	0	0	126	0	0	0	121
Lane Group Flow (vph)	0	91	0	0	856	0	390	232	0	0	0	9
Confl. Peds. (#/hr)												20
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		47.5			36.5		53.0	53.0				7.5
Effective Green, g (s)		47.5			36.5		53.0	53.0				7.5
Actuated g/C Ratio		0.43			0.33		0.48	0.48				0.07
Clearance Time (s)		4.5			4.5		5.0	5.0				3.5
Lane Grp Cap (vph)		1412			1700		824	1479				183
v/s Ratio Prot		c0.00			c0.17		c0.23	0.08				0.00
v/s Ratio Perm		0.02										
v/c Ratio		0.06			0.50		0.47	0.16				0.05
Uniform Delay, d1		18.3			29.5		19.1	16.0				47.9
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			1.1		1.9	0.2				0.5
Delay (s)		18.4			30.6		21.1	16.2				48.4
Level of Service		B			C		C	B				D
Approach Delay (s)		18.4			30.6			18.7			48.4	
Approach LOS		B			C			B			D	

Intersection Summary			
HCM 2000 Control Delay	26.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	55.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.

4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	89	566	794	549	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.89	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1501	1426	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1501	1426	3319	1801		
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	92	584	819	566	0	0
RTOR Reduction (vph)	30	30	0	0	0	0
Lane Group Flow (vph)	313	303	819	566	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	37.0	37.0	23.0	70.0		
Effective Green, g (s)	37.0	37.0	23.0	70.0		
Actuated g/C Ratio	0.53	0.53	0.33	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	793	753	1090	1801		
v/s Ratio Prot	0.21		c0.25	0.31		
v/s Ratio Perm		c0.21				
v/c Ratio	0.39	0.40	0.75	0.31		
Uniform Delay, d1	9.8	9.9	21.0	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.3	0.4	3.0	0.1		
Delay (s)	10.2	10.2	23.9	0.1		
Level of Service	B	B	C	A		
Approach Delay (s)	10.2			14.2	0.0	
Approach LOS	B			B	A	

Intersection Summary			
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	54.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	203	135	181	7	204	13	176	590	16	17	586	173
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.93		1.00	0.99		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	0.98	1.00		0.94	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.99		1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1188	1945		1139	1257		1215	2414		1215	2289	
Flt Permitted	0.36	1.00		0.55	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	454	1945		662	1257		1215	2414		1215	2289	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	211	141	189	7	212	14	183	615	17	18	610	180
RTOR Reduction (vph)	0	127	0	0	2	0	0	2	0	0	27	0
Lane Group Flow (vph)	211	203	0	7	224	0	183	630	0	18	763	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	32.9	32.9		21.9	21.9		17.3	46.8		4.0	33.5	
Effective Green, g (s)	32.9	32.9		21.9	21.9		17.3	46.8		4.0	33.5	
Actuated g/C Ratio	0.33	0.33		0.22	0.22		0.17	0.47		0.04	0.34	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	191	639		144	275		210	1129		48	766	
v/s Ratio Prot	c0.06	0.10			0.18		c0.15	0.26		0.01	c0.33	
v/s Ratio Perm	c0.30			0.01								
v/c Ratio	1.10	0.32		0.05	0.81		0.87	0.56		0.38	1.00	
Uniform Delay, d1	34.2	25.1		30.8	37.1		40.3	19.2		46.8	33.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.04	0.81	
Incremental Delay, d2	95.9	0.3		0.1	16.6		30.2	2.0		4.0	28.5	
Delay (s)	130.1	25.4		31.0	53.7		70.5	21.2		52.5	55.3	
Level of Service	F	C		C	D		E	C		D	E	
Approach Delay (s)		66.3			53.0			32.2			55.3	
Approach LOS		E			D			C			E	

Intersection Summary			
HCM 2000 Control Delay	49.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	100.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

EXISTING 2015 PLUS PROJECT - NO EVENT
SATURDAY EVENING

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	637	670	58	152	569	78	43	515	175	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	0.90			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	0.99		1.00	0.98			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	3018		2987	2982			5517	1233			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	3018		2987	2982			5517	1233			
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	708	744	64	169	632	87	48	572	194	0	0	0
RTOR Reduction (vph)	0	4	0	0	8	0	0	0	157	0	0	0
Lane Group Flow (vph)	708	804	0	169	711	0	0	620	37	0	0	0
Confl. Peds. (#/hr)			100			100	100		100			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	25.4	58.7		11.5	44.8			20.9	20.9			
Effective Green, g (s)	25.4	58.7		11.5	44.8			20.9	20.9			
Actuated g/C Ratio	0.23	0.53		0.10	0.41			0.19	0.19			
Clearance Time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	1034	1610		312	1214			1048	234			
v/s Ratio Prot	c0.16	0.27		0.06	c0.24							
v/s Ratio Perm								0.11	0.03			
v/c Ratio	0.68	0.50		0.54	0.59			0.59	0.16			
Uniform Delay, d1	38.6	16.3		46.7	25.4			40.7	37.2			
Progression Factor	0.57	0.25		1.31	0.26			1.15	3.59			
Incremental Delay, d2	1.7	1.0		0.6	0.2			0.8	0.3			
Delay (s)	23.7	5.0		61.6	6.7			47.4	133.7			
Level of Service	C	A		E	A			D	F			
Approach Delay (s)		13.8			17.2			68.0			0.0	
Approach LOS		B			B			E			A	

Intersection Summary			
HCM 2000 Control Delay	28.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.9
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	152	1277	79	51	517	44	7	49	28	60	235	97
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.98		1.00	0.95			1.00	0.63	1.00	0.98	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.96	1.00	0.67	1.00	1.00
Frt	1.00	0.99		1.00	0.99			1.00	0.85	1.00	0.99	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	4288		1296	2437			1543	853	1033	2873	580
Flt Permitted	0.95	1.00		0.95	1.00			0.93	1.00	0.72	1.00	1.00
Satd. Flow (perm)	1540	4288		1296	2437			1450	853	781	2873	580
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	162	1359	84	54	550	47	7	52	30	64	250	103
RTOR Reduction (vph)	0	4	0	0	4	0	0	0	26	0	3	79
Lane Group Flow (vph)	162	1439	0	54	593	0	0	59	4	64	257	14
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	17.5	65.6		8.9	55.4			15.6	15.6	16.6	16.6	16.6
Effective Green, g (s)	17.5	65.6		8.9	55.4			15.6	15.6	16.6	16.6	16.6
Actuated g/C Ratio	0.16	0.60		0.08	0.50			0.14	0.14	0.15	0.15	0.15
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	245	2557		104	1227			205	120	117	433	87
v/s Ratio Prot	0.11	c0.34		0.04	c0.24						c0.09	
v/s Ratio Perm								0.04	0.00	0.08		0.02
v/c Ratio	0.66	0.56		0.52	0.48			0.29	0.04	0.55	0.59	0.16
Uniform Delay, d1	43.5	13.5		48.5	17.9			42.2	40.7	43.2	43.5	40.6
Progression Factor	0.90	1.29		0.83	0.48			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.1	0.7		3.6	0.2			0.8	0.1	5.1	2.2	0.9
Delay (s)	44.4	18.1		43.7	8.9			43.0	40.8	48.4	45.7	41.5
Level of Service	D	B		D	A			D	D	D	D	D
Approach Delay (s)		20.8			11.8			42.3			45.2	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	23.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	110.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1458	80	3	618	30	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3052			3078	1540	1357
Flt Permitted	1.00			0.95	0.95	1.00
Satd. Flow (perm)	3052			2922	1540	1357
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	1602	88	3	679	33	55
RTOR Reduction (vph)	1	0	0	0	0	21
Lane Group Flow (vph)	1689	0	0	682	33	35
Confl. Peds. (#/hr)		10	10			3
Confl. Bikes (#/hr)		1				
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Actuated Green, G (s)	91.2			91.2	7.5	7.5
Effective Green, g (s)	91.2			91.2	7.5	7.5
Actuated g/C Ratio	0.83			0.83	0.07	0.07
Clearance Time (s)	4.9			4.9	6.4	6.4
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	2530			2422	105	92
v/s Ratio Prot	c0.55				0.02	
v/s Ratio Perm				0.23		c0.03
v/c Ratio	0.67			0.28	0.31	0.38
Uniform Delay, d1	3.6			2.1	48.8	49.0
Progression Factor	1.00			0.51	1.00	1.00
Incremental Delay, d2	1.4			0.1	1.7	2.6
Delay (s)	5.0			1.1	50.5	51.6
Level of Service	A			A	D	D
Approach Delay (s)	5.0			1.1	51.2	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	5.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

4/27/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	262	1267	145	34	172	356	188	145	465	262
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		3.5			3.0	3.0			3.0	3.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.98	1.00
Flpb, ped/bikes		0.99			0.99	1.00			1.00	1.00
Frt		0.99			1.00	0.95			0.99	0.85
Flt Protected		0.99			0.99	1.00			0.96	1.00
Satd. Flow (prot)		5770			2846	2429			3997	1122
Flt Permitted		0.99			0.83	1.00			0.96	1.00
Satd. Flow (perm)		5770			2373	2429			3997	1122
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	270	1306	149	35	177	367	194	149	479	270
RTOR Reduction (vph)	0	22	0	0	0	6	0	0	0	0
Lane Group Flow (vph)	0	1703	0	0	212	555	0	0	690	208
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Prot
Protected Phases		6			4	4		7	7	7
Permitted Phases	6			4						
Actuated Green, G (s)		22.4			20.4	20.4			14.7	14.7
Effective Green, g (s)		24.4			23.4	23.4			17.7	17.7
Actuated g/C Ratio		0.33			0.31	0.31			0.24	0.24
Clearance Time (s)		5.5			6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1877			740	757			943	264
v/s Ratio Prot						c0.23			0.17	c0.19
v/s Ratio Perm		0.30			0.09					
v/c Ratio		0.91			0.29	0.73			0.73	0.79
Uniform Delay, d1		24.2			19.5	23.0			26.5	26.9
Progression Factor		1.00			0.70	1.00			1.00	1.00
Incremental Delay, d2		6.8			0.2	3.7			3.0	14.4
Delay (s)		31.0			13.7	26.7			29.4	41.2
Level of Service		C			B	C			C	D
Approach Delay (s)		31.0			13.7	26.7			32.2	
Approach LOS		C			B	C			C	

Intersection Summary			
HCM 2000 Control Delay	29.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	85.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

4/27/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	51	328	276	49	155	105	14	231	55	477
Ideal Flow (vphpl)	1400	1400	1400	1400	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.88		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.98		0.94		0.85		1.00	1.00
Flt Protected		0.95	0.99		1.00		1.00		0.95	1.00
Satd. Flow (prot)		1700	2620		2297		1161		1327	2547
Flt Permitted		0.95	0.99		1.00		1.00		0.44	0.91
Satd. Flow (perm)		1700	2620		2297		1161		621	2323
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	63	405	341	60	191	130	17	285	68	589
RTOR Reduction (vph)	0	0	18	0	1	0	12	0	0	0
Lane Group Flow (vph)	0	342	509	0	322	0	3	0	292	650
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	8	0	5	0	0	0	0	5
Parking (#/hr)		10	10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		18.5	18.5		16.0		16.0		31.0	31.0
Effective Green, g (s)		18.5	21.0		17.5		16.0		32.5	32.5
Actuated g/C Ratio		0.25	0.28		0.23		0.21		0.43	0.43
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		419	733		535		247		386	1043
v/s Ratio Prot		c0.20	0.19		0.14				c0.13	0.10
v/s Ratio Perm							0.00		c0.20	0.17
v/c Ratio		0.82	0.69		0.60		0.01		0.76	0.62
Uniform Delay, d1		26.6	24.1		25.6		23.3		20.1	16.5
Progression Factor		1.00	1.00		1.00		1.00		0.88	0.89
Incremental Delay, d2		16.0	5.4		5.0		0.1		10.1	2.1
Delay (s)		42.6	29.5		30.6		23.4		27.8	16.8
Level of Service		D	C		C		C		C	B
Approach Delay (s)			34.7		30.3					20.2
Approach LOS			C		C					C

Intersection Summary			
HCM 2000 Control Delay	27.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	2	67	8	4	14	9	374	2	7	91	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.93		1.00	1.00		1.00	0.99	
Flt Protected		0.96	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1550	1350		1464		1272	2541		1540	3042	
Flt Permitted		1.00	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1614	1350		1486		1272	2541		1540	3042	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	10	2	69	8	4	14	9	386	2	7	94	7
RTOR Reduction (vph)	0	0	64	0	13	0	0	1	0	0	5	0
Lane Group Flow (vph)	0	12	5	0	13	0	9	387	0	7	96	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		1.9	1.9		1.9		0.6	9.1		0.6	9.4	
Effective Green, g (s)		1.9	1.9		1.9		0.6	9.1		0.6	9.4	
Actuated g/C Ratio		0.07	0.07		0.07		0.02	0.33		0.02	0.34	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Vehicle Extension (s)		3.0	3.0		3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		111	93		102		27	840		33	1039	
v/s Ratio Prot							0.01	c0.15		0.00	c0.03	
v/s Ratio Perm		0.01	0.00		c0.01							
v/c Ratio		0.11	0.05		0.13		0.33	0.46		0.21	0.09	
Uniform Delay, d1		12.0	12.0		12.0		13.3	7.3		13.2	6.2	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4	0.2		0.6		2.6	0.4		1.2	0.0	
Delay (s)		12.4	12.2		12.6		15.9	7.7		14.4	6.2	
Level of Service		B	B		B		B	A		B	A	
Approach Delay (s)		12.2			12.6			7.9			6.7	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	27.5	Sum of lost time (s)	15.9
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	5	7	2	2	16	5	29	1	72	59	10
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00	1.00	1.00	1.00		1.00	0.97	
Flpb, ped/bikes		0.99			1.00	1.00	0.83	1.00		1.00	1.00	
Frt		0.95			1.00	0.85	1.00	1.00		1.00	0.98	
Flt Protected		0.98			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2370			1413	1230	1145	1438		1377	1378	
Flt Permitted		0.95			1.00	1.00	1.00	1.00		0.95	1.00	
Satd. Flow (perm)		2305			1448	1230	1206	1438		1377	1378	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	8	6	8	2	2	18	6	33	1	83	68	11
RTOR Reduction (vph)	0	8	0	0	0	8	0	1	0	0	3	0
Lane Group Flow (vph)	0	14	0	0	4	10	6	33	0	83	76	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Parking (#/hr)		2										
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		1.0			1.0	20.9	1.2	1.2		19.9	26.1	
Effective Green, g (s)		1.0			1.0	20.9	1.2	1.2		19.9	26.1	
Actuated g/C Ratio		0.03			0.03	0.56	0.03	0.03		0.54	0.70	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	2.0	3.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		62			39	858	39	46		738	969	
v/s Ratio Prot						0.01		c0.02		c0.06	0.05	
v/s Ratio Perm		c0.01			0.00	0.00	0.00					
v/c Ratio		0.23			0.10	0.01	0.15	0.72		0.11	0.08	
Uniform Delay, d1		17.7			17.6	3.6	17.5	17.8		4.2	1.7	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.9			1.2	0.0	1.8	41.6		0.0	0.0	
Delay (s)		19.6			18.8	3.6	19.3	59.4		4.3	1.8	
Level of Service		B			B	A	B	E		A	A	
Approach Delay (s)		19.6			6.3			53.4			3.0	
Approach LOS		B			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.15		
Actuated Cycle Length (s)	37.1	Sum of lost time (s)	15.0
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.
4/27/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	20	115	242	25	61	129
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1743	1535	849	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1743	1535	849	1134	1194
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	23	132	278	29	70	148
RTOR Reduction (vph)	0	119	0	17	0	0
Lane Group Flow (vph)	23	13	278	12	70	148
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	5.6	5.6	28.9	23.9	7.5	41.4
Effective Green, g (s)	5.6	5.6	28.9	23.9	7.5	41.4
Actuated g/C Ratio	0.10	0.10	0.51	0.42	0.13	0.73
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	111	171	778	430	149	867
v/s Ratio Prot	c0.02		c0.18	0.01	c0.06	0.12
v/s Ratio Perm		0.01		0.01		
v/c Ratio	0.21	0.08	0.36	0.03	0.47	0.17
Uniform Delay, d1	23.7	23.3	8.5	9.7	22.9	2.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.2	0.3	0.0	2.3	0.1
Delay (s)	24.6	23.5	8.7	9.8	25.2	2.5
Level of Service	C	C	A	A	C	A
Approach Delay (s)	23.7		8.8			9.8
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	57.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	36.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
9: Terry A Francois Blvd/Terry A Francois Blvd. & South St.

4/27/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	3	1	7	67	43	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.90		1.00	1.00	
Flpb, ped/bikes	0.98	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1671	1371		3144	3120	
Flt Permitted	0.95	1.00		0.94	1.00	
Satd. Flow (perm)	1671	1371		2974	3120	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	4	1	8	80	51	4
RTOR Reduction (vph)	0	1	0	0	1	0
Lane Group Flow (vph)	4	0	0	88	54	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	0.9	0.9		21.3	21.3	
Effective Green, g (s)	0.9	0.9		21.3	21.3	
Actuated g/C Ratio	0.03	0.03		0.66	0.66	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	46	38		1967	2063	
v/s Ratio Prot	c0.00				0.02	
v/s Ratio Perm		0.00		c0.03		
v/c Ratio	0.09	0.00		0.04	0.03	
Uniform Delay, d1	15.2	15.2		1.9	1.9	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	0.0		0.0	0.0	
Delay (s)	16.1	15.2		1.9	1.9	
Level of Service	B	B		A	A	
Approach Delay (s)	15.9			1.9	1.9	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	2.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.05		
Actuated Cycle Length (s)	32.2	Sum of lost time (s)	10.0
Intersection Capacity Utilization	36.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: Third St. & South St.

4/27/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	10	85	287	7	71	226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.95	1.00		1.00	1.00
Flpb, ped/bikes	0.96	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1634	1458	3403		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1634	1458	3403		1711	3421
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	11	91	309	8	76	243
RTOR Reduction (vph)	0	82	1	0	0	0
Lane Group Flow (vph)	11	9	316	0	76	243
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	5.9	5.9	33.9		5.1	44.1
Effective Green, g (s)	5.9	5.9	33.9		5.1	44.1
Actuated g/C Ratio	0.10	0.10	0.56		0.08	0.73
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	160	142	1916		144	2506
v/s Ratio Prot			c0.09		c0.04	0.07
v/s Ratio Perm	c0.01	0.01				
v/c Ratio	0.07	0.06	0.16		0.53	0.10
Uniform Delay, d1	24.7	24.6	6.3		26.4	2.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	0.2	0.2		3.5	0.1
Delay (s)	24.8	24.8	6.5		29.9	2.4
Level of Service	C	C	A		C	A
Approach Delay (s)	24.8		6.5			8.9
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	60.2	Sum of lost time (s)	15.3
Intersection Capacity Utilization	48.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	10	5	5	64	34	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.97	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1521	1344		2873	2769	
Flt Permitted	0.95	1.00		0.93	1.00	
Satd. Flow (perm)	1521	1344		2683	2769	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	12	6	6	75	40	12
RTOR Reduction (vph)	0	6	0	0	10	0
Lane Group Flow (vph)	12	0	0	81	42	0
Confl. Peds. (#/hr)	1	1	25			25
Parking (#/hr)				5	5	
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	0.7	0.7		6.6	6.6	
Effective Green, g (s)	0.7	0.7		6.6	6.6	
Actuated g/C Ratio	0.02	0.02		0.16	0.16	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	25	22		416	430	
v/s Ratio Prot	c0.01				0.02	
v/s Ratio Perm		0.00		c0.03		
v/c Ratio	0.48	0.00		0.19	0.10	
Uniform Delay, d1	20.7	20.6		15.6	15.4	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.8	0.1		0.2	0.1	
Delay (s)	34.5	20.6		15.9	15.5	
Level of Service	C	C		B	B	
Approach Delay (s)	29.9			15.9	15.5	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.06		
Actuated Cycle Length (s)	42.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	22.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	230	1	20	2	2	5	28	68	6	5	159	178
Peak Hour Factor	0.92	0.79	0.79	0.79	0.79	0.92	0.79	0.92	0.79	0.92	0.92	0.92
Hourly flow rate (vph)	250	1	25	3	3	5	35	74	8	5	173	193

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	250	27	3	8	117	178	193
Volume Left (vph)	250	0	3	0	35	5	0
Volume Right (vph)	0	25	0	5	8	0	193
Hadj (s)	0.53	-0.63	0.53	-0.44	0.06	0.05	-0.67
Departure Headway (s)	6.3	5.1	6.7	5.7	5.9	5.6	4.9
Degree Utilization, x	0.44	0.04	0.00	0.01	0.19	0.28	0.26
Capacity (veh/h)	548	662	489	568	583	617	708
Control Delay (s)	12.9	7.1	8.6	7.6	10.2	9.5	8.4
Approach Delay (s)	12.3		7.8		10.2	8.9	
Approach LOS	B		A		B	A	

Intersection Summary			
Delay	10.3		
Level of Service	B		
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰↰	↑↱		↰	↑↱	
Volume (vph)	46	184	99	1	201	6	62	242	66	1	163	71
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.96	1.00	0.99		1.00	0.99	
Flpb, ped/bikes	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1279	1365	1131	1290	1365	1116	2515	2491		1296	2454	
Flt Permitted	0.62	1.00	1.00	0.63	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	831	1365	1131	853	1365	1116	2515	2491		1296	2454	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	52	207	111	1	226	7	70	272	74	1	183	80
RTOR Reduction (vph)	0	0	79	0	0	5	0	24	0	0	52	0
Lane Group Flow (vph)	52	207	32	1	226	2	70	322	0	1	211	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	13.4	13.4	13.4	13.4	13.4	13.4	3.9	16.7		0.8	13.6	
Effective Green, g (s)	13.4	13.4	13.4	13.4	13.4	13.4	3.9	16.7		0.8	13.6	
Actuated g/C Ratio	0.29	0.29	0.29	0.29	0.29	0.29	0.08	0.36		0.02	0.29	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	238	392	325	245	392	320	210	892		22	716	
v/s Ratio Prot		0.15			c0.17		0.03	c0.13		0.00	c0.09	
v/s Ratio Perm	0.06		0.03	0.00		0.00						
v/c Ratio	0.22	0.53	0.10	0.00	0.58	0.01	0.33	0.36		0.05	0.29	
Uniform Delay, d1	12.6	13.9	12.2	11.8	14.2	11.8	20.1	11.0		22.5	12.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	1.3	0.1	0.0	2.1	0.0	0.9	0.3		0.9	0.2	
Delay (s)	13.1	15.2	12.3	11.8	16.2	11.9	21.1	11.3		23.4	13.0	
Level of Service	B	B	B	B	B	B	C	B		C	B	
Approach Delay (s)		14.1			16.1			12.9			13.1	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	46.6	Sum of lost time (s)	15.7
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↱		↰	↑↱	
Volume (vph)	39	310	1	2	319	12	3	5	1	17	1	44
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.87	1.00	1.00		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1255	1621	1663		1493	1356	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.73	1.00		0.75	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1255	1239	1663		1185	1356	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	41	323	1	2	332	12	3	5	1	18	1	46
RTOR Reduction (vph)	0	0	0	0	0	6	0	1	0	0	37	0
Lane Group Flow (vph)	41	323	1	2	332	6	3	5	0	18	10	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	7.4	47.2	47.2	2.4	42.2	42.2	14.9	14.9		14.9	14.9	
Effective Green, g (s)	7.4	47.2	47.2	2.4	42.2	42.2	14.9	14.9		14.9	14.9	
Actuated g/C Ratio	0.09	0.59	0.59	0.03	0.53	0.53	0.19	0.19		0.19	0.19	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	150	1012	860	48	905	666	232	311		222	254	
v/s Ratio Prot	c0.03	c0.19		0.00	c0.19			0.00			0.01	
v/s Ratio Perm			0.00			0.01	0.00			c0.02		
v/c Ratio	0.27	0.32	0.00	0.04	0.37	0.01	0.01	0.02		0.08	0.04	
Uniform Delay, d1	33.5	8.1	6.6	37.4	10.9	8.8	26.3	26.3		26.7	26.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	0.8	0.0	0.4	0.3	0.0	0.0	0.0		0.2	0.1	
Delay (s)	34.5	8.9	6.6	37.8	11.1	8.8	26.3	26.4		26.8	26.5	
Level of Service	C	A	A	D	B	A	C	C		C	C	
Approach Delay (s)		11.8			11.2			26.3			26.6	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	79.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	317	3	5	357	4	11	42	13	21	14	39
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.97	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1053	1540	2967			2989	1073
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.93	1.00			0.95	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1053	1508	2967			2941	1073
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	16	356	3	6	401	4	12	47	15	24	16	44
RTOR Reduction (vph)	0	0	1	0	0	2	0	13	0	0	0	40
Lane Group Flow (vph)	16	356	2	6	401	2	12	49	0	0	40	4
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	0.5	20.0	20.0	0.6	19.1	19.1	4.3	4.3			3.3	3.3
Effective Green, g (s)	0.5	20.0	20.0	0.6	19.1	19.1	4.3	4.3			3.3	3.3
Actuated g/C Ratio	0.01	0.53	0.53	0.02	0.50	0.50	0.11	0.11			0.09	0.09
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	16	641	727	24	612	530	171	336			256	93
v/s Ratio Prot	c0.01	0.29		0.00	c0.33			c0.02				
v/s Ratio Perm			0.00			0.00	0.01				0.01	0.00
v/c Ratio	1.00	0.56	0.00	0.25	0.66	0.00	0.07	0.14			0.16	0.04
Uniform Delay, d1	18.7	6.0	4.2	18.4	7.0	4.7	15.0	15.1			16.0	15.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	225.0	1.0	0.0	5.4	2.5	0.0	0.2	0.2			0.3	0.2
Delay (s)	243.7	7.0	4.2	23.8	9.5	4.7	15.2	15.3			16.3	16.0
Level of Service	F	A	A	C	A	A	B	B			B	B
Approach Delay (s)		17.1			9.7			15.3			16.2	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	37.9	Sum of lost time (s)	15.0
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	252	60	8	295	105	31	91	8	73	40	24
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.92	1.00	1.00	0.95	1.00	0.98	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1329	922		1334	1126	880	1070	957	913	1070	1039	
Flt Permitted	0.30	1.00		0.45	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	424	922		632	1126	880	1070	957	913	1070	1039	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	24	296	71	9	347	124	36	107	9	86	47	28
RTOR Reduction (vph)	0	8	0	0	0	55	0	0	7	0	22	0
Lane Group Flow (vph)	24	359	0	9	347	69	36	107	2	86	53	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	35.6	35.6		34.9	34.9	43.7	4.8	13.6	13.6	8.8	17.6	
Effective Green, g (s)	35.6	35.6		34.9	34.9	43.7	4.8	13.6	13.6	8.8	17.6	
Actuated g/C Ratio	0.45	0.45		0.44	0.44	0.56	0.06	0.17	0.17	0.11	0.22	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	207	417		286	499	544	65	165	157	119	232	
v/s Ratio Prot	0.00	c0.39		0.00	c0.31	0.01	0.03	c0.11		c0.08	0.05	
v/s Ratio Perm	0.05			0.01		0.06			0.00			
v/c Ratio	0.12	0.86		0.03	0.70	0.13	0.55	0.65	0.01	0.72	0.23	
Uniform Delay, d1	13.3	19.3		14.3	17.6	8.4	35.9	30.3	27.0	33.8	25.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	16.4		0.0	4.2	0.1	9.8	8.5	0.0	19.4	0.5	
Delay (s)	13.5	35.7		14.3	21.8	8.5	45.7	38.8	27.0	53.2	25.5	
Level of Service	B	D		B	C	A	D	D	C	D	C	
Approach Delay (s)		34.3			18.2			39.7			40.3	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	29.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	78.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	47.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	39	27	26	54	7	22	24	30	5	24	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		0.99		1.00	1.00			1.00	0.98		0.98	
Flpb, ped/bikes		0.99		0.99	1.00			1.00	1.00		1.00	
Frt		0.97		1.00	0.98			1.00	0.85		0.88	
Flt Protected		0.97		0.95	1.00			0.98	1.00		1.00	
Satd. Flow (prot)		1431		1689	1762			1752	1500		1325	
Flt Permitted		0.80		0.71	1.00			0.81	1.00		0.99	
Satd. Flow (perm)		1171		1260	1762			1450	1500		1318	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	88	49	34	32	68	9	28	30	38	6	30	208
RTOR Reduction (vph)	0	11	0	0	6	0	0	0	30	0	162	0
Lane Group Flow (vph)	0	160	0	32	71	0	0	58	8	0	82	0
Confl. Peds. (#/hr)	13		16	16		13	16		19	19		16
Parking (#/hr)		10	10								10	10
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4		4	8		
Actuated Green, G (s)		13.1		13.1	13.1			10.9	10.9		10.9	
Effective Green, g (s)		13.1		13.1	13.1			10.9	10.9		10.9	
Actuated g/C Ratio		0.27		0.27	0.27			0.22	0.22		0.22	
Clearance Time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		313		337	472			323	334		293	
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.14		0.03				0.04	0.01		c0.06	
v/c Ratio		0.51		0.09	0.15			0.18	0.03		0.28	
Uniform Delay, d1		15.2		13.4	13.7			15.4	14.8		15.8	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		1.4		0.1	0.1			0.3	0.0		0.5	
Delay (s)		16.6		13.6	13.8			15.6	14.9		16.3	
Level of Service		B		B	B			B	B		B	
Approach Delay (s)		16.6			13.7			15.3			16.3	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	48.9	Sum of lost time (s)	14.0
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	46	110	21	80	150	13	16	311	14	12	179	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1669	3320		1680	3367		1260	2500		1260	2390	
Flt Permitted	0.63	1.00		0.66	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1114	3320		1161	3367		1260	2500		1260	2390	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	53	126	24	92	172	15	18	357	16	14	206	83
RTOR Reduction (vph)	0	15	0	0	6	0	0	3	0	0	40	0
Lane Group Flow (vph)	53	135	0	92	181	0	18	370	0	14	249	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	30.1	30.1		30.1	30.1		6.8	43.9		2.6	39.7	
Effective Green, g (s)	30.1	30.1		30.1	30.1		6.8	43.9		2.6	39.7	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.07	0.48		0.03	0.43	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	364	1085		379	1100		93	1191		35	1030	
v/s Ratio Prot		0.04			0.05		0.01	c0.15		0.01	c0.10	
v/s Ratio Perm	0.05			c0.08								
v/c Ratio	0.15	0.12		0.24	0.16		0.19	0.31		0.40	0.24	
Uniform Delay, d1	21.9	21.8		22.7	22.1		40.1	14.8		44.0	16.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.1		0.3	0.1		1.0	0.7		7.3	0.1	
Delay (s)	22.1	21.8		23.0	22.1		41.1	15.5		51.3	16.8	
Level of Service	C	C		C	C		D	B		D	B	
Approach Delay (s)		21.9			22.4			16.7			18.4	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	92.1	Sum of lost time (s)	15.5
Intersection Capacity Utilization	90.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	200	11	2	233	1	13	0	1	2	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00			0.99		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3394		1711	3419			1705		1711	1621	
Flt Permitted	0.59	1.00		0.61	1.00			0.82		0.75	1.00	
Satd. Flow (perm)	1071	3394		1097	3419			1465		1346	1621	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	217	12	2	253	1	14	0	1	2	1	2
RTOR Reduction (vph)	0	9	0	0	1	0	0	9	0	0	1	0
Lane Group Flow (vph)	2	220	0	2	253	0	0	6	0	2	2	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	7.2	7.2		7.2	7.2			10.1		10.1	10.1	
Effective Green, g (s)	7.2	7.2		7.2	7.2			10.1		10.1	10.1	
Actuated g/C Ratio	0.26	0.26		0.26	0.26			0.37		0.37	0.37	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	282	895		289	901			541		497	599	
v/s Ratio Prot		0.06			c0.07						0.00	
v/s Ratio Perm	0.00			0.00				c0.00		0.00		
v/c Ratio	0.01	0.25		0.01	0.28			0.01		0.00	0.00	
Uniform Delay, d1	7.4	7.9		7.4	8.0			5.4		5.4	5.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.1		0.0	0.2			0.0		0.0	0.0	
Delay (s)	7.4	8.1		7.4	8.2			5.4		5.4	5.4	
Level of Service	A	A		A	A			A		A	A	
Approach Delay (s)		8.1			8.2			5.4			5.4	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.12		
Actuated Cycle Length (s)	27.3	Sum of lost time (s)	10.0
Intersection Capacity Utilization	22.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	85	0	0	303	2	155	43	136	0	0	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frt		1.00			1.00		1.00	0.89				0.85
Flt Protected		1.00			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3420			5128		1711	3032				2694
Flt Permitted		0.95			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3265			5128		1711	3032				2694
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	1	106	0	0	379	2	194	54	170	0	0	31
RTOR Reduction (vph)	0	0	0	0	1	0	0	101	0	0	0	29
Lane Group Flow (vph)	0	107	0	0	380	0	194	123	0	0	0	2
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		35.5			26.5		31.0	31.0				4.0
Effective Green, g (s)		35.5			26.5		31.0	31.0				4.0
Actuated g/C Ratio		0.47			0.35		0.41	0.41				0.05
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1533			1788		697	1236				141
v/s Ratio Prot		c0.00			c0.07		c0.11	0.04				0.00
v/s Ratio Perm		0.03										
v/c Ratio		0.07			0.21		0.28	0.10				0.01
Uniform Delay, d1		11.2			17.4		15.0	13.9				34.1
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			0.3		1.0	0.2				0.1
Delay (s)		11.2			17.7		16.0	14.0				34.3
Level of Service		B			B		B	B				C
Approach Delay (s)		11.2			17.7			15.0			34.3	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	32.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.
4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	86	169	244	239	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.95	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1609	1428	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1609	1428	3319	1801		
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	105	206	298	291	0	0
RTOR Reduction (vph)	20	51	0	0	0	0
Lane Group Flow (vph)	143	97	298	291	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	39.3	39.3	10.7	60.0		
Effective Green, g (s)	39.3	39.3	10.7	60.0		
Actuated g/C Ratio	0.65	0.65	0.18	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	1053	935	591	1801		
v/s Ratio Prot	0.09		c0.09	c0.16		
v/s Ratio Perm		0.07				
v/c Ratio	0.14	0.10	0.50	0.16		
Uniform Delay, d1	3.9	3.8	22.3	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.1	0.0	0.7	0.0		
Delay (s)	4.0	3.9	22.9	0.0		
Level of Service	A	A	C	A		
Approach Delay (s)	3.9			11.6	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	24.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	62	33	105	2	25	0	85	215	0	6	209	67
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.94		1.00	1.00		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	0.98	1.00		0.95	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	1.00		1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1185	1895		1154	1279		1215	2431		1215	2300	
Flt Permitted	0.41	1.00		0.65	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	515	1895		794	1279		1215	2431		1215	2300	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	70	37	118	2	28	0	96	242	0	7	235	75
RTOR Reduction (vph)	0	84	0	0	0	0	0	0	0	0	24	0
Lane Group Flow (vph)	70	71	0	2	28	0	96	242	0	7	286	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	17.9	17.9		6.7	6.7		8.8	26.0		2.6	19.8	
Effective Green, g (s)	17.9	17.9		6.7	6.7		8.8	26.0		2.6	19.8	
Actuated g/C Ratio	0.29	0.29		0.11	0.11		0.14	0.41		0.04	0.32	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	209	540		84	136		170	1006		50	725	
v/s Ratio Prot	c0.03	0.04			0.02		c0.08	0.10		0.01	c0.12	
v/s Ratio Perm	c0.06			0.00								
v/c Ratio	0.33	0.13		0.02	0.21		0.56	0.24		0.14	0.39	
Uniform Delay, d1	17.3	16.7		25.1	25.6		25.2	12.0		29.0	16.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	0.1		0.1	0.8		4.2	0.1		1.3	0.4	
Delay (s)	18.3	16.8		25.2	26.4		29.5	12.1		30.3	17.2	
Level of Service	B	B		C	C		C	B		C	B	
Approach Delay (s)		17.2			26.3			17.0			17.5	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	62.8	Sum of lost time (s)	21.6
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

EXISTING 2015 PLUS PROJECT - CONVENTION EVENT
WEEKDAY PM PEAK

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	889	733	12	166	907	36	53	1117	343	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.68			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	1.00		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	3057		2987	3023			5484	942			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	3057		2987	3023			5484	942			
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	916	756	12	171	935	37	55	1152	354	0	0	0
RTOR Reduction (vph)	0	1	0	0	0	0	0	0	212	0	0	0
Lane Group Flow (vph)	916	767	0	171	972	0	0	1207	142	0	0	0
Confl. Peds. (#/hr)			400			400	400		400			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.2	39.3		13.2	35.8			37.1	37.1			
Effective Green, g (s)	18.2	39.3		13.2	35.8			37.1	37.1			
Actuated g/C Ratio	0.17	0.36		0.12	0.33			0.34	0.34			
Clearance Time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	741	1092		358	983			1849	317			
v/s Ratio Prot	c0.20	0.25		0.06	c0.32							
v/s Ratio Perm								0.22	0.15			
v/c Ratio	1.24	0.70		0.48	0.99			0.65	0.45			
Uniform Delay, d1	45.9	30.3		45.2	36.9			31.0	28.5			
Progression Factor	1.38	1.59		1.54	1.01			0.92	2.13			
Incremental Delay, d2	111.8	1.8		0.3	13.6			0.8	1.0			
Delay (s)	175.4	50.1		69.8	50.8			29.1	61.5			
Level of Service	F	D		E	D			C	E			
Approach Delay (s)		118.2			53.7			36.5			0.0	
Approach LOS		F			D			D			A	

Intersection Summary			
HCM 2000 Control Delay	72.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	151	1521	25	24	917	19	5	69	79	34	299	304
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	0.64	1.00	0.85	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00	0.68	1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85	1.00	0.96	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1296	3693		1296	2553			1586	858	1044	2401	581
Flt Permitted	0.95	1.00		0.95	1.00			0.97	1.00	0.71	1.00	1.00
Satd. Flow (perm)	1296	3693		1296	2553			1542	858	778	2401	581
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	154	1552	26	24	936	19	5	70	81	35	305	310
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	53	0	35	122
Lane Group Flow (vph)	154	1577	0	24	954	0	0	75	28	35	391	67
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.4	45.9		6.0	35.9			38.2	38.2	39.2	39.2	39.2
Effective Green, g (s)	14.4	45.9		6.0	35.9			38.2	38.2	39.2	39.2	39.2
Actuated g/C Ratio	0.13	0.42		0.05	0.33			0.35	0.35	0.36	0.36	0.36
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	169	1540		70	833			535	297	277	855	207
v/s Ratio Prot	0.12	c0.43		0.02	c0.37						c0.16	
v/s Ratio Perm								0.05	0.03	0.04		0.12
v/c Ratio	0.91	1.02		0.34	1.14			0.14	0.09	0.13	0.46	0.33
Uniform Delay, d1	47.2	32.0		50.1	37.0			24.6	24.2	23.9	27.2	25.8
Progression Factor	0.58	1.24		0.88	0.89			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.1	14.2		0.9	69.8			0.1	0.1	0.2	0.4	0.9
Delay (s)	34.6	53.9		44.9	102.7			24.8	24.4	24.1	27.6	26.7
Level of Service	C	D		D	F			C	C	C	C	C
Approach Delay (s)		52.2			101.3			24.6			27.2	
Approach LOS		D			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	60.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	119.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1689	138	0	1226	86	8
Ideal Flow (vphpl)	1850	1850	1850	1850	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2957			2998	1540	1357
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	2957			2998	1540	1357
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1759	144	0	1277	90	8
RTOR Reduction (vph)	6	0	0	0	0	5
Lane Group Flow (vph)	1897	0	0	1277	90	3
Confl. Peds. (#/hr)		37	37		1	3
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	1669			1692	512	451
v/s Ratio Prot	c0.64			0.43	c0.06	
v/s Ratio Perm						0.00
v/c Ratio	1.14			0.75	0.18	0.01
Uniform Delay, d1	23.9			18.2	26.0	24.5
Progression Factor	1.00			0.54	1.00	1.00
Incremental Delay, d2	69.5			0.9	0.7	0.0
Delay (s)	93.5			10.7	26.8	24.6
Level of Service	F			B	C	C
Approach Delay (s)	93.5			10.7	26.6	
Approach LOS	F			B	C	

Intersection Summary			
HCM 2000 Control Delay	59.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	98.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

4/27/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	272	1171	161	52	302	537	219	199	734	265
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		2.0			2.0	2.0			2.0	2.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.99	0.87
Flpb, ped/bikes		0.99			1.00	1.00			1.00	1.00
Frt		0.98			1.00	0.96			1.00	0.85
Flt Protected		0.99			0.99	1.00			0.95	1.00
Satd. Flow (prot)		5749			2857	2464			4087	978
Flt Permitted		0.99			0.66	1.00			0.95	1.00
Satd. Flow (perm)		5749			1899	2464			4087	978
Peak-hour factor, PHF	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93
Adj. Flow (vph)	296	1259	173	56	325	577	235	216	789	285
RTOR Reduction (vph)	0	22	0	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	1706	0	0	381	808	0	0	1034	256
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Perm
Protected Phases		6			4	4		7	7	
Permitted Phases	6			4						7
Actuated Green, G (s)		27.0			25.0	25.0			24.0	24.0
Effective Green, g (s)		29.0			28.0	28.0			27.0	27.0
Actuated g/C Ratio		0.32			0.31	0.31			0.30	0.30
Clearance Time (s)		4.0			5.0	5.0			5.0	5.0
Lane Grp Cap (vph)		1852			590	766			1226	293
v/s Ratio Prot						c0.33			0.25	
v/s Ratio Perm		0.30			0.20					c0.26
v/c Ratio		0.92			0.65	1.05			0.84	0.87
Uniform Delay, d1		29.4			26.7	31.0			29.5	29.9
Progression Factor		1.48			0.06	1.00			1.00	1.00
Incremental Delay, d2		6.6			0.5	47.9			7.2	28.4
Delay (s)		50.1			2.1	78.9			36.7	58.2
Level of Service		D			A	E			D	E
Approach Delay (s)		50.1			2.1	78.9			41.0	
Approach LOS		D			A	E			D	

Intersection Summary			
HCM 2000 Control Delay	48.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	109.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

5: Fifth St. & Bryant St. & I-80 EB On-Ramp

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	16	522	568	45	338	362	24	255	129	624
Ideal Flow (vphpl)	1000	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.84		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.99		0.92		0.85		1.00	1.00
Flt Protected		0.95	0.99		1.00		1.00		0.95	0.99
Satd. Flow (prot)		1313	1912		2130		1163		1327	2541
Flt Permitted		0.95	0.99		1.00		1.00		0.15	0.63
Satd. Flow (perm)		1313	1912		2130		1163		207	1622
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	17	561	611	48	363	389	26	274	139	671
RTOR Reduction (vph)	0	0	7	0	0	0	17	0	0	0
Lane Group Flow (vph)	0	488	742	0	755	0	6	0	307	777
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	5	0	5	0	0	0	0	5
Parking (#/hr)			10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		22.5	22.5		23.0		23.0		42.0	42.0
Effective Green, g (s)		22.5	25.0		24.5		23.0		43.5	43.5
Actuated g/C Ratio		0.25	0.28		0.27		0.26		0.48	0.48
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		328	531		579		297		305	952
v/s Ratio Prot		0.37	c0.39		c0.35				c0.18	0.15
v/s Ratio Perm							0.01		0.30	0.24
v/c Ratio		1.49	1.40		1.42dr		0.02		1.01	0.82
Uniform Delay, d1		33.8	32.5		32.8		25.1		31.1	19.8
Progression Factor		1.00	1.00		1.00		1.00		1.10	1.15
Incremental Delay, d2		235.1	189.8		149.0		0.1		28.6	2.2
Delay (s)		268.9	222.3		181.8		25.2		62.8	25.1
Level of Service		F	F		F		C		E	C
Approach Delay (s)			240.7		177.1					35.7
Approach LOS			F		F					D

Intersection Summary			
HCM 2000 Control Delay	153.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	103.2%	ICU Level of Service	G
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

6: Third St. & Channel St.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	15	97	19	10	67	20	1044	18	12	190	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		0.99	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.91		1.00	1.00		1.00	0.99	
Flt Protected		0.97	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1569	1353		1426		1272	2533		1540	3043	
Flt Permitted		0.87	1.00		0.95		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1405	1353		1373		1272	2533		1540	3043	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	18	16	102	20	11	71	21	1099	19	13	200	14
RTOR Reduction (vph)	0	0	69	0	48	0	0	1	0	0	5	0
Lane Group Flow (vph)	0	34	33	0	54	0	21	1117	0	13	209	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		32.1	32.1		32.1		12.8	41.5		10.5	39.5	
Effective Green, g (s)		32.1	32.1		32.1		12.8	41.5		10.5	39.5	
Actuated g/C Ratio		0.32	0.32		0.32		0.13	0.42		0.10	0.40	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Grp Cap (vph)		451	434		440		162	1051		161	1201	
v/s Ratio Prot							0.02	c0.44		0.01	c0.07	
v/s Ratio Perm		0.02	0.02		c0.04							
v/c Ratio		0.08	0.08		0.12		0.13	1.06		0.08	0.17	
Uniform Delay, d1		23.6	23.6		24.0		38.7	29.2		40.4	19.7	
Progression Factor		1.00	1.00		1.00		1.23	0.34		1.00	1.00	
Incremental Delay, d2		0.3	0.3		0.6		1.3	43.2		1.0	0.3	
Delay (s)		23.9	24.0		24.6		48.8	53.2		41.4	20.0	
Level of Service		C	C		C		D	D		D	B	
Approach Delay (s)		24.0			24.6			53.2			21.2	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	44.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.9
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	12	10	3	10	30	7	84	6	111	114	14
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00	1.00	1.00	1.00		1.00	0.98	
Flpb, ped/bikes		0.99			1.00	1.00	0.84	1.00		1.00	1.00	
Frt		0.96			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.98			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2552			1434	1227	1150	1432		1377	1392	
Flt Permitted		0.95			1.00	1.00	0.80	1.00		0.95	1.00	
Satd. Flow (perm)		2492			1449	1227	969	1432		1377	1392	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	20	13	11	3	11	32	8	90	6	119	123	15
RTOR Reduction (vph)	0	10	0	0	0	16	0	4	0	0	5	0
Lane Group Flow (vph)	0	34	0	0	14	16	8	92	0	119	133	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		2.2			2.2	19.4	5.0	5.0		17.2	27.2	
Effective Green, g (s)		2.2			2.2	19.4	5.0	5.0		17.2	27.2	
Actuated g/C Ratio		0.06			0.06	0.49	0.13	0.13		0.44	0.69	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		139			80	759	122	181		601	960	
v/s Ratio Prot						0.01		c0.06		c0.09	0.10	
v/s Ratio Perm		c0.01			0.01	0.00	0.01					
v/c Ratio		0.24			0.17	0.02	0.07	0.51		0.20	0.14	
Uniform Delay, d1		17.8			17.7	5.1	15.1	16.0		6.8	2.1	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.9			1.0	0.0	0.2	2.2		0.2	0.1	
Delay (s)		18.7			18.8	5.1	15.4	18.3		7.0	2.2	
Level of Service		B			B	A	B	B		A	A	
Approach Delay (s)		18.7			9.3			18.0			4.4	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	39.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.

4/27/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	34	258	841	29	83	264
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1743	1535	848	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1743	1535	848	1134	1194
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	280	914	32	90	287
RTOR Reduction (vph)	0	250	0	5	0	0
Lane Group Flow (vph)	37	30	914	27	90	287
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	8.8	8.8	47.6	42.6	10.0	62.6
Effective Green, g (s)	8.8	8.8	47.6	42.6	10.0	62.6
Actuated g/C Ratio	0.11	0.11	0.58	0.52	0.12	0.77
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	122	188	897	495	139	918
v/s Ratio Prot	c0.03		c0.60	0.01	c0.08	0.24
v/s Ratio Perm		0.02		0.02		
v/c Ratio	0.30	0.16	1.02	0.06	0.65	0.31
Uniform Delay, d1	33.5	32.9	16.9	9.5	34.0	2.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	0.4	34.9	0.0	9.9	0.2
Delay (s)	34.9	33.4	51.8	9.6	44.0	3.1
Level of Service	C	C	D	A	D	A
Approach Delay (s)	33.5		50.4			12.8
Approach LOS	C		D			B

Intersection Summary			
HCM 2000 Control Delay	38.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	81.4	Sum of lost time (s)	20.0
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
9: Terry A Francois Blvd/Terry A Francois Blvd. & South St.

4/27/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	19	43	13	174	209	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.93		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.98	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1711	1427		3150	3063	
Flt Permitted	0.95	1.00		0.93	1.00	
Satd. Flow (perm)	1711	1427		2948	3063	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	21	48	14	193	232	46
RTOR Reduction (vph)	0	45	0	0	16	0
Lane Group Flow (vph)	21	3	0	207	262	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	10
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	2.2	2.2		20.3	20.3	
Effective Green, g (s)	2.2	2.2		20.3	20.3	
Actuated g/C Ratio	0.07	0.07		0.62	0.62	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	115	96		1841	1913	
v/s Ratio Prot	c0.01				c0.09	
v/s Ratio Perm		0.00		0.07		
v/c Ratio	0.18	0.03		0.11	0.14	
Uniform Delay, d1	14.3	14.2		2.5	2.5	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	0.1		0.0	0.0	
Delay (s)	15.1	14.3		2.5	2.5	
Level of Service	B	B		A	A	
Approach Delay (s)	14.5			2.5	2.5	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	4.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	32.5	Sum of lost time (s)	10.0
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: Third St. & South St.

4/27/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	189	267	860	17	74	487
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.96	1.00		1.00	1.00
Flpb, ped/bikes	0.93	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1584	1466	3408		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1584	1466	3408		1711	3421
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	210	297	956	19	82	541
RTOR Reduction (vph)	0	168	2	0	0	0
Lane Group Flow (vph)	210	129	973	0	82	541
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	28.7	28.7	48.1		7.9	61.1
Effective Green, g (s)	28.7	28.7	48.1		7.9	61.1
Actuated g/C Ratio	0.29	0.29	0.48		0.08	0.61
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	454	420	1639		135	2090
v/s Ratio Prot			c0.29		c0.05	0.16
v/s Ratio Perm	c0.13	0.09				
v/c Ratio	0.46	0.31	0.59		0.61	0.26
Uniform Delay, d1	29.3	27.9	18.9		44.5	9.0
Progression Factor	1.00	1.00	1.91		1.07	1.32
Incremental Delay, d2	0.7	0.4	1.0		7.5	0.1
Delay (s)	30.1	28.3	37.0		55.1	11.9
Level of Service	C	C	D		E	B
Approach Delay (s)	29.0		37.0			17.6
Approach LOS	C		D			B

Intersection Summary			
HCM 2000 Control Delay	29.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	10	10	20	177	192	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.97		1.00	0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.96	
Flt Protected	0.95	1.00		0.99	1.00	
Satd. Flow (prot)	1520	1343		3060	2948	
Flt Permitted	0.95	1.00		0.89	1.00	
Satd. Flow (perm)	1520	1343		2733	2948	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	12	12	24	208	226	71
RTOR Reduction (vph)	0	12	0	0	57	0
Lane Group Flow (vph)	12	0	0	232	240	0
Confl. Peds. (#/hr)	1	1	25			25
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	0.6	0.6		9.1	9.1	
Effective Green, g (s)	0.6	0.6		9.1	9.1	
Actuated g/C Ratio	0.01	0.01		0.20	0.20	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	20	17		552	596	
v/s Ratio Prot	c0.01				0.08	
v/s Ratio Perm		0.00		c0.08		
v/c Ratio	0.60	0.01		0.42	0.40	
Uniform Delay, d1	22.1	21.9		15.7	15.6	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	40.2	0.2		0.5	0.4	
Delay (s)	62.3	22.1		16.2	16.0	
Level of Service	E	C		B	B	
Approach Delay (s)	42.2			16.2	16.0	
Approach LOS	D			B	B	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	34.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	136	8	67	49	28	5	130	48	9	5	274	193
Peak Hour Factor	0.92	0.87	0.87	0.87	0.87	0.92	0.87	0.92	0.87	0.92	0.92	0.92
Hourly flow rate (vph)	148	9	77	56	32	5	149	52	10	5	298	210

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	148	86	56	38	212	303	210
Volume Left (vph)	148	0	56	0	149	5	0
Volume Right (vph)	0	77	0	5	10	0	210
Hadj (s)	0.53	-0.59	0.53	-0.07	0.15	0.04	-0.67
Departure Headway (s)	7.1	6.0	7.4	6.8	6.3	5.9	5.2
Degree Utilization, x	0.29	0.14	0.12	0.07	0.37	0.50	0.30
Capacity (veh/h)	474	557	443	480	546	589	666
Control Delay (s)	11.8	8.8	10.2	9.1	13.0	13.4	9.2
Approach Delay (s)	10.7		9.7		13.0	11.7	
Approach LOS	B		A		B	B	

Intersection Summary			
Delay	11.6		
Level of Service	B		
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	134	156	266	3	301	47	264	696	38	18	472	186
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1271	1365	1126	1284	1365	1099	2515	2567		1296	2464	
Flt Permitted	0.41	1.00	1.00	0.62	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	549	1365	1126	843	1365	1099	2515	2567		1296	2464	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	147	171	292	3	331	52	290	765	42	20	519	204
RTOR Reduction (vph)	0	0	191	0	0	34	0	4	0	0	42	0
Lane Group Flow (vph)	147	171	101	3	331	18	290	803	0	20	681	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Effective Green, g (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Actuated g/C Ratio	0.34	0.34	0.34	0.34	0.34	0.34	0.14	0.38		0.12	0.36	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Grp Cap (vph)	189	470	388	290	470	379	352	970		155	882	
v/s Ratio Prot		0.13			0.24		0.12	c0.31		0.02	c0.28	
v/s Ratio Perm	c0.27		0.09	0.00		0.02						
v/c Ratio	0.78	0.36	0.26	0.01	0.70	0.05	0.82	0.83		0.13	0.77	
Uniform Delay, d1	29.3	24.5	23.6	21.5	28.3	21.8	41.8	28.2		39.3	28.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.63	0.77		1.16	1.19	
Incremental Delay, d2	26.4	2.2	1.6	0.1	8.6	0.2	7.5	2.9		1.7	6.3	
Delay (s)	55.7	26.7	25.2	21.6	36.9	22.0	33.9	24.7		47.4	40.3	
Level of Service	E	C	C	C	D	C	C	C		D	D	
Approach Delay (s)		33.0			34.8			27.2			40.4	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	32.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	116.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	89	481	8	6	715	30	33	25	34	41	3	105
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.85	1.00	0.98		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1411	1621	1706	1238	1621	1527		1491	1355	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.68	1.00		0.72	1.00	
Satd. Flow (perm)	1621	1706	1411	1621	1706	1238	1163	1527		1123	1355	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	523	9	7	777	33	36	27	37	45	3	114
RTOR Reduction (vph)	0	0	4	0	0	18	0	28	0	0	85	0
Lane Group Flow (vph)	97	523	5	7	777	15	36	36	0	45	32	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	10.9	47.6	47.6	2.7	39.4	39.4	21.9	21.9		21.9	21.9	
Effective Green, g (s)	10.9	47.6	47.6	2.7	39.4	39.4	21.9	21.9		21.9	21.9	
Actuated g/C Ratio	0.12	0.55	0.55	0.03	0.45	0.45	0.25	0.25		0.25	0.25	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	202	931	770	50	770	559	292	383		282	340	
v/s Ratio Prot	c0.06	c0.31		0.00	c0.46			0.02			0.02	
v/s Ratio Perm			0.00			0.01	0.03			c0.04		
v/c Ratio	0.48	0.56	0.01	0.14	1.01	0.03	0.12	0.09		0.16	0.09	
Uniform Delay, d1	35.5	13.0	9.0	41.1	23.9	13.3	25.2	25.0		25.5	25.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	2.4	0.0	1.3	34.7	0.0	0.2	0.1		0.3	0.1	
Delay (s)	37.3	15.4	9.0	42.4	58.6	13.3	25.4	25.2		25.7	25.2	
Level of Service	D	B	A	D	E	B	C	C		C	C	
Approach Delay (s)		18.7			56.6			25.3			25.3	
Approach LOS		B			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	37.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	87.2	Sum of lost time (s)	15.0
Intersection Capacity Utilization	89.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	118	405	14	21	754	78	49	134	61	112	54	146
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.97	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1046	1540	2934			2978	1072
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.64	1.00			0.69	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1046	1041	2934			2120	1072
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	123	422	15	22	785	81	51	140	64	117	56	152
RTOR Reduction (vph)	0	0	5	0	0	23	0	54	0	0	0	130
Lane Group Flow (vph)	123	422	10	22	785	58	51	150	0	0	173	22
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	8.0	57.6	57.6	1.9	50.5	50.5	13.3	13.3			12.3	12.3
Effective Green, g (s)	8.0	57.6	57.6	1.9	50.5	50.5	13.3	13.3			12.3	12.3
Actuated g/C Ratio	0.09	0.67	0.67	0.02	0.59	0.59	0.16	0.16			0.14	0.14
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	113	815	925	34	715	615	161	454			303	153
v/s Ratio Prot	c0.10	0.35		0.01	c0.65			0.05				
v/s Ratio Perm			0.01			0.06	0.05				c0.08	0.02
v/c Ratio	1.09	0.52	0.01	0.65	1.10	0.09	0.32	0.33			0.57	0.14
Uniform Delay, d1	38.9	7.1	4.7	41.6	17.6	7.7	32.2	32.3			34.3	32.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	110.5	2.3	0.0	35.3	63.6	0.1	1.1	0.4			2.6	0.4
Delay (s)	149.4	9.4	4.7	76.9	81.3	7.8	33.3	32.7			36.9	32.6
Level of Service	F	A	A	E	F	A	C	C			D	C
Approach Delay (s)		40.1			74.4			32.8			34.9	
Approach LOS		D			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	53.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	85.8	Sum of lost time (s)	15.0
Intersection Capacity Utilization	97.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	386	70	33	491	425	61	249	30	120	138	43
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.90	1.00	1.00	0.96	1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1337	929		1335	1126	861	1070	957	919	1070	1068	
Flt Permitted	0.14	1.00		0.29	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	196	929		414	1126	861	1070	957	919	1070	1068	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	50	411	74	35	522	452	65	265	32	128	147	46
RTOR Reduction (vph)	0	6	0	0	0	124	0	0	25	0	11	0
Lane Group Flow (vph)	50	479	0	35	522	328	65	265	7	128	182	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	52.8	52.8		52.1	52.1	62.1	12.6	25.1	25.1	10.0	22.5	
Effective Green, g (s)	52.8	52.8		52.1	52.1	62.1	12.6	25.1	25.1	10.0	22.5	
Actuated g/C Ratio	0.48	0.48		0.47	0.47	0.56	0.11	0.23	0.23	0.09	0.20	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	125	444		215	531	523	122	217	209	97	217	
v/s Ratio Prot	0.01	c0.52		0.00	c0.46	0.06	0.06	c0.28		c0.12	0.17	
v/s Ratio Perm	0.18			0.07		0.32			0.01			
v/c Ratio	0.40	1.08		0.16	0.98	0.63	0.53	1.22	0.03	1.32	0.84	
Uniform Delay, d1	21.0	28.8		26.5	28.7	16.3	46.1	42.6	33.2	50.1	42.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.1	65.7		0.4	34.5	2.4	4.4	133.6	0.1	199.1	23.6	
Delay (s)	23.1	94.5		26.9	63.1	18.6	50.5	176.2	33.2	249.3	65.8	
Level of Service	C	F		C	E	B	D	F	C	F	E	
Approach Delay (s)		87.8			41.9			141.0			138.9	
Approach LOS		F			D			F			F	

Intersection Summary			
HCM 2000 Control Delay	83.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	110.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	67	74	39	45	162	2	31	116	78	11	51	325
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		0.99		1.00	1.00			1.00	0.98		0.98	
Flpb, ped/bikes		1.00		0.99	1.00			1.00	1.00		1.00	
Frt		0.97		1.00	1.00			1.00	0.85		0.89	
Flt Protected		0.98		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)		1694		1689	1797			1780	1499		1561	
Flt Permitted		0.81		0.65	1.00			0.78	1.00		0.99	
Satd. Flow (perm)		1393		1159	1797			1395	1499		1547	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	74	82	43	50	180	2	34	129	87	12	57	361
RTOR Reduction (vph)	0	12	0	0	1	0	0	0	65	0	264	0
Lane Group Flow (vph)	0	187	0	50	181	0	0	163	22	0	166	0
Confl. Peds. (#/hr)	13		16	16		13	16		19	19		16
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4		4	8		
Actuated Green, G (s)		13.3		13.3	13.3			13.4	13.4		13.4	
Effective Green, g (s)		13.3		13.3	13.3			13.4	13.4		13.4	
Actuated g/C Ratio		0.25		0.25	0.25			0.26	0.26		0.26	
Clearance Time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		352		293	455			356	382		394	
v/s Ratio Prot					0.10							
v/s Ratio Perm		c0.13		0.04				c0.12	0.01		0.11	
v/c Ratio		0.53		0.17	0.40			0.46	0.06		0.42	
Uniform Delay, d1		16.9		15.3	16.3			16.5	14.8		16.3	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		1.5		0.3	0.6			0.9	0.1		0.7	
Delay (s)		18.5		15.6	16.9			17.4	14.8		17.0	
Level of Service		B		B	B			B	B		B	
Approach Delay (s)		18.5			16.6			16.5			17.0	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	52.5	Sum of lost time (s)	14.0
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	146	129	51	69	426	23	40	829	35	16	426	299
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.99		1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1683	3242		1679	3387		1260	2501		1260	2331	
Flt Permitted	0.41	1.00		0.63	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	720	3242		1116	3387		1260	2501		1260	2331	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	155	137	54	73	453	24	43	882	37	17	453	318
RTOR Reduction (vph)	0	35	0	0	4	0	0	3	0	0	127	0
Lane Group Flow (vph)	155	156	0	73	473	0	43	916	0	17	644	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	34.7	34.7		34.7	34.7		11.9	34.9		14.9	37.9	
Effective Green, g (s)	34.7	34.7		34.7	34.7		11.9	34.9		14.9	37.9	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.12	0.35		0.15	0.38	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Grp Cap (vph)	249	1124		387	1175		149	872		187	883	
v/s Ratio Prot		0.05			0.14		0.03	c0.37		0.01	c0.28	
v/s Ratio Perm	c0.22			0.07								
v/c Ratio	0.62	0.14		0.19	0.40		0.29	1.05		0.09	0.73	
Uniform Delay, d1	27.2	22.4		22.8	24.8		40.2	32.5		36.7	26.6	
Progression Factor	1.00	1.00		1.00	1.00		0.91	0.80		1.55	0.62	
Incremental Delay, d2	11.2	0.3		1.1	1.0		3.7	40.9		0.7	3.8	
Delay (s)	38.4	22.7		23.9	25.8		40.1	67.1		57.6	20.3	
Level of Service	D	C		C	C		D	E		E	C	
Approach Delay (s)		29.7			25.6			65.9			21.1	
Approach LOS		C			C			E			C	

Intersection Summary			
HCM 2000 Control Delay	39.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	107.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	280	38	4	818	2	38	0	12	13	0	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00			0.97		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3360		1711	3420			1678		1711	1531	
Flt Permitted	0.22	1.00		0.54	1.00			0.84		0.72	1.00	
Satd. Flow (perm)	391	3360		981	3420			1467		1300	1531	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	304	41	4	889	2	41	0	13	14	0	14
RTOR Reduction (vph)	0	17	0	0	0	0	0	20	0	0	8	0
Lane Group Flow (vph)	7	328	0	4	891	0	0	34	0	14	6	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	24.0	24.0		24.0	24.0			26.0		26.0	26.0	
Effective Green, g (s)	24.0	24.0		24.0	24.0			26.0		26.0	26.0	
Actuated g/C Ratio	0.40	0.40		0.40	0.40			0.43		0.43	0.43	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Grp Cap (vph)	156	1344		392	1368			635		563	663	
v/s Ratio Prot		0.10			c0.26						0.00	
v/s Ratio Perm	0.02			0.00				c0.02		0.01		
v/c Ratio	0.04	0.24		0.01	0.65			0.05		0.02	0.01	
Uniform Delay, d1	11.0	12.0		10.8	14.6			9.9		9.7	9.7	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.4		0.0	2.4			0.2		0.1	0.0	
Delay (s)	11.5	12.4		10.9	17.0			10.0		9.8	9.7	
Level of Service	B	B		B	B			B		A	A	
Approach Delay (s)		12.4			17.0			10.0			9.8	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	86	0	0	929	6	382	112	242	0	0	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				3.5
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Flpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Frt		1.00			1.00		1.00	0.90				0.85
Flt Protected		1.00			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3416			5127		1711	3070				2694
Flt Permitted		0.95			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3242			5127		1711	3070				2694
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	3	88	0	0	948	6	390	114	247	0	0	130
RTOR Reduction (vph)	0	0	0	0	1	0	0	128	0	0	0	121
Lane Group Flow (vph)	0	91	0	0	953	0	390	233	0	0	0	9
Confl. Peds. (#/hr)												20
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		47.5			36.5		53.0	53.0				7.5
Effective Green, g (s)		47.5			36.5		53.0	53.0				7.5
Actuated g/C Ratio		0.43			0.33		0.48	0.48				0.07
Clearance Time (s)		4.5			4.5		5.0	5.0				3.5
Lane Grp Cap (vph)		1411			1701		824	1479				183
v/s Ratio Prot		c0.00			c0.19		c0.23	0.08				0.00
v/s Ratio Perm		0.02										
v/c Ratio		0.06			0.56		0.47	0.16				0.05
Uniform Delay, d1		18.3			30.2		19.1	16.0				47.9
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			1.3		1.9	0.2				0.5
Delay (s)		18.4			31.5		21.1	16.2				48.4
Level of Service		B			C		C	B				D
Approach Delay (s)		18.4			31.5			18.7			48.4	
Approach LOS		B			C			B			D	

Intersection Summary			
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	89	566	889	549	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.89	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1501	1426	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1501	1426	3319	1801		
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	92	584	916	566	0	0
RTOR Reduction (vph)	22	22	0	0	0	0
Lane Group Flow (vph)	321	311	916	566	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	35.6	35.6	24.4	70.0		
Effective Green, g (s)	35.6	35.6	24.4	70.0		
Actuated g/C Ratio	0.51	0.51	0.35	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	763	725	1156	1801		
v/s Ratio Prot	0.21		c0.28	0.31		
v/s Ratio Perm		c0.22				
v/c Ratio	0.42	0.43	0.79	0.31		
Uniform Delay, d1	10.8	10.8	20.5	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.4	0.4	3.8	0.1		
Delay (s)	11.1	11.2	24.3	0.1		
Level of Service	B	B	C	A		
Approach Delay (s)	11.2			15.1	0.0	
Approach LOS	B			B	A	

Intersection Summary			
HCM 2000 Control Delay	13.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	200	135	181	7	204	13	176	575	16	17	572	170
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.93		1.00	0.99		1.00	1.00		1.00	0.97	
Flpb, ped/bikes	0.98	1.00		0.94	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.99		1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1188	1945		1139	1257		1215	2413		1215	2289	
Flt Permitted	0.36	1.00		0.55	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	454	1945		662	1257		1215	2413		1215	2289	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	208	141	189	7	212	14	183	599	17	18	596	177
RTOR Reduction (vph)	0	127	0	0	2	0	0	2	0	0	28	0
Lane Group Flow (vph)	208	203	0	7	224	0	183	614	0	18	745	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	32.9	32.9		21.9	21.9		17.3	46.7		4.1	33.5	
Effective Green, g (s)	32.9	32.9		21.9	21.9		17.3	46.7		4.1	33.5	
Actuated g/C Ratio	0.33	0.33		0.22	0.22		0.17	0.47		0.04	0.34	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	191	639		144	275		210	1126		49	766	
v/s Ratio Prot	c0.06	0.10			0.18		c0.15	0.25		0.01	c0.33	
v/s Ratio Perm	c0.30			0.01								
v/c Ratio	1.09	0.32		0.05	0.81		0.87	0.55		0.37	0.97	
Uniform Delay, d1	34.2	25.1		30.8	37.1		40.3	19.1		46.7	32.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.04	0.81	
Incremental Delay, d2	90.9	0.3		0.1	16.6		30.2	1.9		3.8	23.4	
Delay (s)	125.1	25.4		31.0	53.7		70.5	21.0		52.2	49.9	
Level of Service	F	C		C	D		E	C		D	D	
Approach Delay (s)		63.9			53.0			32.3			50.0	
Approach LOS		E			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	47.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	99.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

EXISTING 2015 PLUS PROJECT – BASKETBALL GAME
NO SF GIANTS GAME AT AT&T PARK
WEEKDAY PM PEAK

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	889	733	12	170	907	36	53	1070	290	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.68			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	1.00		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	3057		2987	3023			5480	942			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	3057		2987	3023			5480	942			
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	916	756	12	175	935	37	55	1103	299	0	0	0
RTOR Reduction (vph)	0	1	0	0	0	0	0	0	201	0	0	0
Lane Group Flow (vph)	916	767	0	175	972	0	0	1158	98	0	0	0
Confl. Peds. (#/hr)			400			400	400		400			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.2	40.3		13.2	36.8			36.1	36.1			
Effective Green, g (s)	18.2	40.3		13.2	36.8			36.1	36.1			
Actuated g/C Ratio	0.17	0.37		0.12	0.33			0.33	0.33			
Clearance Time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	741	1119		358	1011			1798	309			
v/s Ratio Prot	c0.20	0.25		0.06	c0.32							
v/s Ratio Perm								0.21	0.10			
v/c Ratio	1.24	0.69		0.49	0.96			0.64	0.32			
Uniform Delay, d1	45.9	29.5		45.2	35.9			31.5	27.7			
Progression Factor	1.38	1.60		1.53	1.02			0.90	2.83			
Incremental Delay, d2	111.8	1.6		0.3	8.9			0.7	0.6			
Delay (s)	175.4	48.9		69.4	45.5			29.1	79.0			
Level of Service	F	D		E	D			C	E			
Approach Delay (s)		117.7			49.1			39.4			0.0	
Approach LOS		F			D			D			A	

Intersection Summary			
HCM 2000 Control Delay	72.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	151	1521	25	24	917	19	5	69	79	34	318	304
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	0.64	1.00	0.86	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00	0.68	1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85	1.00	0.96	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1296	3693		1296	2553			1587	858	1044	2442	581
Flt Permitted	0.95	1.00		0.95	1.00			0.97	1.00	0.71	1.00	1.00
Satd. Flow (perm)	1296	3693		1296	2553			1541	858	778	2442	581
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	154	1552	26	24	936	19	5	70	81	35	324	310
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	53	0	30	126
Lane Group Flow (vph)	154	1577	0	24	954	0	0	75	28	35	409	69
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.4	45.9		6.0	35.9			38.2	38.2	39.2	39.2	39.2
Effective Green, g (s)	14.4	45.9		6.0	35.9			38.2	38.2	39.2	39.2	39.2
Actuated g/C Ratio	0.13	0.42		0.05	0.33			0.35	0.35	0.36	0.36	0.36
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	169	1540		70	833			535	297	277	870	207
v/s Ratio Prot	0.12	c0.43		0.02	c0.37						c0.17	
v/s Ratio Perm								0.05	0.03	0.04		0.12
v/c Ratio	0.91	1.02		0.34	1.14			0.14	0.09	0.13	0.47	0.34
Uniform Delay, d1	47.2	32.0		50.1	37.0			24.6	24.2	23.9	27.4	25.9
Progression Factor	0.58	1.24		0.87	0.90			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.1	14.2		1.0	70.5			0.1	0.1	0.2	0.4	1.0
Delay (s)	34.6	53.9		44.8	104.0			24.8	24.4	24.1	27.8	26.8
Level of Service	C	D		D	F			C	C	C	C	C
Approach Delay (s)		52.2			102.5			24.6			27.3	
Approach LOS		D			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	60.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	119.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1689	138	0	1226	86	8
Ideal Flow (vphpl)	1850	1850	1850	1850	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2957			2998	1540	1357
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	2957			2998	1540	1357
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1759	144	0	1277	90	8
RTOR Reduction (vph)	6	0	0	0	0	5
Lane Group Flow (vph)	1897	0	0	1277	90	3
Confl. Peds. (#/hr)		37	37		1	3
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	1669			1692	512	451
v/s Ratio Prot	c0.64			0.43	c0.06	
v/s Ratio Perm						0.00
v/c Ratio	1.14			0.75	0.18	0.01
Uniform Delay, d1	23.9			18.2	26.0	24.5
Progression Factor	1.00			0.54	1.00	1.00
Incremental Delay, d2	69.5			0.9	0.7	0.0
Delay (s)	93.5			10.7	26.8	24.6
Level of Service	F			B	C	C
Approach Delay (s)	93.5			10.7	26.6	
Approach LOS	F			B	C	

Intersection Summary			
HCM 2000 Control Delay	59.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	98.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	272	1171	161	52	302	537	219	226	788	265
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		2.0			2.0	2.0			2.0	2.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.99	0.87
Flpb, ped/bikes		0.99			1.00	1.00			1.00	1.00
Frt		0.98			1.00	0.96			1.00	0.85
Flt Protected		0.99			0.99	1.00			0.95	1.00
Satd. Flow (prot)		5749			2857	2464			4090	978
Flt Permitted		0.99			0.66	1.00			0.95	1.00
Satd. Flow (perm)		5749			1899	2464			4090	978
Peak-hour factor, PHF	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93
Adj. Flow (vph)	296	1259	173	56	325	577	235	246	847	285
RTOR Reduction (vph)	0	22	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	1706	0	0	381	809	0	0	1122	256
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Perm
Protected Phases		6			4	4		7	7	
Permitted Phases	6			4						7
Actuated Green, G (s)		27.0			25.0	25.0			24.0	24.0
Effective Green, g (s)		29.0			28.0	28.0			27.0	27.0
Actuated g/C Ratio		0.32			0.31	0.31			0.30	0.30
Clearance Time (s)		4.0			5.0	5.0			5.0	5.0
Lane Grp Cap (vph)		1852			590	766			1227	293
v/s Ratio Prot						c0.33			c0.27	
v/s Ratio Perm		0.30			0.20					0.26
v/c Ratio		0.92			0.65	1.06			0.91	0.87
Uniform Delay, d1		29.4			26.7	31.0			30.4	29.9
Progression Factor		1.48			0.06	1.00			1.00	1.00
Incremental Delay, d2		6.6			0.5	48.2			12.0	28.4
Delay (s)		50.1			2.1	79.2			42.3	58.2
Level of Service		D			A	E			D	E
Approach Delay (s)		50.1			2.1	79.2			45.3	
Approach LOS		D			A	E			D	

Intersection Summary			
HCM 2000 Control Delay	49.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	111.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

4/27/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations		↰↰	↰↑↑↱		↑↑↱		↱		↶	↰↑↑
Volume (vph)	16	504	568	45	338	362	24	255	129	651
Ideal Flow (vphpl)	1000	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.84		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.99		0.92		0.85		1.00	1.00
Flt Protected		0.95	0.99		1.00		1.00		0.95	0.99
Satd. Flow (prot)		1313	1912		2130		1163		1327	2543
Flt Permitted		0.95	0.99		1.00		1.00		0.15	0.65
Satd. Flow (perm)		1313	1912		2130		1163		207	1667
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	17	542	611	48	363	389	26	274	139	700
RTOR Reduction (vph)	0	0	7	0	0	0	17	0	0	0
Lane Group Flow (vph)	0	478	733	0	755	0	6	0	314	799
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	5	0	5	0	0	0	0	5
Parking (#/hr)			10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		22.5	22.5		23.0		23.0		42.0	42.0
Effective Green, g (s)		22.5	25.0		24.5		23.0		43.5	43.5
Actuated g/C Ratio		0.25	0.28		0.27		0.26		0.48	0.48
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		328	531		579		297		305	966
v/s Ratio Prot		0.36	c0.38		c0.35				c0.19	0.15
v/s Ratio Perm							0.01		0.31	0.25
v/c Ratio		1.46	1.38		1.42dr		0.02		1.03	0.83
Uniform Delay, d1		33.8	32.5		32.8		25.1		31.1	20.0
Progression Factor		1.00	1.00		1.00		1.00		1.08	1.12
Incremental Delay, d2		222.0	182.5		149.0		0.1		33.5	2.1
Delay (s)		255.8	215.0		181.8		25.2		67.0	24.6
Level of Service		F	F		F		C		E	C
Approach Delay (s)			231.0		177.1					36.5
Approach LOS			F		F					D

Intersection Summary			
HCM 2000 Control Delay	147.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	102.7%	ICU Level of Service	G
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑	↱		↰↑↱		↰	↑↑		↰	↑↑	
Volume (vph)	17	141	78	19	10	67	20	943	51	24	181	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.98		1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.91		1.00	0.99		1.00	0.99	
Flt Protected		0.99	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1610	1353		1426		1272	2509		1540	3036	
Flt Permitted		0.97	1.00		0.93		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1567	1353		1344		1272	2509		1540	3036	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	18	148	82	20	11	71	21	993	54	25	191	16
RTOR Reduction (vph)	0	0	56	0	48	0	0	4	0	0	6	0
Lane Group Flow (vph)	0	166	26	0	54	0	21	1043	0	25	201	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		32.1	32.1		32.1		13.8	38.5		13.5	38.5	
Effective Green, g (s)		32.1	32.1		32.1		13.8	38.5		13.5	38.5	
Actuated g/C Ratio		0.32	0.32		0.32		0.14	0.38		0.14	0.38	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Grp Cap (vph)		503	434		431		175	965		207	1168	
v/s Ratio Prot							0.02	c0.42		0.02	c0.07	
v/s Ratio Perm		c0.11	0.02		0.04							
v/c Ratio		0.33	0.06		0.12		0.12	1.08		0.12	0.17	
Uniform Delay, d1		25.8	23.5		24.0		37.8	30.8		38.0	20.3	
Progression Factor		1.00	1.00		1.00		1.21	0.25		1.00	1.00	
Incremental Delay, d2		1.8	0.3		0.6		1.1	50.1		1.2	0.3	
Delay (s)		27.5	23.8		24.6		46.8	57.9		39.2	20.6	
Level of Service		C	C		C		D	E		D	C	
Approach Delay (s)		26.3			24.6			57.6			22.6	
Approach LOS		C			C			E			C	

Intersection Summary			
HCM 2000 Control Delay	46.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.9
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	120	10	3	12	30	7	84	6	110	129	18
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00	0.99	1.00	1.00		1.00	0.97	
Flpb, ped/bikes		1.00			1.00	1.00	0.84	1.00		1.00	1.00	
Frt		0.99			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.99			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2699			1436	1217	1151	1432		1377	1385	
Flt Permitted		0.92			0.91	1.00	0.82	1.00		0.95	1.00	
Satd. Flow (perm)		2485			1318	1217	989	1432		1377	1385	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	20	129	11	3	13	32	8	90	6	118	139	19
RTOR Reduction (vph)	0	8	0	0	0	16	0	4	0	0	7	0
Lane Group Flow (vph)	0	152	0	0	16	16	8	92	0	118	151	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		6.7			6.7	20.4	4.9	4.9		13.7	23.6	
Effective Green, g (s)		6.7			6.7	20.4	4.9	4.9		13.7	23.6	
Actuated g/C Ratio		0.17			0.17	0.51	0.12	0.12		0.34	0.59	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		413			219	767	120	174		468	811	
v/s Ratio Prot						0.01		c0.06		c0.09	0.11	
v/s Ratio Perm		c0.06			0.01	0.01	0.01					
v/c Ratio		0.37			0.07	0.02	0.07	0.53		0.25	0.19	
Uniform Delay, d1		14.9			14.2	5.0	15.7	16.6		9.6	3.9	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.6			0.1	0.0	0.2	2.9		0.3	0.1	
Delay (s)		15.5			14.3	5.0	15.9	19.5		9.9	4.0	
Level of Service		B			B	A	B	B		A	A	
Approach Delay (s)		15.5			8.1			19.2			6.5	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	40.3	Sum of lost time (s)	15.0
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	34	240	782	29	180	233
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1742	1535	847	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1742	1535	847	1134	1194
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	261	850	32	196	253
RTOR Reduction (vph)	0	236	0	6	0	0
Lane Group Flow (vph)	37	25	850	26	196	253
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	8.8	8.8	47.0	42.0	20.0	72.0
Effective Green, g (s)	8.8	8.8	47.0	42.0	20.0	72.0
Actuated g/C Ratio	0.10	0.10	0.52	0.46	0.22	0.79
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	109	168	794	438	249	946
v/s Ratio Prot	c0.03		c0.55	0.01	c0.17	0.21
v/s Ratio Perm		0.01		0.02		
v/c Ratio	0.34	0.15	1.07	0.06	0.79	0.27
Uniform Delay, d1	38.3	37.6	21.9	13.5	33.4	2.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.9	0.4	52.5	0.1	15.1	0.2
Delay (s)	40.1	38.0	74.4	13.5	48.5	2.6
Level of Service	D	D	E	B	D	A
Approach Delay (s)	38.3		72.2			22.6
Approach LOS	D		E			C

Intersection Summary			
HCM 2000 Control Delay	52.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	19	43	57	192	209	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frpb, ped/bikes	0.96		1.00	1.00	0.99	
Flpb, ped/bikes	1.00		0.98	1.00	1.00	
Frt	0.91		1.00	1.00	0.98	
Flt Protected	0.99		0.95	1.00	1.00	
Satd. Flow (prot)	1539		1678	1531	3061	
Flt Permitted	0.99		0.58	1.00	1.00	
Satd. Flow (perm)	1539		1026	1531	3061	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	21	48	63	213	232	46
RTOR Reduction (vph)	43	0	0	0	16	0
Lane Group Flow (vph)	26	0	63	213	262	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	10
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	3.6		23.3	23.3	23.3	
Effective Green, g (s)	3.6		23.3	23.3	23.3	
Actuated g/C Ratio	0.10		0.63	0.63	0.63	
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	150		647	966	1932	
v/s Ratio Prot	c0.02			c0.14	0.09	
v/s Ratio Perm			0.06			
v/c Ratio	0.17		0.10	0.22	0.14	
Uniform Delay, d1	15.3		2.7	2.9	2.7	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.5		0.1	0.1	0.0	
Delay (s)	15.8		2.7	3.0	2.8	
Level of Service	B		A	A	A	
Approach Delay (s)	15.8			3.0	2.8	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	4.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	36.9	Sum of lost time (s)	10.0
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	189	147	893	52	39	488
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.96	1.00		1.00	1.00
Flpb, ped/bikes	0.93	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1584	1466	3379		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1584	1466	3379		1711	3421
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	210	163	992	58	43	542
RTOR Reduction (vph)	0	116	4	0	0	0
Lane Group Flow (vph)	210	47	1046	0	43	542
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	28.7	28.7	50.1		5.9	61.1
Effective Green, g (s)	28.7	28.7	50.1		5.9	61.1
Actuated g/C Ratio	0.29	0.29	0.50		0.06	0.61
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	454	420	1692		100	2090
v/s Ratio Prot			c0.31		c0.03	0.16
v/s Ratio Perm	c0.13	0.03				
v/c Ratio	0.46	0.11	0.62		0.43	0.26
Uniform Delay, d1	29.3	26.3	18.0		45.4	9.0
Progression Factor	1.00	1.00	1.82		1.07	1.34
Incremental Delay, d2	0.7	0.1	1.0		3.0	0.1
Delay (s)	30.1	26.4	33.9		51.4	12.1
Level of Service	C	C	C		D	B
Approach Delay (s)	28.4		33.9			15.0
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	27.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	10	12	22	239	192	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.96	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1540	1346		3063	2948	
Flt Permitted	0.95	1.00		0.90	1.00	
Satd. Flow (perm)	1540	1346		2771	2948	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	12	14	26	281	226	71
RTOR Reduction (vph)	0	14	0	0	56	0
Lane Group Flow (vph)	12	0	0	307	241	0
Confl. Peds. (#/hr)	1	1	25			25
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	1.3	1.3		10.2	10.2	
Effective Green, g (s)	1.3	1.3		10.2	10.2	
Actuated g/C Ratio	0.03	0.03		0.22	0.22	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	42	37		601	639	
v/s Ratio Prot	c0.01				0.08	
v/s Ratio Perm		0.00		c0.11		
v/c Ratio	0.29	0.01		0.51	0.38	
Uniform Delay, d1	22.4	22.2		16.2	15.7	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.7	0.1		0.7	0.4	
Delay (s)	26.1	22.3		16.9	16.1	
Level of Service	C	C		B	B	
Approach Delay (s)	24.1			16.9	16.1	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	47.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	37.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	50	8	67	49	28	5	130	44	9	5	164	122
Peak Hour Factor	0.92	0.87	0.87	0.87	0.87	0.92	0.87	0.92	0.87	0.92	0.92	0.92
Hourly flow rate (vph)	54	9	77	56	32	5	149	48	10	5	178	133

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	54	86	56	38	208	184	133
Volume Left (vph)	54	0	56	0	149	5	0
Volume Right (vph)	0	77	0	5	10	0	133
Hadj (s)	0.53	-0.59	0.53	-0.07	0.15	0.05	-0.67
Departure Headway (s)	6.5	5.4	6.6	6.0	5.7	5.5	4.8
Degree Utilization, x	0.10	0.13	0.10	0.06	0.33	0.28	0.18
Capacity (veh/h)	510	613	502	551	609	629	721
Control Delay (s)	9.1	8.0	9.2	8.2	11.5	9.4	7.6
Approach Delay (s)	8.4		8.8		11.5	8.6	
Approach LOS	A		A		B	A	

Intersection Summary			
Delay	9.4		
Level of Service	A		
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	190	89	266	3	230	47	269	708	17	18	472	187
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1266	1365	1126	1283	1365	1099	2515	2581		1296	2464	
Flt Permitted	0.51	1.00	1.00	0.69	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	682	1365	1126	936	1365	1099	2515	2581		1296	2464	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	209	98	292	3	253	52	296	778	19	20	519	205
RTOR Reduction (vph)	0	0	191	0	0	34	0	2	0	0	42	0
Lane Group Flow (vph)	209	98	101	3	253	18	296	795	0	20	682	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Effective Green, g (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Actuated g/C Ratio	0.34	0.34	0.34	0.34	0.34	0.34	0.14	0.38		0.12	0.36	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Grp Cap (vph)	235	470	388	322	470	379	352	975		155	882	
v/s Ratio Prot		0.07			0.19		0.12	c0.31		0.02	c0.28	
v/s Ratio Perm	c0.31		0.09	0.00		0.02						
v/c Ratio	0.89	0.21	0.26	0.01	0.54	0.05	0.84	0.82		0.13	0.77	
Uniform Delay, d1	30.9	23.1	23.6	21.5	26.3	21.8	41.9	28.0		39.3	28.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.64	0.76		1.15	1.19	
Incremental Delay, d2	35.8	1.0	1.6	0.1	4.4	0.2	8.3	2.7		1.7	6.3	
Delay (s)	66.8	24.1	25.2	21.6	30.7	22.0	35.2	24.0		47.0	40.3	
Level of Service	E	C	C	C	C	C	D	C		D	D	
Approach Delay (s)		39.5			29.2			27.0			40.5	
Approach LOS		D			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	33.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	116.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	102	471	8	6	647	32	33	25	34	41	3	105
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.85	1.00	0.98		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1411	1621	1706	1238	1621	1527		1491	1355	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.68	1.00		0.72	1.00	
Satd. Flow (perm)	1621	1706	1411	1621	1706	1238	1163	1527		1123	1355	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	111	512	9	7	703	35	36	27	37	45	3	114
RTOR Reduction (vph)	0	0	4	0	0	19	0	28	0	0	85	0
Lane Group Flow (vph)	111	512	5	7	703	16	36	36	0	45	32	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	10.9	47.6	47.6	2.7	39.4	39.4	21.9	21.9		21.9	21.9	
Effective Green, g (s)	10.9	47.6	47.6	2.7	39.4	39.4	21.9	21.9		21.9	21.9	
Actuated g/C Ratio	0.12	0.55	0.55	0.03	0.45	0.45	0.25	0.25		0.25	0.25	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	202	931	770	50	770	559	292	383		282	340	
v/s Ratio Prot	c0.07	c0.30		0.00	c0.41			0.02			0.02	
v/s Ratio Perm			0.00			0.01	0.03			c0.04		
v/c Ratio	0.55	0.55	0.01	0.14	0.91	0.03	0.12	0.09		0.16	0.09	
Uniform Delay, d1	35.8	12.8	9.0	41.1	22.3	13.3	25.2	25.0		25.5	25.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.0	2.3	0.0	1.3	15.1	0.0	0.2	0.1		0.3	0.1	
Delay (s)	38.9	15.2	9.0	42.4	37.4	13.3	25.4	25.2		25.7	25.2	
Level of Service	D	B	A	D	D	B	C	C		C	C	
Approach Delay (s)		19.3			36.4			25.3			25.3	
Approach LOS		B			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	28.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	87.2	Sum of lost time (s)	15.0
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	123	399	18	22	683	80	49	206	70	112	61	146
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.97	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1048	1540	2962			2983	1072
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.64	1.00			0.65	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1048	1033	2962			1992	1072
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	128	416	19	23	711	83	51	215	73	117	64	152
RTOR Reduction (vph)	0	0	6	0	0	37	0	40	0	0	0	129
Lane Group Flow (vph)	128	416	13	23	711	46	51	248	0	0	181	23
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	11.0	57.2	57.2	2.3	47.5	47.5	14.1	14.1			13.1	13.1
Effective Green, g (s)	11.0	57.2	57.2	2.3	47.5	47.5	14.1	14.1			13.1	13.1
Actuated g/C Ratio	0.13	0.66	0.66	0.03	0.55	0.55	0.16	0.16			0.15	0.15
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	154	802	910	40	666	574	168	482			301	162
v/s Ratio Prot	c0.11	0.34		0.01	c0.58			0.08				
v/s Ratio Perm			0.01			0.04	0.05				c0.09	0.02
v/c Ratio	0.83	0.52	0.01	0.57	1.07	0.08	0.30	0.51			1.02dl	0.14
Uniform Delay, d1	36.9	7.6	5.0	41.7	19.5	9.2	31.9	33.1			34.3	31.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	30.0	2.4	0.0	18.4	54.3	0.1	1.0	0.9			3.4	0.4
Delay (s)	66.9	10.0	5.1	60.1	73.9	9.3	32.9	34.0			37.7	32.3
Level of Service	E	A	A	E	E	A	C	C			D	C
Approach Delay (s)		22.8			66.9			33.9			35.2	
Approach LOS		C			E			C			D	

Intersection Summary			
HCM 2000 Control Delay	44.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	86.6	Sum of lost time (s)	15.0
Intersection Capacity Utilization	95.5%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	420	70	33	478	366	61	249	30	89	138	43
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.89	1.00	1.00	0.96	1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1337	931		1336	1126	856	1070	957	919	1070	1068	
Flt Permitted	0.18	1.00		0.28	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	251	931		389	1126	856	1070	957	919	1070	1068	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	50	447	74	35	509	389	65	265	32	95	147	46
RTOR Reduction (vph)	0	5	0	0	0	130	0	0	25	0	11	0
Lane Group Flow (vph)	50	516	0	35	509	259	65	265	7	95	182	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	55.4	55.4		54.5	54.5	61.5	9.9	25.0	25.0	7.0	22.1	
Effective Green, g (s)	55.4	55.4		54.5	54.5	61.5	9.9	25.0	25.0	7.0	22.1	
Actuated g/C Ratio	0.51	0.51		0.50	0.50	0.56	0.09	0.23	0.23	0.06	0.20	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	158	470		213	559	518	96	218	209	68	215	
v/s Ratio Prot	0.01	c0.55		0.00	c0.45	0.03	0.06	c0.28		c0.09	0.17	
v/s Ratio Perm	0.15			0.08		0.27			0.01			
v/c Ratio	0.32	1.10		0.16	0.91	0.50	0.68	1.22	0.03	1.40	0.85	
Uniform Delay, d1	18.5	27.2		25.7	25.4	14.7	48.4	42.4	33.0	51.4	42.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.2	70.5		0.4	19.0	0.8	17.3	131.4	0.1	246.3	25.1	
Delay (s)	19.6	97.6		26.0	44.4	15.5	65.6	173.7	33.0	297.6	67.2	
Level of Service	B	F		C	D	B	E	F	C	F	E	
Approach Delay (s)		90.8			31.7			141.9			143.2	
Approach LOS		F			C			F			F	

Intersection Summary			
HCM 2000 Control Delay	80.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	109.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	76.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	136	39	45	162	2	31	116	78	11	51	215
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		0.99		1.00	1.00			1.00	0.98		0.98	
Flpb, ped/bikes		1.00		0.99	1.00			1.00	1.00		1.00	
Frt		0.98		1.00	1.00			1.00	0.85		0.90	
Flt Protected		0.99		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)		1721		1691	1797			1779	1499		1578	
Flt Permitted		0.86		0.57	1.00			0.87	1.00		0.98	
Satd. Flow (perm)		1506		1014	1797			1562	1499		1557	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	70	151	43	50	180	2	34	129	87	12	57	239
RTOR Reduction (vph)	0	9	0	0	1	0	0	0	65	0	174	0
Lane Group Flow (vph)	0	255	0	50	181	0	0	163	22	0	134	0
Confl. Peds. (#/hr)	13		16	16		13	16		19	19		16
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4		4	8		
Actuated Green, G (s)		15.5		15.5	15.5			13.3	13.3		13.3	
Effective Green, g (s)		15.5		15.5	15.5			13.3	13.3		13.3	
Actuated g/C Ratio		0.29		0.29	0.29			0.25	0.25		0.25	
Clearance Time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		435		293	519			387	371		386	
v/s Ratio Prot					0.10							
v/s Ratio Perm		c0.17		0.05				c0.10	0.01		0.09	
v/c Ratio		0.59		0.17	0.35			0.42	0.06		0.35	
Uniform Delay, d1		16.3		14.2	15.1			16.9	15.4		16.6	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		2.0		0.3	0.4			0.7	0.1		0.5	
Delay (s)		18.3		14.5	15.5			17.7	15.4		17.1	
Level of Service		B		B	B			B	B		B	
Approach Delay (s)		18.3			15.3			16.9			17.1	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	53.6	Sum of lost time (s)	14.0
Intersection Capacity Utilization	64.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	146	169	51	66	319	23	42	826	53	16	426	299
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1677	3275		1681	3376		1260	2491		1260	2331	
Flt Permitted	0.50	1.00		0.61	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	878	3275		1072	3376		1260	2491		1260	2331	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	155	180	54	70	339	24	45	879	56	17	453	318
RTOR Reduction (vph)	0	28	0	0	5	0	0	5	0	0	127	0
Lane Group Flow (vph)	155	206	0	70	358	0	45	930	0	17	644	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	34.7	34.7		34.7	34.7		11.9	34.9		14.9	37.9	
Effective Green, g (s)	34.7	34.7		34.7	34.7		11.9	34.9		14.9	37.9	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.12	0.35		0.15	0.38	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Grp Cap (vph)	304	1136		371	1171		149	869		187	883	
v/s Ratio Prot		0.06			0.11		0.04	c0.37		0.01	c0.28	
v/s Ratio Perm	c0.18			0.07								
v/c Ratio	0.51	0.18		0.19	0.31		0.30	1.07		0.09	0.73	
Uniform Delay, d1	25.9	22.8		22.8	23.8		40.3	32.5		36.7	26.6	
Progression Factor	1.00	1.00		1.00	1.00		0.91	0.81		1.55	0.62	
Incremental Delay, d2	6.0	0.4		1.1	0.7		4.0	48.0		0.7	3.8	
Delay (s)	31.9	23.1		23.9	24.5		40.7	74.3		57.6	20.3	
Level of Service	C	C		C	C		D	E		E	C	
Approach Delay (s)		26.6			24.4			72.7			21.1	
Approach LOS		C			C			E			C	

Intersection Summary			
HCM 2000 Control Delay	42.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	110.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	320	38	4	713	2	38	0	12	13	0	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00			0.97		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3367		1711	3420			1678		1711	1531	
Flt Permitted	0.27	1.00		0.52	1.00			0.84		0.72	1.00	
Satd. Flow (perm)	494	3367		940	3420			1467		1300	1531	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	348	41	4	775	2	41	0	13	14	0	14
RTOR Reduction (vph)	0	15	0	0	0	0	0	20	0	0	8	0
Lane Group Flow (vph)	7	374	0	4	777	0	0	34	0	14	6	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	24.0	24.0		24.0	24.0			26.0		26.0	26.0	
Effective Green, g (s)	24.0	24.0		24.0	24.0			26.0		26.0	26.0	
Actuated g/C Ratio	0.40	0.40		0.40	0.40			0.43		0.43	0.43	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Grp Cap (vph)	197	1346		376	1368			635		563	663	
v/s Ratio Prot		0.11			c0.23						0.00	
v/s Ratio Perm	0.01			0.00				c0.02		0.01		
v/c Ratio	0.04	0.28		0.01	0.57			0.05		0.02	0.01	
Uniform Delay, d1	11.0	12.2		10.8	14.0			9.9		9.7	9.7	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.5		0.1	1.7			0.2		0.1	0.0	
Delay (s)	11.3	12.7		10.9	15.7			10.0		9.8	9.7	
Level of Service	B	B		B	B			B		A	A	
Approach Delay (s)		12.6			15.7			10.0			9.8	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	37.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	86	0	0	822	18	382	200	282	0	0	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				3.5
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Flpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Frt		1.00			1.00		1.00	0.91				0.85
Flt Protected		0.99			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3399			5116		1711	3121				2694
Flt Permitted		0.88			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3021			5116		1711	3121				2694
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	13	88	0	0	839	18	390	204	288	0	0	130
RTOR Reduction (vph)	0	0	0	0	2	0	0	149	0	0	0	121
Lane Group Flow (vph)	0	101	0	0	855	0	390	343	0	0	0	9
Confl. Peds. (#/hr)												20
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		47.5			36.5		53.0	53.0				7.5
Effective Green, g (s)		47.5			36.5		53.0	53.0				7.5
Actuated g/C Ratio		0.43			0.33		0.48	0.48				0.07
Clearance Time (s)		4.5			4.5		5.0	5.0				3.5
Lane Grp Cap (vph)		1330			1697		824	1503				183
v/s Ratio Prot		c0.01			c0.17		c0.23	0.11				0.00
v/s Ratio Perm		0.03										
v/c Ratio		0.08			0.50		0.47	0.23				0.05
Uniform Delay, d1		18.4			29.5		19.1	16.6				47.9
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			1.1		1.9	0.4				0.5
Delay (s)		18.5			30.6		21.1	16.9				48.4
Level of Service		B			C		C	B				D
Approach Delay (s)		18.5			30.6			18.8			48.4	
Approach LOS		B			C			B			D	

Intersection Summary			
HCM 2000 Control Delay	25.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

21: I-280 SB On-Ramp & Mariposa St.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	99	566	782	549	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.89	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1507	1426	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1507	1426	3319	1801		
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	102	584	806	566	0	0
RTOR Reduction (vph)	31	31	0	0	0	0
Lane Group Flow (vph)	322	302	806	566	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	37.4	37.4	22.6	70.0		
Effective Green, g (s)	37.4	37.4	22.6	70.0		
Actuated g/C Ratio	0.53	0.53	0.32	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	805	761	1071	1801		
v/s Ratio Prot	c0.21		c0.24	0.31		
v/s Ratio Perm		0.21				
v/c Ratio	0.40	0.40	0.75	0.31		
Uniform Delay, d1	9.7	9.6	21.2	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.3	0.3	3.0	0.1		
Delay (s)	10.0	10.0	24.2	0.1		
Level of Service	A	A	C	A		
Approach Delay (s)	10.0			14.3	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

22: Third St. & Cesar Chavez

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	203	135	181	7	204	13	176	589	16	17	570	169
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.93		1.00	0.99		1.00	1.00		1.00	0.97	
Flpb, ped/bikes	0.98	1.00		0.94	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.99		1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1188	1945		1139	1257		1215	2414		1215	2289	
Flt Permitted	0.36	1.00		0.55	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	454	1945		662	1257		1215	2414		1215	2289	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	211	141	189	7	212	14	183	614	17	18	594	176
RTOR Reduction (vph)	0	127	0	0	2	0	0	2	0	0	28	0
Lane Group Flow (vph)	211	203	0	7	224	0	183	629	0	18	742	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	32.9	32.9		21.9	21.9		17.3	46.8		4.0	33.5	
Effective Green, g (s)	32.9	32.9		21.9	21.9		17.3	46.8		4.0	33.5	
Actuated g/C Ratio	0.33	0.33		0.22	0.22		0.17	0.47		0.04	0.34	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	191	639		144	275		210	1129		48	766	
v/s Ratio Prot	c0.06	0.10			0.18		c0.15	0.26		0.01	c0.32	
v/s Ratio Perm	c0.30			0.01								
v/c Ratio	1.10	0.32		0.05	0.81		0.87	0.56		0.38	0.97	
Uniform Delay, d1	34.2	25.1		30.8	37.1		40.3	19.1		46.8	32.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.03	0.81	
Incremental Delay, d2	95.9	0.3		0.1	16.6		30.2	2.0		3.9	22.6	
Delay (s)	130.1	25.4		31.0	53.7		70.5	21.1		52.3	49.0	
Level of Service	F	C		C	D		E	C		D	D	
Approach Delay (s)		66.3			53.0			32.2			49.1	
Approach LOS		E			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	47.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	99.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

EXISTING 2015 PLUS PROJECT – BASKETBALL GAME WITH SF GIANTS GAME AT AT&T PARK WEEKDAY PM PEAK

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	783	704	102	323	632	48	12	710	163	0	0	0
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Lane Util. Factor	0.94	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.93		1.00	0.96			1.00	0.47			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	0.98		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	3656	2370		2515	2469			4651	547			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	3656	2370		2515	2469			4651	547			
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	807	726	105	333	652	49	12	732	168	0	0	0
RTOR Reduction (vph)	0	10	0	0	0	0	0	0	126	0	0	0
Lane Group Flow (vph)	807	821	0	333	701	0	0	744	42	0	0	0
Confl. Peds. (#/hr)			1700			1700	1700		1700			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	20.7	40.2		21.7	42.7			27.7	27.7			
Effective Green, g (s)	20.7	40.2		21.7	42.7			27.7	27.7			
Actuated g/C Ratio	0.19	0.37		0.20	0.39			0.25	0.25			
Clearance Time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	687	866		496	958			1171	137			
v/s Ratio Prot	c0.22	c0.35		0.13	c0.28							
v/s Ratio Perm								0.16	0.08			
v/c Ratio	1.17	0.95		0.67	0.73			0.64	0.31			
Uniform Delay, d1	44.6	33.9		40.9	28.8			36.7	33.4			
Progression Factor	1.21	1.34		1.58	1.19			0.84	2.42			
Incremental Delay, d2	84.1	9.1		1.1	0.9			1.0	1.1			
Delay (s)	138.1	54.5		65.5	35.1			31.9	81.9			
Level of Service	F	D		E	D			C	F			
Approach Delay (s)		95.7			44.9			41.1			0.0	
Approach LOS		F			D			D			A	

Intersection Summary			
HCM 2000 Control Delay	67.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	128	1358	33	34	586	24	7	131	109	122	459	452
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	*0.80		1.00	*0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00	0.64	1.00	0.86	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00	0.71	1.00	1.00
Frt	1.00	1.00		1.00	0.99			1.00	0.85	1.00	0.96	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1296	3234		1296	2516			1602	858	1088	2423	581
Flt Permitted	0.95	1.00		0.95	1.00			0.96	1.00	0.67	1.00	1.00
Satd. Flow (perm)	1296	3234		1296	2516			1545	858	764	2423	581
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	131	1386	34	35	598	24	7	134	111	124	468	461
RTOR Reduction (vph)	0	2	0	0	3	0	0	0	72	0	32	184
Lane Group Flow (vph)	131	1418	0	35	619	0	0	141	39	124	611	102
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.4	43.0		8.9	35.9			38.2	38.2	39.2	39.2	39.2
Effective Green, g (s)	14.4	43.0		8.9	35.9			38.2	38.2	39.2	39.2	39.2
Actuated g/C Ratio	0.13	0.39		0.08	0.33			0.35	0.35	0.36	0.36	0.36
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	169	1264		104	821			536	297	272	863	207
v/s Ratio Prot	0.10	c0.44		0.03	c0.25						c0.25	
v/s Ratio Perm								0.09	0.04	0.16		0.18
v/c Ratio	0.78	1.12		0.34	0.75			0.26	0.13	0.46	0.71	0.49
Uniform Delay, d1	46.2	33.5		47.8	33.1			25.8	24.5	27.2	30.5	27.6
Progression Factor	0.63	0.91		0.95	0.91			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.1	56.0		1.3	2.7			0.3	0.2	1.2	2.7	1.8
Delay (s)	31.2	86.5		46.6	32.7			26.1	24.7	28.4	33.1	29.5
Level of Service	C	F		D	C			C	C	C	C	C
Approach Delay (s)		81.8			33.5			25.5			31.6	
Approach LOS		F			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	53.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	134.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1494	151	3	1042	77	25
Ideal Flow (vphpl)	1700	1700	1400	1400	1700	1700
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2709			2269	1377	1214
Flt Permitted	1.00			0.95	0.95	1.00
Satd. Flow (perm)	2709			2157	1377	1214
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1556	157	3	1085	80	26
RTOR Reduction (vph)	7	0	0	0	0	14
Lane Group Flow (vph)	1706	0	0	1088	80	12
Confl. Peds. (#/hr)		37	37		1	3
Confl. Bikes (#/hr)		1				
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	1529			1217	458	403
v/s Ratio Prot	c0.63				c0.06	
v/s Ratio Perm				0.50		0.01
v/c Ratio	1.12			0.89	0.17	0.03
Uniform Delay, d1	23.9			21.1	26.0	24.7
Progression Factor	1.00			0.84	1.00	1.00
Incremental Delay, d2	61.7			7.3	0.8	0.1
Delay (s)	85.6			24.9	26.8	24.9
Level of Service	F			C	C	C
Approach Delay (s)	85.6			24.9	26.3	
Approach LOS	F			C	C	

Intersection Summary			
HCM 2000 Control Delay	60.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	88	794	99	22	227	661	205	289	821	261
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		2.0			2.0	2.0			2.0	2.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.97			1.00	0.87
Flpb, ped/bikes		1.00			1.00	1.00			1.00	1.00
Frt		0.98			1.00	0.96			1.00	0.85
Flt Protected		1.00			1.00	1.00			0.95	1.00
Satd. Flow (prot)		5795			2871	2501			4094	978
Flt Permitted		1.00			0.74	1.00			0.95	1.00
Satd. Flow (perm)		5795			2124	2501			4094	978
Peak-hour factor, PHF	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93
Adj. Flow (vph)	96	854	106	24	244	711	220	314	883	281
RTOR Reduction (vph)	0	22	0	0	0	6	0	0	0	0
Lane Group Flow (vph)	0	1034	0	0	268	925	0	0	1225	253
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Perm
Protected Phases		6			4	4		7	7	
Permitted Phases	6			4						7
Actuated Green, G (s)		27.0			25.0	25.0			24.0	24.0
Effective Green, g (s)		29.0			28.0	28.0			27.0	27.0
Actuated g/C Ratio		0.32			0.31	0.31			0.30	0.30
Clearance Time (s)		4.0			5.0	5.0			5.0	5.0
Lane Grp Cap (vph)		1867			660	778			1228	293
v/s Ratio Prot						c0.37			c0.30	
v/s Ratio Perm		0.18			0.13					0.26
v/c Ratio		0.55			0.41	1.19			1.00	0.86
Uniform Delay, d1		25.2			24.4	31.0			31.5	29.8
Progression Factor		1.66			0.15	1.00			1.00	1.00
Incremental Delay, d2		0.6			0.2	97.6			25.1	27.0
Delay (s)		42.3			3.9	128.6			56.6	56.8
Level of Service		D			A	F			E	E
Approach Delay (s)		42.3			3.9	128.6			56.6	
Approach LOS		D			A	F			E	

Intersection Summary			
HCM 2000 Control Delay	66.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	90.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

4/27/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	28	419	683	63	221	322	64	211	145	682
Ideal Flow (vphpl)	1000	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.81		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.99		0.91		0.85		1.00	1.00
Flt Protected		0.95	1.00		1.00		1.00		0.95	1.00
Satd. Flow (prot)		1313	1910		2041		1163		1327	2550
Flt Permitted		0.95	1.00		1.00		1.00		0.23	0.89
Satd. Flow (perm)		1313	1910		2041		1163		326	2269
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	30	451	734	68	238	346	69	227	156	733
RTOR Reduction (vph)	0	0	9	0	1	0	46	0	0	0
Lane Group Flow (vph)	0	436	838	0	590	0	16	0	328	788
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	5	0	5	0	0	0	0	5
Parking (#/hr)			10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		22.5	22.5		23.0		23.0		42.0	42.0
Effective Green, g (s)		22.5	25.0		24.5		23.0		43.5	43.5
Actuated g/C Ratio		0.25	0.28		0.27		0.26		0.48	0.48
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		328	530		555		297		341	1148
v/s Ratio Prot		0.33	c0.44		c0.29				c0.18	0.13
v/s Ratio Perm							0.01		0.29	0.21
v/c Ratio		1.33	1.58		1.32dr		0.05		0.96	0.69
Uniform Delay, d1		33.8	32.5		32.8		25.3		27.9	18.0
Progression Factor		1.00	1.00		1.00		1.00		1.03	1.10
Incremental Delay, d2		167.7	270.1		56.2		0.3		8.1	0.3
Delay (s)		201.5	302.6		89.0		25.6		36.8	20.2
Level of Service		F	F		F		C		D	C
Approach Delay (s)			268.3		82.9					25.0
Approach LOS			F		F					C

Intersection Summary			
HCM 2000 Control Delay	139.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	100.1%	ICU Level of Service	G
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	32	58	89	1	1	3	23	849	56	135	188	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.98		1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.92		1.00	0.99		1.00	0.98	
Flt Protected		0.98	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1584	1353		1450		1272	2502		1540	2994	
Flt Permitted		0.91	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1473	1353		1431		1272	2502		1540	2994	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	34	61	94	1	1	3	24	894	59	142	198	36
RTOR Reduction (vph)	0	0	64	0	2	0	0	5	0	0	15	0
Lane Group Flow (vph)	0	95	30	0	3	0	24	948	0	142	219	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		32.1	32.1		32.1		14.8	38.5		13.5	37.5	
Effective Green, g (s)		32.1	32.1		32.1		14.8	38.5		13.5	37.5	
Actuated g/C Ratio		0.32	0.32		0.32		0.15	0.38		0.14	0.38	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Grp Cap (vph)		472	434		459		188	963		207	1122	
v/s Ratio Prot							0.02	c0.38		c0.09	0.07	
v/s Ratio Perm		c0.06	0.02		0.00							
v/c Ratio		0.20	0.07		0.01		0.13	0.98		0.69	0.20	
Uniform Delay, d1		24.6	23.6		23.1		37.0	30.5		41.2	21.1	
Progression Factor		1.00	1.00		1.00		1.55	0.40		1.00	1.00	
Incremental Delay, d2		1.0	0.3		0.0		1.1	22.4		17.0	0.4	
Delay (s)		25.6	23.9		23.1		58.5	34.6		58.2	21.5	
Level of Service		C	C		C		E	C		E	C	
Approach Delay (s)		24.7			23.1			35.2			35.3	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	33.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.9
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

7: Fourth St. & Channel St.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	33	16	23	2	12	44	44	255	16	147	150	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00	0.99	1.00	1.00		1.00	0.95	
Flpb, ped/bikes		0.99			1.00	1.00	0.83	1.00		1.00	1.00	
Frt		0.95			1.00	0.85	1.00	0.99		1.00	0.97	
Flt Protected		0.98			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2811			1609	1364	1275	1603		1540	1500	
Flt Permitted		0.91			0.94	1.00	0.63	1.00		0.95	1.00	
Satd. Flow (perm)		2628			1519	1364	849	1603		1540	1500	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	35	17	25	2	13	47	47	274	17	158	161	38
RTOR Reduction (vph)	0	23	0	0	0	31	0	3	0	0	9	0
Lane Group Flow (vph)	0	54	0	0	15	16	47	288	0	158	190	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		3.7			3.7	15.0	14.7	14.7		11.3	31.0	
Effective Green, g (s)		3.7			3.7	15.0	14.7	14.7		11.3	31.0	
Actuated g/C Ratio		0.08			0.08	0.34	0.33	0.33		0.25	0.69	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		217			125	610	279	527		389	1040	
v/s Ratio Prot						0.01		c0.18		c0.10	0.13	
v/s Ratio Perm		c0.02			0.01	0.01	0.06					
v/c Ratio		0.25			0.12	0.03	0.17	0.55		0.41	0.18	
Uniform Delay, d1		19.2			19.0	10.0	10.7	12.3		13.9	2.4	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.6			0.4	0.0	0.3	1.2		0.7	0.1	
Delay (s)		19.8			19.4	10.0	10.9	13.4		14.6	2.5	
Level of Service		B			B	A	B	B		B	A	
Approach Delay (s)		19.8			12.3			13.1			7.8	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	44.7	Sum of lost time (s)	15.0
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis

8: Seventh St. & Mission Bay St.

4/27/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	47	281	934	37	188	234
Ideal Flow (vphpl)	1900	1900	1400	1400	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1540	2364	1791	988	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1540	2364	1791	988	1134	1194
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	305	1015	40	204	254
RTOR Reduction (vph)	0	276	0	6	0	0
Lane Group Flow (vph)	51	29	1015	34	204	254
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	8.6	8.6	47.0	42.0	20.0	72.0
Effective Green, g (s)	8.6	8.6	47.0	42.0	20.0	72.0
Actuated g/C Ratio	0.09	0.09	0.52	0.46	0.22	0.79
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	146	224	929	512	250	948
v/s Ratio Prot	c0.03		c0.57	0.01	c0.18	0.21
v/s Ratio Perm		0.01		0.02		
v/c Ratio	0.35	0.13	1.09	0.07	0.82	0.27
Uniform Delay, d1	38.4	37.6	21.8	13.5	33.6	2.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	0.3	58.1	0.1	18.2	0.2
Delay (s)	39.8	37.8	79.9	13.5	51.8	2.6
Level of Service	D	D	E	B	D	A
Approach Delay (s)	38.1		77.3			24.5
Approach LOS	D		E			C

Intersection Summary			
HCM 2000 Control Delay	56.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	90.6	Sum of lost time (s)	20.0
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
9: Terry A Francois Blvd/Terry A Francois Blvd. & South St.

4/27/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	22	37	78	234	219	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frpb, ped/bikes	0.96		1.00	1.00	0.99	
Flpb, ped/bikes	1.00		0.98	1.00	1.00	
Frt	0.92		1.00	1.00	0.97	
Flt Protected	0.98		0.95	1.00	1.00	
Satd. Flow (prot)	1555		1679	1531	3054	
Flt Permitted	0.98		0.56	1.00	1.00	
Satd. Flow (perm)	1555		993	1531	3054	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	26	44	92	275	258	55
RTOR Reduction (vph)	40	0	0	0	18	0
Lane Group Flow (vph)	30	0	92	275	295	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	10
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	3.7		24.7	24.7	24.7	
Effective Green, g (s)	3.7		24.7	24.7	24.7	
Actuated g/C Ratio	0.10		0.64	0.64	0.64	
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	149		638	984	1964	
v/s Ratio Prot	c0.02			c0.18	0.10	
v/s Ratio Perm			0.09			
v/c Ratio	0.20		0.14	0.28	0.15	
Uniform Delay, d1	16.0		2.7	3.0	2.7	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.7		0.1	0.2	0.0	
Delay (s)	16.7		2.8	3.1	2.7	
Level of Service	B		A	A	A	
Approach Delay (s)	16.7			3.1	2.7	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	4.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	38.4	Sum of lost time (s)	10.0
Intersection Capacity Utilization	46.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: Third St. & South St.

4/27/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	223	130	874	94	66	500
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.96	0.99		1.00	1.00
Flpb, ped/bikes	0.93	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1584	1466	3347		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1584	1466	3347		1711	3421
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	248	144	971	104	73	556
RTOR Reduction (vph)	0	103	8	0	0	0
Lane Group Flow (vph)	248	41	1067	0	73	556
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	28.7	28.7	48.1		7.9	61.1
Effective Green, g (s)	28.7	28.7	48.1		7.9	61.1
Actuated g/C Ratio	0.29	0.29	0.48		0.08	0.61
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	454	420	1609		135	2090
v/s Ratio Prot			c0.32		c0.04	0.16
v/s Ratio Perm	c0.16	0.03				
v/c Ratio	0.55	0.10	0.66		0.54	0.27
Uniform Delay, d1	30.1	26.2	19.8		44.3	9.0
Progression Factor	1.00	1.00	1.69		1.04	0.93
Incremental Delay, d2	1.3	0.1	1.3		4.4	0.1
Delay (s)	31.5	26.3	34.7		50.3	8.5
Level of Service	C	C	C		D	A
Approach Delay (s)	29.6		34.7			13.3
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	27.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
11: Terry A Francois Blvd./Terry A Francois Blvd & 16th

4/27/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	10	12	22	302	196	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.96	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1540	1346		3066	2950	
Flt Permitted	0.95	1.00		0.91	1.00	
Satd. Flow (perm)	1540	1346		2806	2950	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	12	14	26	355	231	71
RTOR Reduction (vph)	0	14	0	0	50	0
Lane Group Flow (vph)	12	0	0	381	252	0
Confl. Peds. (#/hr)	1	1	25			25
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	1.3	1.3		11.6	11.6	
Effective Green, g (s)	1.3	1.3		11.6	11.6	
Actuated g/C Ratio	0.03	0.03		0.24	0.24	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	41	36		672	707	
v/s Ratio Prot	c0.01				0.09	
v/s Ratio Perm		0.00		c0.14		
v/c Ratio	0.29	0.01		0.57	0.36	
Uniform Delay, d1	23.1	22.9		16.2	15.3	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.9	0.1		1.1	0.3	
Delay (s)	27.0	23.0		17.3	15.6	
Level of Service	C	C		B	B	
Approach Delay (s)	24.9			17.3	15.6	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	48.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	39.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
12: Illinois St & 16th

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	70	10	90	50	29	5	169	62	8	5	164	122
Peak Hour Factor	0.92	0.84	0.84	0.84	0.84	0.92	0.84	0.92	0.84	0.92	0.92	0.92
Hourly flow rate (vph)	76	12	107	60	35	5	201	67	10	5	178	133

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	76	119	60	40	278	184	133
Volume Left (vph)	76	0	60	0	201	5	0
Volume Right (vph)	0	107	0	5	10	0	133
Hadj (s)	0.53	-0.60	0.53	-0.06	0.16	0.05	-0.67
Departure Headway (s)	6.8	5.7	7.0	6.4	5.9	5.8	5.1
Degree Utilization, x	0.14	0.19	0.12	0.07	0.46	0.30	0.19
Capacity (veh/h)	489	584	471	512	587	591	671
Control Delay (s)	9.8	8.8	9.7	8.7	13.8	10.0	8.1
Approach Delay (s)	9.2		9.3		13.8	9.2	
Approach LOS	A		A		B	A	

Intersection Summary			
Delay	10.7		
Level of Service	B		
Intersection Capacity Utilization	45.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	208	116	271	6	243	71	328	688	34	19	428	276
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1267	1365	1126	1283	1365	1099	2515	2569		1296	2414	
Flt Permitted	0.49	1.00	1.00	0.68	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	657	1365	1126	913	1365	1099	2515	2569		1296	2414	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	229	127	298	7	267	78	360	756	37	21	470	303
RTOR Reduction (vph)	0	0	195	0	0	51	0	4	0	0	105	0
Lane Group Flow (vph)	229	127	103	7	267	27	360	789	0	21	668	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Effective Green, g (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Actuated g/C Ratio	0.34	0.34	0.34	0.34	0.34	0.34	0.14	0.38		0.12	0.36	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Grp Cap (vph)	226	470	388	314	470	379	352	971		155	864	
v/s Ratio Prot		0.09			0.20		c0.14	c0.31		0.02	c0.28	
v/s Ratio Perm	c0.35		0.09	0.01		0.02						
v/c Ratio	1.01	0.27	0.26	0.02	0.57	0.07	1.02	0.81		0.14	0.77	
Uniform Delay, d1	32.8	23.7	23.6	21.6	26.7	22.0	43.0	27.9		39.4	28.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.78	0.77		1.13	1.19	
Incremental Delay, d2	63.3	1.4	1.7	0.1	4.9	0.4	29.3	1.9		1.7	6.4	
Delay (s)	96.1	25.1	25.3	21.7	31.6	22.4	62.9	23.3		46.0	40.2	
Level of Service	F	C	C	C	C	C	E	C		D	D	
Approach Delay (s)		50.0			29.3			35.6			40.4	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	39.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	117.3%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	129	524	7	6	789	52	26	24	24	48	4	132
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.84	1.00	1.00		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.91	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1224	1621	1578		1479	1351	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.64	1.00		0.72	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1224	1083	1578		1126	1351	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	139	563	8	6	848	56	28	26	26	52	4	142
RTOR Reduction (vph)	0	0	4	0	0	33	0	19	0	0	104	0
Lane Group Flow (vph)	139	563	4	6	848	23	28	33	0	52	42	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	15.0	51.0	51.0	3.0	39.0	39.0	25.0	25.0		25.0	25.0	
Effective Green, g (s)	15.0	51.0	51.0	3.0	39.0	39.0	25.0	25.0		25.0	25.0	
Actuated g/C Ratio	0.16	0.54	0.54	0.03	0.41	0.41	0.27	0.27		0.27	0.27	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	258	925	786	51	707	507	288	419		299	359	
v/s Ratio Prot	c0.09	c0.33		0.00	c0.50			0.02			0.03	
v/s Ratio Perm			0.00			0.02	0.03			c0.05		
v/c Ratio	0.54	0.61	0.01	0.12	1.20	0.05	0.10	0.08		0.17	0.12	
Uniform Delay, d1	36.3	14.7	9.9	44.2	27.5	16.4	26.0	25.9		26.6	26.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.2	3.0	0.0	1.0	103.1	0.0	0.1	0.1		0.3	0.1	
Delay (s)	38.5	17.7	9.9	45.2	130.6	16.4	26.1	25.9		26.8	26.3	
Level of Service	D	B	A	D	F	B	C	C		C	C	
Approach Delay (s)		21.6			123.0			26.0			26.4	
Approach LOS		C			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	70.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	94.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	93.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	140	452	19	23	818	106	49	160	78	130	63	165
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.97	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1048	1540	2928			2979	1072
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.61	1.00			0.64	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1048	988	2928			1958	1072
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	146	471	20	24	852	110	51	167	81	135	66	172
RTOR Reduction (vph)	0	0	6	0	0	21	0	58	0	0	0	146
Lane Group Flow (vph)	146	471	14	24	852	89	51	190	0	0	201	26
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	8.0	70.5	70.5	2.3	63.8	63.8	16.7	16.7			15.7	15.7
Effective Green, g (s)	8.0	70.5	70.5	2.3	63.8	63.8	16.7	16.7			15.7	15.7
Actuated g/C Ratio	0.08	0.69	0.69	0.02	0.62	0.62	0.16	0.16			0.15	0.15
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	94	835	947	34	756	652	160	477			299	164
v/s Ratio Prot	c0.12	0.39		0.02	c0.70			0.06				
v/s Ratio Perm			0.01			0.08	0.05				c0.10	0.02
v/c Ratio	1.55	0.56	0.01	0.71	1.13	0.14	0.32	0.40			1.09dl	0.16
Uniform Delay, d1	47.2	8.2	5.0	49.8	19.4	8.0	37.9	38.4			41.0	37.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	294.4	0.9	0.0	49.8	73.6	0.1	1.2	0.5			5.8	0.5
Delay (s)	341.6	9.0	5.1	99.6	92.9	8.1	39.0	39.0			46.8	38.1
Level of Service	F	A	A	F	F	A	D	D			D	D
Approach Delay (s)		85.1			83.6			39.0			42.8	
Approach LOS		F			F			D			D	

Intersection Summary			
HCM 2000 Control Delay	71.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	102.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	107.0%	ICU Level of Service	G
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	469	84	36	552	443	43	357	34	107	130	38
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.90	1.00	1.00	0.96	1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1337	929		1337	1126	859	1070	957	922	1070	1072	
Flt Permitted	0.09	1.00		0.14	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	125	929		192	1126	859	1070	957	922	1070	1072	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	43	499	89	38	587	471	46	380	36	114	138	40
RTOR Reduction (vph)	0	6	0	0	0	104	0	0	26	0	10	0
Lane Group Flow (vph)	43	582	0	38	587	367	46	380	10	114	168	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	48.1	48.1		48.1	48.1	57.1	10.7	29.2	29.2	9.0	27.5	
Effective Green, g (s)	48.1	48.1		48.1	48.1	57.1	10.7	29.2	29.2	9.0	27.5	
Actuated g/C Ratio	0.44	0.44		0.44	0.44	0.52	0.10	0.27	0.27	0.08	0.25	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	87	409		114	495	488	104	255	246	88	269	
v/s Ratio Prot	0.01	c0.63		0.01	c0.52	0.06	0.04	c0.40		c0.11	0.16	
v/s Ratio Perm	0.20			0.14		0.36			0.01			
v/c Ratio	0.49	1.42		0.33	1.19	0.75	0.44	1.49	0.04	1.30	0.63	
Uniform Delay, d1	25.7	30.6		40.2	30.6	20.5	46.4	40.0	29.6	50.1	36.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	4.4	204.6		1.7	102.6	6.4	3.0	240.3	0.1	194.3	4.5	
Delay (s)	30.0	235.1		41.9	133.1	26.9	49.4	280.3	29.7	244.4	40.8	
Level of Service	C	F		D	F	C	D	F	C	F	D	
Approach Delay (s)		221.1			84.3			237.8			120.3	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	151.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.46		
Actuated Cycle Length (s)	109.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	86.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	97	303	86	75	181	18	55	132	70	19	118	202
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		0.99		1.00	1.00			1.00	0.98		0.98	
Flpb, ped/bikes		1.00		0.99	1.00			1.00	1.00		1.00	
Frt		0.98		1.00	0.99			1.00	0.85		0.92	
Flt Protected		0.99		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)		1720		1695	1769			1771	1493		1621	
Flt Permitted		0.88		0.38	1.00			0.69	1.00		0.98	
Satd. Flow (perm)		1531		671	1769			1237	1493		1585	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	108	337	96	83	201	20	61	147	78	21	131	224
RTOR Reduction (vph)	0	8	0	0	4	0	0	0	56	0	69	0
Lane Group Flow (vph)	0	533	0	83	217	0	0	208	22	0	307	0
Confl. Peds. (#/hr)	13		16	16		13	16		19	19		16
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4		4	8		
Actuated Green, G (s)		32.0		32.0	32.0			21.9	21.9		21.9	
Effective Green, g (s)		32.0		32.0	32.0			21.9	21.9		21.9	
Actuated g/C Ratio		0.41		0.41	0.41			0.28	0.28		0.28	
Clearance Time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		627		274	724			346	418		444	
v/s Ratio Prot					0.12							
v/s Ratio Perm		c0.35		0.12				0.17	0.01		c0.19	
v/c Ratio		0.85		0.30	0.30			0.60	0.05		0.69	
Uniform Delay, d1		20.9		15.5	15.5			24.3	20.5		25.1	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		10.7		0.6	0.2			2.9	0.1		4.6	
Delay (s)		31.6		16.2	15.7			27.3	20.6		29.7	
Level of Service		C		B	B			C	C		C	
Approach Delay (s)		31.6			15.9			25.4			29.7	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	78.1	Sum of lost time (s)	14.0
Intersection Capacity Utilization	88.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	256	429	42	57	346	35	41	760	34	22	396	287
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1300	1300	1300	1300	1300	1300
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1502	3010		1514	3006		1170	2321		1170	2161	
Flt Permitted	0.46	1.00		0.39	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	731	3010		619	3006		1170	2321		1170	2161	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	272	456	45	61	368	37	44	809	36	23	421	305
RTOR Reduction (vph)	0	7	0	0	8	0	0	3	0	0	130	0
Lane Group Flow (vph)	272	494	0	61	397	0	44	842	0	23	596	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	34.7	34.7		34.7	34.7		11.9	34.9		14.9	37.9	
Effective Green, g (s)	34.7	34.7		34.7	34.7		11.9	34.9		14.9	37.9	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.12	0.35		0.15	0.38	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Grp Cap (vph)	253	1044		214	1043		139	810		174	819	
v/s Ratio Prot		0.16			0.13		0.04	c0.36		0.02	c0.28	
v/s Ratio Perm	c0.37			0.10								
v/c Ratio	1.08	0.47		0.29	0.38		0.32	1.04		0.13	0.73	
Uniform Delay, d1	32.6	25.5		23.7	24.6		40.3	32.5		36.9	26.6	
Progression Factor	1.00	1.00		1.00	1.00		0.91	0.80		1.45	0.72	
Incremental Delay, d2	78.0	1.5		3.3	1.1		4.2	37.4		1.1	4.1	
Delay (s)	110.6	27.0		27.0	25.6		41.0	63.5		54.9	23.2	
Level of Service	F	C		C	C		D	E		D	C	
Approach Delay (s)		56.4			25.8			62.4			24.2	
Approach LOS		E			C			E			C	

Intersection Summary			
HCM 2000 Control Delay	44.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	112.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1086	28	2	707	2	38	0	8	13	0	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor		0.95		1.00	0.95			1.00		1.00	1.00	
Frpb, ped/bikes		1.00		1.00	1.00			0.99		1.00	0.96	
Flpb, ped/bikes		1.00		1.00	1.00			0.99		0.98	1.00	
Frt		1.00		1.00	1.00			0.98		1.00	0.85	
Flt Protected		1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)		3404		1704	3419			1653		1682	1477	
Flt Permitted		1.00		0.15	1.00			0.83		0.72	1.00	
Satd. Flow (perm)		3404		266	3419			1421		1283	1477	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1180	30	2	768	2	41	0	9	14	0	14
RTOR Reduction (vph)	0	3	0	0	1	0	0	22	0	0	9	0
Lane Group Flow (vph)	0	1207	0	2	769	0	0	28	0	14	5	0
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		27.0		27.0	27.0			23.0		23.0	23.0	
Effective Green, g (s)		27.0		27.0	27.0			23.0		23.0	23.0	
Actuated g/C Ratio		0.45		0.45	0.45			0.38		0.38	0.38	
Clearance Time (s)		5.0		5.0	5.0			5.0		5.0	5.0	
Lane Grp Cap (vph)		1531		119	1538			544		491	566	
v/s Ratio Prot		c0.35			0.23						0.00	
v/s Ratio Perm				0.01				c0.02		0.01		
v/c Ratio		0.79		0.02	0.50			0.05		0.03	0.01	
Uniform Delay, d1		14.1		9.1	11.7			11.6		11.5	11.4	
Progression Factor		1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2		4.2		0.3	1.2			0.2		0.1	0.0	
Delay (s)		18.3		9.4	12.9			11.8		11.6	11.5	
Level of Service		B		A	B			B		B	B	
Approach Delay (s)		18.3			12.9			11.8			11.6	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	56.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	93	0	0	877	18	467	165	785	0	0	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frpb, ped/bikes		1.00			1.00		1.00	0.98				1.00
Flpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Frt		1.00			1.00		1.00	0.88				0.85
Flt Protected		0.99			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3398			5113		1711	2941				2694
Flt Permitted		0.87			1.00		0.95	1.00				1.00
Satd. Flow (perm)		2980			5113		1711	2941				2694
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	14	97	0	0	914	19	486	172	818	0	0	132
RTOR Reduction (vph)	0	0	0	0	3	0	0	436	0	0	0	126
Lane Group Flow (vph)	0	111	0	0	930	0	486	554	0	0	0	6
Confl. Peds. (#/hr)	20					20	1		10			
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		38.5			29.5		42.0	42.0				4.0
Effective Green, g (s)		38.5			29.5		42.0	42.0				4.0
Actuated g/C Ratio		0.43			0.33		0.47	0.47				0.04
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1293			1675		798	1372				119
v/s Ratio Prot		c0.00			c0.18		c0.28	0.19				0.00
v/s Ratio Perm		0.03										
v/c Ratio		0.09			0.56		0.61	0.40				0.05
Uniform Delay, d1		15.3			24.9		17.9	15.8				41.2
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			1.3		3.4	0.9				0.8
Delay (s)		15.4			26.2		21.3	16.7				42.0
Level of Service		B			C		C	B				D
Approach Delay (s)		15.4			26.2			18.2			42.0	
Approach LOS		B			C			B			D	

Intersection Summary			
HCM 2000 Control Delay	22.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.

4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	106	616	773	698	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.98	0.97	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.89	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1499	1417	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1499	1417	3319	1801		
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	108	629	789	712	0	0
RTOR Reduction (vph)	25	25	0	0	0	0
Lane Group Flow (vph)	353	334	789	712	0	0
Confl. Peds. (#/hr)		4	5			
Confl. Bikes (#/hr)		24				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	31.2	31.2	18.8	60.0		
Effective Green, g (s)	31.2	31.2	18.8	60.0		
Actuated g/C Ratio	0.52	0.52	0.31	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	779	736	1039	1801		
v/s Ratio Prot	0.24		c0.24	c0.40		
v/s Ratio Perm		0.24				
v/c Ratio	0.45	0.45	0.76	0.40		
Uniform Delay, d1	9.0	9.0	18.6	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.4	0.4	3.2	0.1		
Delay (s)	9.5	9.5	21.8	0.1		
Level of Service	A	A	C	A		
Approach Delay (s)	9.5			11.5	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	10.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	218	159	178	8	222	16	199	663	5	25	458	160
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.94		1.00	0.99		1.00	1.00		1.00	0.97	
Flpb, ped/bikes	0.98	1.00		0.94	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.92		1.00	0.99		1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1191	1972		1141	1254		1215	2426		1215	2270	
Flt Permitted	0.34	1.00		0.54	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	431	1972		650	1254		1215	2426		1215	2270	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	227	166	185	8	231	17	207	691	5	26	477	167
RTOR Reduction (vph)	0	117	0	0	3	0	0	1	0	0	37	0
Lane Group Flow (vph)	227	234	0	8	245	0	207	695	0	26	607	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	36.7	36.7		23.1	23.1		16.1	43.2		3.8	30.9	
Effective Green, g (s)	36.7	36.7		23.1	23.1		16.1	43.2		3.8	30.9	
Actuated g/C Ratio	0.37	0.37		0.23	0.23		0.16	0.43		0.04	0.31	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	221	723		150	289		195	1048		46	701	
v/s Ratio Prot	c0.09	0.12			0.20		c0.17	0.29		0.02	c0.27	
v/s Ratio Perm	c0.29			0.01								
v/c Ratio	1.03	0.32		0.05	0.85		1.06	0.66		0.57	0.87	
Uniform Delay, d1	31.0	22.7		29.9	36.8		42.0	22.6		47.3	32.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.86	
Incremental Delay, d2	67.8	0.3		0.1	20.0		81.7	3.3		10.9	10.2	
Delay (s)	98.7	23.0		30.1	56.7		123.6	25.9		58.0	38.2	
Level of Service	F	C		C	E		F	C		E	D	
Approach Delay (s)		52.7			55.9			48.3			39.0	
Approach LOS		D			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	47.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	97.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

EXISTING 2015 PLUS PROJECT – BASKETBALL GAME
NO SF GIANTS GAME AT AT&T PARK
WEEKDAY EVENING

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	808	695	17	392	920	53	44	860	253	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00	0.68			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00			
Frt	1.00	1.00		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	3046		2987	2999			5478	941			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	3046		2987	2999			5478	941			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	878	755	18	426	1000	58	48	935	275	0	0	0
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	195	0	0	0
Lane Group Flow (vph)	878	772	0	426	1057	0	0	983	81	0	0	0
Confl. Peds. (#/hr)			400			400	400		400			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.2	38.7		20.2	40.7			32.2	32.2			
Effective Green, g (s)	18.2	38.7		20.2	40.7			32.2	32.2			
Actuated g/C Ratio	0.17	0.35		0.18	0.37			0.29	0.29			
Clearance Time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	741	1071		548	1109			1603	275			
v/s Ratio Prot	c0.20	0.25		0.14	c0.35							
v/s Ratio Perm								0.18	0.09			
v/c Ratio	1.18	0.72		0.78	0.95			0.61	0.29			
Uniform Delay, d1	45.9	31.0		42.8	33.7			33.5	30.1			
Progression Factor	0.93	0.93		0.77	0.56			1.45	5.41			
Incremental Delay, d2	90.8	2.3		4.6	12.6			0.6	0.5			
Delay (s)	133.6	31.0		37.6	31.7			49.2	163.2			
Level of Service	F	C		D	C			D	F			
Approach Delay (s)		85.5			33.4			74.1			0.0	
Approach LOS		F			C			E			A	

Intersection Summary			
HCM 2000 Control Delay	64.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.9
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	187	1389	24	31	902	31	26	87	80	51	619	458
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00	0.64	1.00	0.91	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.97	1.00	0.70	1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85	1.00	0.97	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1296	3692		1296	2527			1555	858	1077	2613	581
Flt Permitted	0.95	1.00		0.95	1.00			0.60	1.00	0.68	1.00	1.00
Satd. Flow (perm)	1296	3692		1296	2527			937	858	768	2613	581
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	205	1526	26	34	991	34	29	96	88	56	680	503
RTOR Reduction (vph)	0	2	0	0	2	0	0	0	58	0	15	183
Lane Group Flow (vph)	205	1550	0	34	1023	0	0	125	30	56	806	179
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	12.4	49.5		3.4	38.9			37.2	37.2	38.2	38.2	38.2
Effective Green, g (s)	12.4	49.5		3.4	38.9			37.2	37.2	38.2	38.2	38.2
Actuated g/C Ratio	0.11	0.45		0.03	0.35			0.34	0.34	0.35	0.35	0.35
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	146	1661		40	893			316	290	266	907	201
v/s Ratio Prot	c0.16	0.42		0.03	c0.40						c0.31	
v/s Ratio Perm								0.13	0.03	0.07		0.31
v/c Ratio	1.40	0.93		0.85	1.15			0.40	0.10	0.21	0.89	0.89
Uniform Delay, d1	48.8	28.7		53.0	35.5			27.8	25.0	25.3	33.9	33.9
Progression Factor	0.70	1.11		0.67	0.60			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	185.6	1.3		43.3	71.0			0.8	0.2	0.4	10.6	34.3
Delay (s)	219.8	33.1		78.7	92.4			28.6	25.1	25.7	44.5	68.1
Level of Service	F	C		E	F			C	C	C	D	E
Approach Delay (s)		54.9			91.9			27.2			50.5	
Approach LOS		D			F			C			D	

Intersection Summary			
HCM 2000 Control Delay	61.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	118.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1581	199	2	1384	74	19
Ideal Flow (vphpl)	1850	1850	1850	1850	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.98			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2937			2998	1540	1357
Flt Permitted	1.00			0.93	0.95	1.00
Satd. Flow (perm)	2937			2789	1540	1357
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1664	209	2	1457	78	20
RTOR Reduction (vph)	9	0	0	0	0	11
Lane Group Flow (vph)	1864	0	0	1459	78	9
Confl. Peds. (#/hr)		37	37		1	3
Confl. Bikes (#/hr)		1				
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	1658			1574	512	451
v/s Ratio Prot	c0.63				c0.05	
v/s Ratio Perm				0.52		0.01
v/c Ratio	1.12			0.93	0.15	0.02
Uniform Delay, d1	23.9			21.9	25.8	24.7
Progression Factor	1.00			0.79	1.00	1.00
Incremental Delay, d2	64.5			1.3	0.6	0.1
Delay (s)	88.5			18.5	26.4	24.7
Level of Service	F			B	C	C
Approach Delay (s)	88.5			18.5	26.1	
Approach LOS	F			B	C	

Intersection Summary			
HCM 2000 Control Delay	56.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	97.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

4/27/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	122	1129	155	29	278	527	260	393	1151	258
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		3.5			3.0	3.0			3.0	3.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			1.00	1.00
Flpb, ped/bikes		1.00			1.00	1.00			1.00	1.00
Frt		0.98			1.00	0.95			1.00	0.85
Flt Protected		1.00			1.00	1.00			0.95	1.00
Satd. Flow (prot)		5773			2869	2440			4101	1122
Flt Permitted		1.00			0.75	1.00			0.95	1.00
Satd. Flow (perm)		5773			2150	2440			4101	1122
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	139	1283	176	33	316	599	295	447	1308	293
RTOR Reduction (vph)	0	29	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	1569	0	0	349	893	0	0	1784	264
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Prot
Protected Phases		6			4	4		7	7	7
Permitted Phases	6			4						
Actuated Green, G (s)		20.5			22.0	22.0			15.0	15.0
Effective Green, g (s)		22.5			25.0	25.0			18.0	18.0
Actuated g/C Ratio		0.30			0.33	0.33			0.24	0.24
Clearance Time (s)		5.5			6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1731			716	813			984	269
v/s Ratio Prot						c0.37			c0.44	0.24
v/s Ratio Perm		0.27			0.16					
v/c Ratio		0.91			0.49	1.10			1.81	0.98
Uniform Delay, d1		25.2			19.9	25.0			28.5	28.3
Progression Factor		1.00			1.00	1.00			1.00	1.00
Incremental Delay, d2		7.2			0.5	62.1			369.9	49.5
Delay (s)		32.4			20.4	87.1			398.4	77.8
Level of Service		C			C	F			F	E
Approach Delay (s)		32.4			20.4	87.1			357.1	
Approach LOS		C			C	F			F	

Intersection Summary			
HCM 2000 Control Delay	177.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.29		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	103.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

4/27/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	29	481	654	48	278	283	30	212	105	725
Ideal Flow (vphpl)	1000	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)	2.0	4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor	1.00	0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes	1.00	1.00	0.99		0.85		0.98		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00		1.00		1.00	1.00
Frt	1.00	1.00	0.99		0.92		0.85		1.00	1.00
Flt Protected	0.95	0.95	1.00		1.00		1.00		0.95	1.00
Satd. Flow (prot)	810	1313	1911		2182		1161		1327	2556
Flt Permitted	0.95	0.95	1.00		1.00		1.00		0.20	0.95
Satd. Flow (perm)	810	1313	1911		2182		1161		279	2428
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	31	506	688	51	293	298	32	223	111	763
RTOR Reduction (vph)	0	0	9	0	1	0	23	0	0	0
Lane Group Flow (vph)	31	455	781	0	593	0	6	0	314	783
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	8	0	5	0	0	0	0	5
Parking (#/hr)			10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)	18.5	18.5	18.5		16.0		16.0		31.0	31.0
Effective Green, g (s)	21.0	18.5	21.0		17.5		16.0		32.5	32.5
Actuated g/C Ratio	0.27	0.24	0.27		0.23		0.21		0.42	0.42
Clearance Time (s)	4.5	4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)	220	315	521		495		241		287	1045
v/s Ratio Prot	0.04	0.35	c0.41		c0.27				c0.18	0.12
v/s Ratio Perm							0.01		0.28	0.19
v/c Ratio	0.14	1.44	1.50		1.28dr		0.03		1.09	0.75
Uniform Delay, d1	21.2	29.2	28.0		29.8		24.3		26.8	18.8
Progression Factor	1.00	1.00	1.00		1.00		1.00		1.00	1.00
Incremental Delay, d2	1.3	217.1	234.7		107.5		0.2		80.6	4.9
Delay (s)	22.5	246.4	262.7		137.3		24.5		107.4	23.7
Level of Service	C	F	F		F		C		F	C
Approach Delay (s)			251.1		132.0					47.7
Approach LOS			F		F					D

Intersection Summary			
HCM 2000 Control Delay	151.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	89.8%	ICU Level of Service	E
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	756	184	12	2	26	20	811	72	88	294	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.98		1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.91		1.00	0.99		1.00	0.98	
Flt Protected		1.00	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1616	1352		1428		1272	2483		1540	3018	
Flt Permitted		0.99	1.00		0.48		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1599	1352		698		1272	2483		1540	3018	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	38	933	227	15	2	32	25	1001	89	109	363	44
RTOR Reduction (vph)	0	0	74	0	18	0	0	6	0	0	7	0
Lane Group Flow (vph)	0	971	153	0	31	0	25	1084	0	109	400	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		55.1	55.1		55.1		6.1	35.5		15.3	45.0	
Effective Green, g (s)		55.1	55.1		55.1		6.1	35.5		15.3	45.0	
Actuated g/C Ratio		0.45	0.45		0.45		0.05	0.29		0.13	0.37	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		723	611		315		63	723		193	1115	
v/s Ratio Prot							0.02	c0.44		c0.07	0.13	
v/s Ratio Perm		c0.61	0.11		0.05							
v/c Ratio		1.34	0.25		0.10		0.40	1.50		0.56	0.36	
Uniform Delay, d1		33.3	20.6		19.1		56.1	43.1		50.1	27.9	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		163.6	0.2		0.1		4.1	232.1		3.8	0.2	
Delay (s)		196.9	20.8		19.3		60.1	275.3		53.9	28.1	
Level of Service		F	C		B		E	F		D	C	
Approach Delay (s)		163.5			19.3			270.5			33.6	
Approach LOS		F			B			F			C	

Intersection Summary			
HCM 2000 Control Delay	179.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	121.8	Sum of lost time (s)	15.9
Intersection Capacity Utilization	99.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	622	8	4	21	33	13	54	4	345	221	54
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00	0.97	1.00	1.00		1.00	0.95	
Flpb, ped/bikes		1.00			1.00	1.00	0.85	1.00		1.00	1.00	
Frt		1.00			1.00	0.85	1.00	0.99		1.00	0.97	
Flt Protected		1.00			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2596			1439	1198	1169	1430		1377	1339	
Flt Permitted		0.95			0.91	1.00	0.83	1.00		0.95	1.00	
Satd. Flow (perm)		2474			1318	1198	1025	1430		1377	1339	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	9	648	8	4	22	34	14	56	4	359	230	56
RTOR Reduction (vph)	0	1	0	0	0	15	0	4	0	0	13	0
Lane Group Flow (vph)	0	664	0	0	26	19	14	56	0	359	273	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Parking (#/hr)		2										
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		16.8			16.8	24.7	4.8	4.8		7.9	17.7	
Effective Green, g (s)		16.8			16.8	24.7	4.8	4.8		7.9	17.7	
Actuated g/C Ratio		0.38			0.38	0.56	0.11	0.11		0.18	0.40	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		934			497	799	110	154		244	532	
v/s Ratio Prot						0.00		0.04		c0.26	c0.20	
v/s Ratio Perm		c0.27			0.02	0.01	0.01					
v/c Ratio		0.71			0.05	0.02	0.13	0.37		1.47	0.51	
Uniform Delay, d1		11.8			8.8	4.5	18.0	18.4		18.3	10.1	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.6			0.0	0.0	0.5	1.5		233.0	0.8	
Delay (s)		14.4			8.8	4.5	18.5	19.9		251.3	11.0	
Level of Service		B			A	A	B	B		F	B	
Approach Delay (s)		14.4			6.4			19.6			144.8	
Approach LOS		B			A			B			F	

Intersection Summary			
HCM 2000 Control Delay	72.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	44.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	64.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.

4/27/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	53	236	505	19	828	314
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1743	1535	847	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1743	1535	847	1134	1194
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	57	254	543	20	890	338
RTOR Reduction (vph)	0	226	0	6	0	0
Lane Group Flow (vph)	57	28	543	14	890	338
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	10.1	10.1	45.6	40.6	20.0	70.6
Effective Green, g (s)	10.1	10.1	45.6	40.6	20.0	70.6
Actuated g/C Ratio	0.11	0.11	0.50	0.45	0.22	0.78
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	126	194	771	425	250	929
v/s Ratio Prot	c0.05		c0.35	0.01	c0.78	0.28
v/s Ratio Perm		0.02		0.01		
v/c Ratio	0.45	0.15	0.70	0.03	3.56	0.36
Uniform Delay, d1	37.7	36.4	17.4	14.0	35.4	3.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.6	0.3	2.9	0.0	1161.9	0.2
Delay (s)	40.3	36.8	20.3	14.1	1197.3	3.4
Level of Service	D	D	C	B	F	A
Approach Delay (s)	37.4		20.1			868.7
Approach LOS	D		C			F

Intersection Summary			
HCM 2000 Control Delay	518.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.53		
Actuated Cycle Length (s)	90.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	113.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	20	24	234	120	126	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frpb, ped/bikes	0.96		1.00	1.00	0.99	
Flpb, ped/bikes	1.00		0.98	1.00	1.00	
Frt	0.93		1.00	1.00	0.98	
Flt Protected	0.98		0.95	1.00	1.00	
Satd. Flow (prot)	1563		1670	1531	3077	
Flt Permitted	0.98		0.64	1.00	1.00	
Satd. Flow (perm)	1563		1131	1531	3077	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	24	28	275	141	148	24
RTOR Reduction (vph)	26	0	0	0	7	0
Lane Group Flow (vph)	26	0	275	141	165	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	10
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	2.3		27.9	27.9	27.9	
Effective Green, g (s)	2.3		27.9	27.9	27.9	
Actuated g/C Ratio	0.06		0.69	0.69	0.69	
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	89		784	1062	2135	
v/s Ratio Prot	c0.02			0.09	0.05	
v/s Ratio Perm			c0.24			
v/c Ratio	0.29		0.35	0.13	0.08	
Uniform Delay, d1	18.2		2.5	2.1	2.0	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	1.8		0.3	0.1	0.0	
Delay (s)	20.0		2.8	2.1	2.0	
Level of Service	B		A	A	A	
Approach Delay (s)	20.0			2.5	2.0	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	3.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	40.2	Sum of lost time (s)	10.0
Intersection Capacity Utilization	54.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	132	113	863	101	274	403
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.95	0.99		1.00	1.00
Flpb, ped/bikes	0.91	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1558	1457	3338		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1558	1457	3338		1711	3421
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	148	127	970	113	308	453
RTOR Reduction (vph)	0	97	7	0	0	0
Lane Group Flow (vph)	148	30	1076	0	308	453
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	28.7	28.7	58.1		17.9	81.1
Effective Green, g (s)	28.7	28.7	58.1		17.9	81.1
Actuated g/C Ratio	0.24	0.24	0.48		0.15	0.68
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	372	348	1616		255	2312
v/s Ratio Prot			c0.32		c0.18	0.13
v/s Ratio Perm	c0.09	0.02				
v/c Ratio	0.40	0.09	0.67		1.21	0.20
Uniform Delay, d1	38.4	35.5	23.6		51.0	7.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.7	0.1	2.2		124.4	0.0
Delay (s)	39.1	35.6	25.7		175.4	7.3
Level of Service	D	D	C		F	A
Approach Delay (s)	37.5		25.7			75.4
Approach LOS	D		C			E

Intersection Summary			
HCM 2000 Control Delay	45.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	90.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
11: Terry A Francois Blvd./Terry A Francois Blvd & 16th

4/27/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	10	7	12	344	120	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.97		1.00	0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.97	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1518	1341		2880	2969	
Flt Permitted	0.95	1.00		0.94	1.00	
Satd. Flow (perm)	1518	1341		2718	2969	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	12	8	14	405	141	35
RTOR Reduction (vph)	0	8	0	0	26	0
Lane Group Flow (vph)	12	0	0	419	150	0
Confl. Peds. (#/hr)	1	1	25			25
Parking (#/hr)				5		
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	0.6	0.6		12.8	12.8	
Effective Green, g (s)	0.6	0.6		12.8	12.8	
Actuated g/C Ratio	0.01	0.01		0.26	0.26	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	18	16		711	777	
v/s Ratio Prot	c0.01				0.05	
v/s Ratio Perm		0.00		c0.15		
v/c Ratio	0.67	0.01		0.59	0.19	
Uniform Delay, d1	24.1	23.9		15.8	14.0	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	66.1	0.2		1.3	0.1	
Delay (s)	90.1	24.0		17.0	14.2	
Level of Service	F	C		B	B	
Approach Delay (s)	63.7			17.0	14.2	
Approach LOS	E			B	B	

Intersection Summary			
HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	48.9	Sum of lost time (s)	15.0
Intersection Capacity Utilization	31.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
12: Illinois St & 16th

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	138	3	61	23	16	5	86	232	7	5	70	55
Peak Hour Factor	0.92	0.81	0.81	0.81	0.81	0.92	0.81	0.92	0.81	0.92	0.92	0.92
Hourly flow rate (vph)	150	4	75	28	20	5	106	252	9	5	76	60

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	150	79	28	25	367	82	60
Volume Left (vph)	150	0	28	0	106	5	0
Volume Right (vph)	0	75	0	5	9	0	60
Hadj (s)	0.53	-0.63	0.53	-0.12	0.08	0.07	-0.67
Departure Headway (s)	6.5	5.4	6.8	6.2	5.6	5.9	5.1
Degree Utilization, x	0.27	0.12	0.05	0.04	0.57	0.13	0.09
Capacity (veh/h)	517	625	479	527	619	576	655
Control Delay (s)	10.8	7.9	9.0	8.3	15.7	8.6	7.4
Approach Delay (s)	9.8		8.7		15.7	8.1	
Approach LOS	A		A		C	A	

Intersection Summary			
Delay	12.2		
Level of Service	B		
Intersection Capacity Utilization	45.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	256	170	219	2	122	33	209	674	22	10	337	187
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.97	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1258	1365	1126	1285	1365	1099	2515	2577		1296	2430	
Flt Permitted	0.67	1.00	1.00	0.59	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	884	1365	1126	798	1365	1099	2515	2577		1296	2430	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	294	195	252	2	140	38	240	775	25	11	387	215
RTOR Reduction (vph)	0	0	165	0	0	25	0	2	0	0	76	0
Lane Group Flow (vph)	294	195	87	2	140	13	240	798	0	11	526	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Effective Green, g (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Actuated g/C Ratio	0.34	0.34	0.34	0.34	0.34	0.34	0.14	0.38		0.12	0.36	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Grp Cap (vph)	304	470	388	275	470	379	352	974		155	869	
v/s Ratio Prot		0.14			0.10		0.10	c0.31		0.01	c0.22	
v/s Ratio Perm	c0.33		0.08	0.00		0.01						
v/c Ratio	0.97	0.41	0.22	0.01	0.30	0.03	0.68	0.82		0.07	0.61	
Uniform Delay, d1	32.2	25.0	23.2	21.5	23.9	21.7	40.9	28.0		39.1	26.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.87	0.80		1.00	1.00	
Incremental Delay, d2	43.9	2.7	1.3	0.0	1.6	0.2	6.0	4.5		0.9	3.1	
Delay (s)	76.1	27.7	24.6	21.6	25.5	21.9	41.4	26.8		39.9	29.4	
Level of Service	E	C	C	C	C	C	D	C		D	C	
Approach Delay (s)		45.8			24.7			30.2			29.6	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	34.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	116.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	151	585	9	19	457	42	23	14	13	46	10	114
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.84	1.00	1.00		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.91	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1225	1621	1582		1477	1373	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.65	1.00		0.74	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1225	1115	1582		1146	1373	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	176	680	10	22	531	49	27	16	15	53	12	133
RTOR Reduction (vph)	0	0	6	0	0	32	0	10	0	0	90	0
Lane Group Flow (vph)	176	680	4	22	531	17	27	21	0	53	55	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	15.0	41.6	41.6	6.0	32.6	32.6	30.0	30.0		30.0	30.0	
Effective Green, g (s)	15.0	41.6	41.6	6.0	32.6	32.6	30.0	30.0		30.0	30.0	
Actuated g/C Ratio	0.16	0.45	0.45	0.06	0.35	0.35	0.32	0.32		0.32	0.32	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	262	766	651	105	600	431	361	512		371	444	
v/s Ratio Prot	c0.11	c0.40		0.01	0.31			0.01			0.04	
v/s Ratio Perm			0.00			0.01	0.02			c0.05		
v/c Ratio	0.67	0.89	0.01	0.21	0.89	0.04	0.07	0.04		0.14	0.12	
Uniform Delay, d1	36.5	23.4	14.1	41.1	28.2	19.7	21.7	21.4		22.2	22.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.6	14.4	0.0	1.0	14.6	0.0	0.1	0.0		0.2	0.1	
Delay (s)	43.1	37.8	14.1	42.0	42.8	19.8	21.8	21.5		22.4	22.2	
Level of Service	D	D	B	D	D	B	C	C		C	C	
Approach Delay (s)		38.6			40.9			21.6			22.2	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	37.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	92.6	Sum of lost time (s)	15.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St. 4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	79	568	40	64	480	50	31	483	83	94	169	106
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.98	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1045	1540	3012			3025	1072
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.53	1.00			0.55	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1045	864	3012			1678	1072
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	86	617	43	70	522	54	34	525	90	102	184	115
RTOR Reduction (vph)	0	0	19	0	0	26	0	13	0	0	0	86
Lane Group Flow (vph)	86	617	24	70	522	28	34	602	0	0	286	29
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	9.0	58.2	58.2	5.0	53.2	53.2	27.2	27.2			26.2	26.2
Effective Green, g (s)	9.0	58.2	58.2	5.0	53.2	53.2	27.2	27.2			26.2	26.2
Actuated g/C Ratio	0.09	0.56	0.56	0.05	0.51	0.51	0.26	0.26			0.25	0.25
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	105	683	775	74	625	537	227	792			425	271
v/s Ratio Prot	c0.07	c0.51		0.05	0.43			c0.20				
v/s Ratio Perm			0.02			0.03	0.04				0.17	0.03
v/c Ratio	0.82	0.90	0.03	0.95	0.84	0.05	0.15	0.76			1.16dl	0.11
Uniform Delay, d1	46.4	20.1	10.1	49.1	21.4	12.5	29.2	35.1			34.7	29.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	37.1	15.3	0.0	85.3	9.4	0.0	0.3	4.2			4.2	0.2
Delay (s)	83.5	35.4	10.1	134.4	30.8	12.6	29.5	39.3			38.9	29.8
Level of Service	F	D	B	F	C	B	C	D			D	C
Approach Delay (s)		39.5			40.5			38.8			36.3	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	39.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	103.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	89.0%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St. 4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	516	77	38	350	229	69	230	17	155	109	36
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.90		1.00	*0.80	*0.80	*0.80	*0.90	*0.80	*0.80	*0.90	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.91	1.00	1.00	0.96	1.00	0.98	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1329	1050		1337	1126	866	1070	1077	916	1070	1197	
Flt Permitted	0.30	1.00		0.20	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	419	1050		288	1126	866	1070	1077	916	1070	1197	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	561	84	41	380	249	75	250	18	168	118	39
RTOR Reduction (vph)	0	5	0	0	0	100	0	0	14	0	12	0
Lane Group Flow (vph)	25	640	0	41	380	149	75	250	4	168	145	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	53.1	53.1		53.1	53.1	65.1	15.0	21.1	21.1	12.0	18.1	
Effective Green, g (s)	53.1	53.1		53.1	53.1	65.1	15.0	21.1	21.1	12.0	18.1	
Actuated g/C Ratio	0.49	0.49		0.49	0.49	0.60	0.14	0.19	0.19	0.11	0.17	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	224	513		163	551	559	147	209	178	118	199	
v/s Ratio Prot	0.00	c0.61		0.01	c0.34	0.03	0.07	c0.23		c0.16	0.12	
v/s Ratio Perm	0.05			0.12		0.14			0.00			
v/c Ratio	0.11	1.25		0.25	0.69	0.27	0.51	1.20	0.02	1.42	0.73	
Uniform Delay, d1	16.3	27.7		31.7	21.3	10.3	43.3	43.7	35.3	48.2	42.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	127.2		0.8	3.6	0.3	3.0	125.3	0.0	232.7	12.9	
Delay (s)	16.5	154.9		32.5	24.9	10.6	46.3	169.0	35.4	280.9	55.8	
Level of Service	B	F		C	C	B	D	F	D	F	E	
Approach Delay (s)		149.8			20.1			135.1			172.2	
Approach LOS		F			C			F			F	

Intersection Summary			
HCM 2000 Control Delay	107.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	108.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	79.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	244	319	59	47	105	6	39	74	53	8	29	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		1.00		1.00	1.00			1.00	0.98		0.98	
Flpb, ped/bikes		0.99		0.99	1.00			1.00	1.00		1.00	
Frt		0.99		1.00	0.99			1.00	0.85		0.90	
Flt Protected		0.98		0.95	1.00			0.98	1.00		1.00	
Satd. Flow (prot)		1467		1699	1781			1763	1497		1351	
Flt Permitted		0.82		0.42	1.00			0.86	1.00		0.98	
Satd. Flow (perm)		1224		746	1781			1534	1497		1329	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	268	351	65	52	115	7	43	81	58	9	32	105
RTOR Reduction (vph)	0	3	0	0	2	0	0	0	44	0	79	0
Lane Group Flow (vph)	0	681	0	52	120	0	0	124	14	0	67	0
Confl. Peds. (#/hr)	13		16	16		13	16		19	19		16
Parking (#/hr)		10	10								10	10
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4		4	8		
Actuated Green, G (s)		35.4		35.4	35.4			15.1	15.1		15.1	
Effective Green, g (s)		35.4		35.4	35.4			15.1	15.1		15.1	
Actuated g/C Ratio		0.59		0.59	0.59			0.25	0.25		0.25	
Clearance Time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		716		436	1042			382	373		331	
v/s Ratio Prot					0.07							
v/s Ratio Perm		c0.56		0.07				c0.08	0.01		0.05	
v/c Ratio		0.95		0.12	0.12			0.32	0.04		0.20	
Uniform Delay, d1		11.7		5.6	5.6			18.5	17.2		17.9	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		22.3		0.1	0.0			0.5	0.0		0.3	
Delay (s)		34.0		5.7	5.6			19.0	17.2		18.2	
Level of Service		C		A	A			B	B		B	
Approach Delay (s)		34.0			5.7			18.5			18.2	
Approach LOS		C			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	25.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	60.5	Sum of lost time (s)	10.0
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	308	555	48	18	210	11	35	588	44	25	362	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.99		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1669	3371		1698	3388		1260	2487		1260	2373	
Flt Permitted	0.60	1.00		0.24	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1049	3371		427	3388		1260	2487		1260	2373	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	342	617	53	20	233	12	39	653	49	28	402	190
RTOR Reduction (vph)	0	6	0	0	4	0	0	5	0	0	56	0
Lane Group Flow (vph)	342	664	0	20	241	0	39	697	0	28	536	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	29.7	29.7		29.7	29.7		16.9	39.9		14.9	37.9	
Effective Green, g (s)	29.7	29.7		29.7	29.7		16.9	39.9		14.9	37.9	
Actuated g/C Ratio	0.30	0.30		0.30	0.30		0.17	0.40		0.15	0.38	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Grp Cap (vph)	311	1001		126	1006		212	992		187	899	
v/s Ratio Prot		0.20			0.07		0.03	c0.28		0.02	c0.23	
v/s Ratio Perm	c0.33			0.05								
v/c Ratio	1.10	0.66		0.16	0.24		0.18	0.70		0.15	0.60	
Uniform Delay, d1	35.1	30.8		25.9	26.6		35.6	25.1		37.0	24.9	
Progression Factor	1.00	1.00		1.00	1.00		0.84	0.73		1.50	0.63	
Incremental Delay, d2	80.5	3.5		2.7	0.6		1.2	2.7		1.4	2.4	
Delay (s)	115.6	34.2		28.6	27.2		31.2	21.0		56.8	18.1	
Level of Service	F	C		C	C		C	C		E	B	
Approach Delay (s)		61.7			27.3			21.6			19.8	
Approach LOS		E			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	37.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	102.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	801	55	6	440	9	36	0	5	17	1	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00			0.98		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3388		1711	3411			1698		1711	1541	
Flt Permitted	0.47	1.00		0.22	1.00			0.81		0.73	1.00	
Satd. Flow (perm)	838	3388		402	3411			1441		1312	1541	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	871	60	7	478	10	39	0	5	18	1	24
RTOR Reduction (vph)	0	8	0	0	2	0	0	22	0	0	15	0
Lane Group Flow (vph)	22	923	0	7	486	0	0	22	0	18	10	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	27.0	27.0		27.0	27.0			23.0		23.0	23.0	
Effective Green, g (s)	27.0	27.0		27.0	27.0			23.0		23.0	23.0	
Actuated g/C Ratio	0.45	0.45		0.45	0.45			0.38		0.38	0.38	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Grp Cap (vph)	377	1524		180	1534			552		502	590	
v/s Ratio Prot		c0.27			0.14						0.01	
v/s Ratio Perm	0.03			0.02				c0.02		0.01		
v/c Ratio	0.06	0.61		0.04	0.32			0.04		0.04	0.02	
Uniform Delay, d1	9.3	12.5		9.2	10.6			11.6		11.6	11.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.3	1.8		0.4	0.5			0.1		0.1	0.1	
Delay (s)	9.6	14.3		9.6	11.1			11.7		11.7	11.5	
Level of Service	A	B		A	B			B		B	B	
Approach Delay (s)		14.2			11.1			11.7			11.6	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	41.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	92	0	0	527	32	308	594	686	0	0	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frt		1.00			0.99		1.00	0.92				0.85
Flt Protected		0.99			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3391			5088		1711	3146				2694
Flt Permitted		0.86			1.00		0.95	1.00				1.00
Satd. Flow (perm)		2943			5088		1711	3146				2694
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	23	107	0	0	613	37	358	691	798	0	0	86
RTOR Reduction (vph)	0	0	0	0	8	0	0	245	0	0	0	80
Lane Group Flow (vph)	0	130	0	0	642	0	358	1244	0	0	0	6
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		40.5			29.5		35.0	35.0				6.0
Effective Green, g (s)		40.5			29.5		35.0	35.0				6.0
Actuated g/C Ratio		0.48			0.35		0.41	0.41				0.07
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1433			1765		704	1295				190
v/s Ratio Prot		c0.01			c0.13		0.21	c0.40				0.00
v/s Ratio Perm		0.04										
v/c Ratio		0.09			0.36		0.51	0.96				0.03
Uniform Delay, d1		12.2			20.7		18.6	24.3				36.8
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			0.6		2.6	17.2				0.3
Delay (s)		12.3			21.3		21.2	41.6				37.1
Level of Service		B			C		C	D				D
Approach Delay (s)		12.3			21.3			37.6			37.1	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	32.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	112	444	447	461	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.91	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1537	1427	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1537	1427	3319	1801		
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	133	529	532	549	0	0
RTOR Reduction (vph)	61	61	0	0	0	0
Lane Group Flow (vph)	278	262	532	549	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	35.0	35.0	15.0	60.0		
Effective Green, g (s)	35.0	35.0	15.0	60.0		
Actuated g/C Ratio	0.58	0.58	0.25	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	896	832	829	1801		
v/s Ratio Prot	0.18		c0.16	c0.30		
v/s Ratio Perm		0.18				
v/c Ratio	0.31	0.31	0.64	0.30		
Uniform Delay, d1	6.4	6.4	20.1	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.2	0.2	1.7	0.1		
Delay (s)	6.6	6.6	21.8	0.1		
Level of Service	A	A	C	A		
Approach Delay (s)	6.6			10.8	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	9.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	214	121	165	6	127	10	122	454	13	17	336	143
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.93		1.00	0.99		1.00	1.00		1.00	0.97	
Flpb, ped/bikes	0.97	1.00		0.94	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.99		1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1175	1943		1137	1253		1215	2414		1215	2246	
Flt Permitted	0.43	1.00		0.56	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	538	1943		670	1253		1215	2414		1215	2246	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	238	134	183	7	141	11	136	504	14	19	373	159
RTOR Reduction (vph)	0	119	0	0	3	0	0	2	0	0	48	0
Lane Group Flow (vph)	238	198	0	7	149	0	136	516	0	19	484	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	35.0	35.0		17.1	17.1		16.4	43.3		5.4	32.3	
Effective Green, g (s)	35.0	35.0		17.1	17.1		16.4	43.3		5.4	32.3	
Actuated g/C Ratio	0.35	0.35		0.17	0.17		0.16	0.43		0.05	0.32	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	268	680		114	214		199	1045		65	725	
v/s Ratio Prot	c0.11	0.10			0.12		c0.11	0.21		0.02	c0.22	
v/s Ratio Perm	c0.20			0.01								
v/c Ratio	0.89	0.29		0.06	0.69		0.68	0.49		0.29	0.67	
Uniform Delay, d1	28.8	23.5		34.7	39.0		39.4	20.4		45.5	29.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.08	1.00	
Incremental Delay, d2	27.8	0.2		0.2	9.4		9.3	1.7		1.8	3.5	
Delay (s)	56.5	23.8		35.0	48.4		48.7	22.1		50.7	32.7	
Level of Service	E	C		C	D		D	C		D	C	
Approach Delay (s)		37.8			47.8			27.6			33.4	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	33.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	91.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

EXISTING 2015 PLUS PROJECT – BASKETBALL GAME WITH SF GIANTS GAME AT AT&T PARK WEEKDAY EVENING

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	618	425	167	546	481	52	26	538	88	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.91		1.00	0.97			1.00	0.68			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	0.96		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	2683		2987	2938			5482	938			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	2683		2987	2938			5482	938			
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	702	483	190	620	547	59	30	611	100	0	0	0
RTOR Reduction (vph)	0	38	0	0	2	0	0	0	81	0	0	0
Lane Group Flow (vph)	702	635	0	620	604	0	0	641	19	0	0	0
Confl. Peds. (#/hr)			400			400	400		400			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	28.2	38.7		31.5	42.0			20.9	20.9			
Effective Green, g (s)	28.2	38.7		31.5	42.0			20.9	20.9			
Actuated g/C Ratio	0.26	0.35		0.29	0.38			0.19	0.19			
Clearance Time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	1148	943		855	1121			1041	178			
v/s Ratio Prot	0.16	c0.24		c0.21	0.21							
v/s Ratio Perm								0.12	0.02			
v/c Ratio	0.61	0.67		0.73	0.54			0.62	0.11			
Uniform Delay, d1	36.1	30.3		35.4	26.5			40.9	36.8			
Progression Factor	1.00	1.00		0.70	0.32			1.14	10.34			
Incremental Delay, d2	1.0	3.8		1.4	0.2			1.0	0.2			
Delay (s)	37.0	34.1		26.2	8.7			47.7	381.2			
Level of Service	D	C		C	A			D	F			
Approach Delay (s)		35.6			17.5			92.7			0.0	
Approach LOS		D			B			F			A	

Intersection Summary			
HCM 2000 Control Delay	41.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.9
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	126	1004	22	33	431	43	10	140	76	131	936	357
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.94			1.00	0.65	1.00	0.98	0.51
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00	0.73	1.00	1.00
Frt	1.00	1.00		1.00	0.99			1.00	0.85	1.00	0.99	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	4374		1296	2407			1606	879	1119	2880	627
Flt Permitted	0.95	1.00		0.95	1.00			0.91	1.00	0.66	1.00	1.00
Satd. Flow (perm)	1540	4374		1296	2407			1462	879	772	2880	627
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	134	1068	23	35	459	46	11	149	81	139	996	380
RTOR Reduction (vph)	0	2	0	0	6	0	0	0	47	0	2	91
Lane Group Flow (vph)	134	1089	0	35	499	0	0	160	34	139	1032	251
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	13.4	41.6		7.5	34.1			51.0	51.0	52.0	52.0	52.0
Effective Green, g (s)	13.4	41.6		7.5	34.1			51.0	51.0	52.0	52.0	52.0
Actuated g/C Ratio	0.11	0.35		0.06	0.28			0.42	0.42	0.43	0.43	0.43
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	171	1516		81	683			621	373	334	1248	271
v/s Ratio Prot	0.09	c0.25		0.03	c0.21						0.36	
v/s Ratio Perm								0.11	0.04	0.18		c0.40
v/c Ratio	0.78	0.72		0.43	0.73			0.26	0.09	0.42	0.83	0.93
Uniform Delay, d1	51.9	34.1		54.2	38.8			22.3	20.6	23.5	30.0	32.2
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	20.5	3.0		3.7	3.9			0.2	0.1	0.8	4.6	35.1
Delay (s)	72.4	37.1		57.9	42.7			22.5	20.8	24.3	34.6	67.3
Level of Service	E	D		E	D			C	C	C	C	E
Approach Delay (s)		40.9			43.7			21.9			41.1	
Approach LOS		D			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	40.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	140.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1130	131	2	796	87	22
Ideal Flow (vphpl)	1200	1200	1200	1200	1200	1200
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.98			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	1908			1944	972	857
Flt Permitted	1.00			0.95	0.95	1.00
Satd. Flow (perm)	1908			1853	972	857
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	1165	135	2	821	90	23
RTOR Reduction (vph)	8	0	0	0	0	15
Lane Group Flow (vph)	1292	0	0	823	90	8
Confl. Peds. (#/hr)		37	37		1	3
Confl. Bikes (#/hr)		1				
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	1077			1046	323	285
v/s Ratio Prot	c0.68				c0.09	
v/s Ratio Perm				0.44		0.01
v/c Ratio	1.20			0.79	0.28	0.03
Uniform Delay, d1	23.9			18.8	27.0	24.7
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	99.0			6.0	2.1	0.2
Delay (s)	123.0			24.7	29.1	24.9
Level of Service	F			C	C	C
Approach Delay (s)	123.0			24.7	28.3	
Approach LOS	F			C	C	

Intersection Summary			
HCM 2000 Control Delay	82.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	102.5%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

4/22/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	114	935	103	43	245	586	279	505	1154	218
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		3.5			3.0	3.0			3.0	3.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			1.00	1.00
Flpb, ped/bikes		0.99			1.00	1.00			1.00	1.00
Frt		0.99			1.00	0.95			1.00	0.85
Flt Protected		1.00			0.99	1.00			0.95	1.00
Satd. Flow (prot)		5800			2858	2445			4105	1122
Flt Permitted		1.00			0.68	1.00			0.95	1.00
Satd. Flow (perm)		5800			1962	2445			4105	1122
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	119	974	107	45	255	610	291	526	1202	227
RTOR Reduction (vph)	0	24	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	1176	0	0	300	899	0	0	1751	204
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Prot
Protected Phases		6			4	4		7	7	7
Permitted Phases	6			4						
Actuated Green, G (s)		20.0			22.0	22.0			15.5	15.5
Effective Green, g (s)		22.0			25.0	25.0			18.5	18.5
Actuated g/C Ratio		0.29			0.33	0.33			0.25	0.25
Clearance Time (s)		5.5			6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1701			654	815			1012	276
v/s Ratio Prot						c0.37			c0.43	0.18
v/s Ratio Perm		0.20			0.15					
v/c Ratio		0.69			0.46	1.10			1.73	0.74
Uniform Delay, d1		23.5			19.7	25.0			28.2	26.0
Progression Factor		1.00			1.00	1.00			1.00	1.00
Incremental Delay, d2		1.2			0.5	63.6			332.8	9.9
Delay (s)		24.7			20.2	88.6			361.0	35.9
Level of Service		C			C	F			F	D
Approach Delay (s)		24.7			20.2	88.6			327.1	
Approach LOS		C			C	F			F	

Intersection Summary			
HCM 2000 Control Delay	173.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	112.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

4/22/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	39	445	673	91	249	240	54	174	124	907
Ideal Flow (vphpl)	1000	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)	2.0	4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor	1.00	0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes	1.00	1.00	0.99		0.86		0.98		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00		1.00		1.00	1.00
Frt	1.00	1.00	0.98		0.93		0.85		1.00	1.00
Flt Protected	0.95	0.95	1.00		1.00		1.00		0.95	1.00
Satd. Flow (prot)	810	1313	1889		2193		1161		1327	2557
Flt Permitted	0.95	0.95	1.00		1.00		1.00		0.23	0.95
Satd. Flow (perm)	810	1313	1889		2193		1161		326	2441
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	43	489	740	100	274	264	59	191	136	997
RTOR Reduction (vph)	0	0	17	0	1	0	42	0	0	0
Lane Group Flow (vph)	43	440	872	0	543	0	11	0	313	1011
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	8	0	5	0	0	0	0	5
Parking (#/hr)			10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)	18.5	18.5	18.5		16.0		16.0		31.0	31.0
Effective Green, g (s)	21.0	18.5	21.0		17.5		16.0		32.5	32.5
Actuated g/C Ratio	0.27	0.24	0.27		0.23		0.21		0.42	0.42
Clearance Time (s)	4.5	4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)	220	315	515		498		241		300	1049
v/s Ratio Prot	0.05	0.34	c0.46		c0.25				0.17	c0.16
v/s Ratio Perm							0.01		0.27	0.25
v/c Ratio	0.20	1.40	1.69		1.14dr		0.05		1.04	0.96
Uniform Delay, d1	21.5	29.2	28.0		29.8		24.4		26.1	21.7
Progression Factor	1.00	1.00	1.00		1.00		1.00		1.00	1.00
Incremental Delay, d2	2.0	196.8	319.9		67.3		0.4		63.7	20.3
Delay (s)	23.5	226.1	347.9		97.0		24.8		89.8	42.0
Level of Service	C	F	F		F		C		F	D
Approach Delay (s)			298.6		90.6					53.3
Approach LOS			F		F					D

Intersection Summary			
HCM 2000 Control Delay	162.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	92.0%	ICU Level of Service	F
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	36	137	151	1	2	1	71	495	162	204	321	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1700	1700	1700	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.99		1.00	0.97		1.00	0.99	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.97		1.00	0.96		1.00	0.96	
Flt Protected		0.99	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1599	1352		1535		1377	2568		1540	2943	
Flt Permitted		0.94	1.00		0.97		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1524	1352		1500		1377	2568		1540	2943	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	39	147	162	1	2	1	76	532	174	219	345	113
RTOR Reduction (vph)	0	0	113	0	1	0	0	26	0	0	28	0
Lane Group Flow (vph)	0	186	49	0	3	0	76	680	0	219	430	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		32.2	32.2		32.2		11.7	36.7		22.1	47.4	
Effective Green, g (s)		32.2	32.2		32.2		11.7	36.7		22.1	47.4	
Actuated g/C Ratio		0.30	0.30		0.30		0.11	0.34		0.21	0.44	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		459	407		451		150	881		318	1304	
v/s Ratio Prot							0.06	c0.26		c0.14	0.15	
v/s Ratio Perm		c0.12	0.04		0.00							
v/c Ratio		0.41	0.12		0.01		0.51	0.77		0.69	0.33	
Uniform Delay, d1		29.7	27.1		26.2		44.9	31.4		39.2	19.4	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.6	0.1		0.0		2.7	4.2		6.1	0.1	
Delay (s)		30.3	27.2		26.2		47.6	35.6		45.3	19.5	
Level of Service		C	C		C		D	D		D	B	
Approach Delay (s)		28.9			26.2			36.8			27.9	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	31.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	106.9	Sum of lost time (s)	15.9
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	21	13	7	78	93	21	106	16	287	273	169
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00	0.99	1.00	0.99		1.00	0.90	
Flpb, ped/bikes		0.99			1.00	1.00	0.87	1.00		1.00	1.00	
Frt		0.96			1.00	0.85	1.00	0.98		1.00	0.94	
Flt Protected		0.99			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2431			1443	1218	1201	1412		1377	1225	
Flt Permitted		0.86			0.97	1.00	0.50	1.00		0.95	1.00	
Satd. Flow (perm)		2129			1401	1218	632	1412		1377	1225	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	13	23	14	8	86	102	23	116	18	315	300	186
RTOR Reduction (vph)	0	12	0	0	0	47	0	9	0	0	26	0
Lane Group Flow (vph)	0	38	0	0	94	55	23	125	0	315	460	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Parking (#/hr)		2										
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		7.1			7.1	26.5	8.0	8.0		19.4	32.4	
Effective Green, g (s)		7.1			7.1	26.5	8.0	8.0		19.4	32.4	
Actuated g/C Ratio		0.14			0.14	0.54	0.16	0.16		0.39	0.65	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		305			200	775	102	228		539	801	
v/s Ratio Prot						0.03		0.09		0.23	c0.38	
v/s Ratio Perm		0.02			c0.07	0.02	0.04					
v/c Ratio		0.12			0.47	0.07	0.23	0.55		0.58	0.57	
Uniform Delay, d1		18.5			19.5	5.6	18.1	19.1		11.9	4.7	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.2			1.7	0.0	1.1	2.7		1.6	1.0	
Delay (s)		18.7			21.2	5.6	19.2	21.8		13.5	5.7	
Level of Service		B			C	A	B	C		B	A	
Approach Delay (s)		18.7			13.1			21.4			8.8	
Approach LOS		B			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	49.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.

4/22/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	42	244	522	28	791	321
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1743	1535	846	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1743	1535	846	1134	1194
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	54	313	669	36	1014	412
RTOR Reduction (vph)	0	279	0	8	0	0
Lane Group Flow (vph)	54	34	669	28	1014	412
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	10.0	10.0	47.1	42.1	20.0	72.1
Effective Green, g (s)	10.0	10.0	47.1	42.1	20.0	72.1
Actuated g/C Ratio	0.11	0.11	0.51	0.46	0.22	0.78
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	123	189	785	432	246	934
v/s Ratio Prot	c0.05		c0.44	0.01	c0.89	0.35
v/s Ratio Perm		0.02		0.02		
v/c Ratio	0.44	0.18	0.85	0.06	4.12	0.44
Uniform Delay, d1	38.4	37.3	19.5	14.0	36.0	3.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.5	0.5	8.9	0.1	1414.5	0.3
Delay (s)	40.9	37.8	28.4	14.0	1450.5	3.7
Level of Service	D	D	C	B	F	A
Approach Delay (s)	38.2		27.6			1032.5
Approach LOS	D		C			F

Intersection Summary			
HCM 2000 Control Delay	602.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.76		
Actuated Cycle Length (s)	92.1	Sum of lost time (s)	20.0
Intersection Capacity Utilization	110.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	37	33	261	297	112	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frpb, ped/bikes	0.97		1.00	1.00	0.99	
Flpb, ped/bikes	1.00		0.97	1.00	1.00	
Frt	0.94		1.00	1.00	0.96	
Flt Protected	0.97		0.95	1.00	1.00	
Satd. Flow (prot)	1591		1667	1531	2988	
Flt Permitted	0.97		0.64	1.00	1.00	
Satd. Flow (perm)	1591		1116	1531	2988	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	44	39	311	354	133	51
RTOR Reduction (vph)	35	0	0	0	16	0
Lane Group Flow (vph)	48	0	311	354	168	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	10
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	4.1		30.1	30.1	30.1	
Effective Green, g (s)	4.1		30.1	30.1	30.1	
Actuated g/C Ratio	0.09		0.68	0.68	0.68	
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	147		759	1042	2034	
v/s Ratio Prot	c0.03			0.23	0.06	
v/s Ratio Perm			c0.28			
v/c Ratio	0.32		0.41	0.34	0.08	
Uniform Delay, d1	18.8		3.1	2.9	2.4	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	1.3		0.4	0.2	0.0	
Delay (s)	20.0		3.5	3.1	2.4	
Level of Service	C		A	A	A	
Approach Delay (s)	20.0			3.3	2.4	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	4.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	44.2	Sum of lost time (s)	10.0
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	123	124	801	151	309	394
Ideal Flow (vphpl)	1200	1200	1200	1200	1200	1200
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.95	0.99		1.00	1.00
Flpb, ped/bikes	0.91	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	984	920	2085		1080	2161
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	984	920	2085		1080	2161
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	137	138	890	168	343	438
RTOR Reduction (vph)	0	105	13	0	0	0
Lane Group Flow (vph)	137	33	1045	0	343	438
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	28.7	28.7	61.1		14.9	81.1
Effective Green, g (s)	28.7	28.7	61.1		14.9	81.1
Actuated g/C Ratio	0.24	0.24	0.51		0.12	0.68
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	235	220	1061		134	1460
v/s Ratio Prot			c0.50		c0.32	0.20
v/s Ratio Perm	c0.14	0.04				
v/c Ratio	0.58	0.15	0.99		2.56	0.30
Uniform Delay, d1	40.4	36.0	29.0		52.5	7.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.7	0.3	24.3		723.3	0.1
Delay (s)	44.0	36.3	53.3		775.8	8.0
Level of Service	D	D	D		F	A
Approach Delay (s)	40.2		53.3			345.2
Approach LOS	D		D			F

Intersection Summary			
HCM 2000 Control Delay	159.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	114.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

11: Terry A Francois Blvd./Terry A Francois Blvd & 16th

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	10	7	12	548	115	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.97	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1540	1345		2883	2964	
Flt Permitted	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1540	1345		2735	2964	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	12	8	14	645	135	35
RTOR Reduction (vph)	0	8	0	0	24	0
Lane Group Flow (vph)	12	0	0	659	146	0
Confl. Peds. (#/hr)	1	1	25			25
Parking (#/hr)				5		
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	1.4	1.4		17.0	17.0	
Effective Green, g (s)	1.4	1.4		17.0	17.0	
Actuated g/C Ratio	0.03	0.03		0.32	0.32	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	40	34		862	934	
v/s Ratio Prot	c0.01				0.05	
v/s Ratio Perm		0.00		c0.24		
v/c Ratio	0.30	0.01		0.76	0.16	
Uniform Delay, d1	25.8	25.6		16.6	13.3	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.2	0.1		4.1	0.1	
Delay (s)	30.0	25.6		20.7	13.4	
Level of Service	C	C		C	B	
Approach Delay (s)	28.2			20.7	13.4	
Approach LOS	C			C	B	

Intersection Summary			
HCM 2000 Control Delay	19.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	53.9	Sum of lost time (s)	15.0
Intersection Capacity Utilization	38.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

12: Illinois St & 16th

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	150	9	70	22	18	5	108	251	8	5	70	55
Peak Hour Factor	0.92	0.77	0.77	0.77	0.77	0.92	0.77	0.92	0.77	0.92	0.92	0.92
Hourly flow rate (vph)	163	12	91	29	23	5	140	273	10	5	76	60

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	163	103	29	29	423	82	60
Volume Left (vph)	163	0	29	0	140	5	0
Volume Right (vph)	0	91	0	5	10	0	60
Hadj (s)	0.53	-0.59	0.53	-0.10	0.09	0.07	-0.67
Departure Headway (s)	6.8	5.6	7.1	6.5	5.7	6.1	5.4
Degree Utilization, x	0.31	0.16	0.06	0.05	0.67	0.14	0.09
Capacity (veh/h)	501	596	455	496	610	551	621
Control Delay (s)	11.5	8.5	9.4	8.7	19.7	8.9	7.7
Approach Delay (s)	10.4		9.0		19.7	8.4	
Approach LOS	B		A		C	A	

Intersection Summary			
Delay	14.4		
Level of Service	B		
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰↰	↑↱		↰	↑↱	
Volume (vph)	238	177	260	4	137	40	199	675	41	11	308	197
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.97	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1258	1365	1126	1285	1365	1099	2515	2564		1296	2415	
Flt Permitted	0.67	1.00	1.00	0.61	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	884	1365	1126	824	1365	1099	2515	2564		1296	2415	
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	243	181	265	4	140	41	203	689	42	11	314	201
RTOR Reduction (vph)	0	0	174	0	0	27	0	4	0	0	103	0
Lane Group Flow (vph)	243	181	91	4	140	14	203	727	0	11	412	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Effective Green, g (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Actuated g/C Ratio	0.34	0.34	0.34	0.34	0.34	0.34	0.14	0.38		0.12	0.36	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Grp Cap (vph)	304	470	388	284	470	379	352	969		155	864	
v/s Ratio Prot		0.13			0.10		0.08	c0.28		0.01	c0.17	
v/s Ratio Perm	c0.27		0.08	0.00		0.01						
v/c Ratio	0.80	0.39	0.24	0.01	0.30	0.04	0.58	0.75		0.07	0.48	
Uniform Delay, d1	29.6	24.7	23.3	21.6	23.9	21.7	40.2	27.0		39.1	24.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.87	0.77		1.00	1.00	
Incremental Delay, d2	19.4	2.4	1.4	0.1	1.6	0.2	3.7	3.0		0.9	1.9	
Delay (s)	49.0	27.1	24.8	21.6	25.5	21.9	38.8	23.7		39.9	26.7	
Level of Service	D	C	C	C	C	C	D	C		D	C	
Approach Delay (s)		33.9			24.6			27.0			27.0	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	28.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	116.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↱		↰	↱	
Volume (vph)	172	606	10	17	466	50	20	13	27	41	11	117
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1237	1621	1531		1487	1375	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.67	1.00		0.73	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1237	1138	1531		1143	1375	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	177	625	10	18	480	52	21	13	28	42	11	121
RTOR Reduction (vph)	0	0	5	0	0	31	0	21	0	0	91	0
Lane Group Flow (vph)	177	625	5	18	480	21	21	20	0	42	41	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	15.7	47.6	47.6	2.7	34.6	34.6	22.0	22.0		22.0	22.0	
Effective Green, g (s)	15.7	47.6	47.6	2.7	34.6	34.6	22.0	22.0		22.0	22.0	
Actuated g/C Ratio	0.18	0.55	0.55	0.03	0.40	0.40	0.25	0.25		0.25	0.25	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	291	930	790	50	676	490	286	385		288	346	
v/s Ratio Prot	c0.11	c0.37		0.01	0.28			0.01			0.03	
v/s Ratio Perm			0.00			0.02	0.02			c0.04		
v/c Ratio	0.61	0.67	0.01	0.36	0.71	0.04	0.07	0.05		0.15	0.12	
Uniform Delay, d1	33.0	14.2	9.1	41.5	22.1	16.2	24.9	24.7		25.4	25.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.6	3.9	0.0	4.4	3.5	0.0	0.1	0.1		0.2	0.2	
Delay (s)	36.5	18.1	9.1	45.8	25.7	16.2	25.0	24.8		25.6	25.3	
Level of Service	D	B	A	D	C	B	C	C		C	C	
Approach Delay (s)		22.0			25.4			24.9			25.4	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	87.3	Sum of lost time (s)	15.0
Intersection Capacity Utilization	83.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	119	605	52	78	464	62	31	381	83	100	236	116
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.99	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1045	1540	2997			3034	1072
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.45	1.00			0.59	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1045	722	2997			1816	1072
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	135	688	59	89	527	70	35	433	94	114	268	132
RTOR Reduction (vph)	0	0	26	0	0	29	0	19	0	0	0	98
Lane Group Flow (vph)	135	688	33	89	527	41	35	508	0	0	382	34
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	10.0	50.2	50.2	7.0	46.2	46.2	25.9	25.9			24.9	24.9
Effective Green, g (s)	10.0	50.2	50.2	7.0	46.2	46.2	25.9	25.9			24.9	24.9
Actuated g/C Ratio	0.10	0.52	0.52	0.07	0.48	0.48	0.27	0.27			0.26	0.26
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	126	634	719	112	584	502	194	807			470	277
v/s Ratio Prot	c0.11	c0.57		0.06	0.43			0.17				
v/s Ratio Perm			0.02			0.04	0.05				c0.21	0.03
v/c Ratio	1.07	1.09	0.05	0.79	0.90	0.08	0.18	0.63			0.93dl	0.12
Uniform Delay, d1	43.0	22.9	11.2	43.8	22.9	13.5	27.0	30.9			33.4	27.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	100.6	61.0	0.0	31.0	17.2	0.1	0.4	1.5			10.3	0.2
Delay (s)	143.7	84.0	11.3	74.9	40.1	13.6	27.4	32.4			43.7	27.4
Level of Service	F	F	B	E	D	B	C	C			D	C
Approach Delay (s)		88.3			41.9			32.1			39.5	
Approach LOS		F			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	54.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	96.1	Sum of lost time (s)	15.0
Intersection Capacity Utilization	91.5%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	546	68	42	343	226	64	198	40	191	122	32
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.91	1.00	1.00	0.96	1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1331	937		1337	1126	869	1070	957	915	1070	1075	
Flt Permitted	0.26	1.00		0.08	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	364	937		119	1126	869	1070	957	915	1070	1075	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	34	628	78	48	394	260	74	228	46	220	140	37
RTOR Reduction (vph)	0	4	0	0	0	104	0	0	37	0	10	0
Lane Group Flow (vph)	34	702	0	48	394	156	74	228	9	220	167	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	50.1	50.1		52.0	52.0	66.0	14.0	21.1	21.1	14.0	21.1	
Effective Green, g (s)	50.1	50.1		52.0	52.0	66.0	14.0	21.1	21.1	14.0	21.1	
Actuated g/C Ratio	0.46	0.46		0.47	0.47	0.60	0.13	0.19	0.19	0.13	0.19	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	191	426		109	532	560	136	183	175	136	206	
v/s Ratio Prot	0.00	c0.75		0.02	c0.35	0.04	0.07	c0.24		c0.21	0.16	
v/s Ratio Perm	0.08			0.19		0.14			0.01			
v/c Ratio	0.18	1.65		0.44	0.74	0.28	0.54	1.25	0.05	1.62	0.81	
Uniform Delay, d1	19.0	29.9		47.7	23.5	10.6	45.0	44.4	36.3	48.0	42.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	302.1		2.8	5.5	0.3	4.4	147.9	0.1	309.1	21.1	
Delay (s)	19.5	332.1		50.5	29.0	10.8	49.4	192.4	36.4	357.1	63.6	
Level of Service	B	F		D	C	B	D	F	D	F	E	
Approach Delay (s)		317.7			23.8			141.4			226.3	
Approach LOS		F			C			F			F	

Intersection Summary			
HCM 2000 Control Delay	178.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.52		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	84.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd. 4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	264	537	27	35	141	7	35	100	69	5	48	94
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	272	554	28	36	145	7	36	103	71	5	49	97

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	854	36	153	139	71	152
Volume Left (vph)	272	36	0	36	0	5
Volume Right (vph)	28	0	7	0	71	97
Hadj (s)	0.08	0.53	0.00	0.16	-0.67	-0.34
Departure Headway (s)	6.2	7.2	6.7	7.4	6.5	7.0
Degree Utilization, x	1.0	0.07	0.28	0.28	0.13	0.29
Capacity (veh/h)	577	479	517	474	530	493
Control Delay (s)	236.6	9.6	11.1	12.1	9.3	12.9
Approach Delay (s)	236.6	10.8		11.1		12.9
Approach LOS	F	B		B		B

Intersection Summary			
Delay	148.4		
Level of Service	F		
Intersection Capacity Utilization	86.6%	ICU Level of Service	E
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St. 4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	286	782	46	22	202	45	58	585	20	26	344	202
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1300	1300	1300	1300	1300	1300
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.97		1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1495	3030		1523	2951		1170	2325		1170	2183	
Flt Permitted	0.58	1.00		0.13	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	907	3030		216	2951		1170	2325		1170	2183	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	308	841	49	24	217	48	62	629	22	28	370	217
RTOR Reduction (vph)	0	4	0	0	19	0	0	2	0	0	85	0
Lane Group Flow (vph)	308	886	0	24	246	0	62	649	0	28	502	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	29.7	29.7		29.7	29.7		16.9	39.9		14.9	37.9	
Effective Green, g (s)	29.7	29.7		29.7	29.7		16.9	39.9		14.9	37.9	
Actuated g/C Ratio	0.30	0.30		0.30	0.30		0.17	0.40		0.15	0.38	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Grp Cap (vph)	269	899		64	876		197	927		174	827	
v/s Ratio Prot		0.29			0.08		0.05	c0.28		0.02	c0.23	
v/s Ratio Perm	c0.34			0.11								
v/c Ratio	1.14	0.99		0.38	0.28		0.31	0.70		0.16	0.61	
Uniform Delay, d1	35.1	34.9		27.8	27.0		36.5	25.1		37.1	25.0	
Progression Factor	1.00	1.00		1.00	1.00		0.83	0.74		1.40	0.68	
Incremental Delay, d2	99.8	26.7		16.0	0.8		2.7	2.9		1.8	3.0	
Delay (s)	134.9	61.6		43.8	27.8		33.0	21.3		53.8	20.0	
Level of Service	F	E		D	C		C	C		D	B	
Approach Delay (s)		80.5			29.1			22.3			21.5	
Approach LOS		F			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	47.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	112.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

19: Minnesota St./4th St. & Mariposa St.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	1128	55	6	484	9	36	0	5	17	1	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00			0.98		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3397		1711	3412			1698		1711	1541	
Flt Permitted	0.43	1.00		0.15	1.00			0.81		0.73	1.00	
Satd. Flow (perm)	781	3397		267	3412			1441		1312	1541	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	1226	60	7	526	10	39	0	5	18	1	24
RTOR Reduction (vph)	0	6	0	0	2	0	0	22	0	0	15	0
Lane Group Flow (vph)	22	1280	0	7	534	0	0	22	0	18	10	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	27.0	27.0		27.0	27.0			23.0		23.0	23.0	
Effective Green, g (s)	27.0	27.0		27.0	27.0			23.0		23.0	23.0	
Actuated g/C Ratio	0.45	0.45		0.45	0.45			0.38		0.38	0.38	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Grp Cap (vph)	351	1528		120	1535			552		502	590	
v/s Ratio Prot		c0.38			0.16						0.01	
v/s Ratio Perm	0.03			0.03				c0.02		0.01		
v/c Ratio	0.06	0.84		0.06	0.35			0.04		0.04	0.02	
Uniform Delay, d1	9.3	14.6		9.3	10.8			11.6		11.6	11.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.3	5.6		0.9	0.6			0.1		0.1	0.1	
Delay (s)	9.7	20.2		10.2	11.4			11.7		11.7	11.5	
Level of Service	A	C		B	B			B		B	B	
Approach Delay (s)		20.0			11.4			11.7			11.6	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	50.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

20: I-280 NB Off-Ramp & Mariposa St.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	102	0	0	567	36	253	547	1107	0	0	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frt		1.00			0.99		1.00	0.90				0.85
Flt Protected		0.99			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3393			5086		1711	3078				2694
Flt Permitted		0.86			1.00		0.95	1.00				1.00
Satd. Flow (perm)		2952			5086		1711	3078				2694
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	111	0	0	616	39	275	595	1203	0	0	80
RTOR Reduction (vph)	0	0	0	0	8	0	0	405	0	0	0	75
Lane Group Flow (vph)	0	133	0	0	647	0	275	1393	0	0	0	5
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		43.5			32.5		37.0	37.0				6.0
Effective Green, g (s)		43.5			32.5		37.0	37.0				6.0
Actuated g/C Ratio		0.48			0.36		0.41	0.41				0.07
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1456			1836		703	1265				179
v/s Ratio Prot		c0.01			c0.13		0.16	c0.45				0.00
v/s Ratio Perm		0.04										
v/c Ratio		0.09			0.35		0.39	1.16dr				0.03
Uniform Delay, d1		12.6			21.0		18.6	26.5				39.3
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			0.5		1.6	57.9				0.3
Delay (s)		12.7			21.6		20.2	84.4				39.6
Level of Service		B			C		C	F				D
Approach Delay (s)		12.7			21.6			75.9			39.6	
Approach LOS		B			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	59.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		
dr Defacto Right Lane. Recode with 1 though lane as a right lane.			
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	122	498	465	428	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.91	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1534	1427	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1534	1427	3319	1801		
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	139	566	528	486	0	0
RTOR Reduction (vph)	62	62	0	0	0	0
Lane Group Flow (vph)	303	278	528	486	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	35.1	35.1	14.9	60.0		
Effective Green, g (s)	35.1	35.1	14.9	60.0		
Actuated g/C Ratio	0.59	0.59	0.25	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	897	834	824	1801		
v/s Ratio Prot	c0.20		c0.16	0.27		
v/s Ratio Perm		0.19				
v/c Ratio	0.34	0.33	0.64	0.27		
Uniform Delay, d1	6.4	6.4	20.2	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.2	0.2	1.7	0.1		
Delay (s)	6.7	6.7	21.9	0.1		
Level of Service	A	A	C	A		
Approach Delay (s)	6.7			11.4	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	9.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	220	154	144	3	120	9	127	392	9	8	314	102
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.94		1.00	0.99		1.00	1.00		1.00	0.97	
Flpb, ped/bikes	0.97	1.00		0.94	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.99		1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1173	1996		1139	1254		1215	2417		1215	2278	
Flt Permitted	0.44	1.00		0.55	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	545	1996		659	1254		1215	2417		1215	2278	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	247	173	162	3	135	10	143	440	10	9	353	115
RTOR Reduction (vph)	0	103	0	0	3	0	0	1	0	0	34	0
Lane Group Flow (vph)	247	232	0	3	142	0	143	449	0	9	434	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	36.4	36.4		16.5	16.5		17.5	44.4		2.9	29.8	
Effective Green, g (s)	36.4	36.4		16.5	16.5		17.5	44.4		2.9	29.8	
Actuated g/C Ratio	0.36	0.36		0.16	0.16		0.18	0.44		0.03	0.30	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	290	726		108	206		212	1073		35	678	
v/s Ratio Prot	c0.12	0.12			0.11		c0.12	0.19		0.01	c0.19	
v/s Ratio Perm	c0.19			0.00								
v/c Ratio	0.85	0.32		0.03	0.69		0.67	0.42		0.26	0.64	
Uniform Delay, d1	27.0	22.9		35.0	39.3		38.6	19.0		47.5	30.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.17	1.05	
Incremental Delay, d2	20.7	0.3		0.1	9.2		8.2	1.2		2.8	3.3	
Delay (s)	47.7	23.1		35.1	48.5		46.8	20.2		58.5	35.2	
Level of Service	D	C		D	D		D	C		E	D	
Approach Delay (s)		33.6			48.2			26.6			35.6	
Approach LOS		C			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	33.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

EXISTING 2015 PLUS PROJECT – BASKETBALL GAME
NO SF GIANTS GAME AT AT&T PARK
WEEKDAY LATE EVENING

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	478	420	8	94	764	52	37	491	385	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.90			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	1.00		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	3064		2987	3028			5522	1237			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	3064		2987	3028			5522	1237			
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	576	506	10	113	920	63	45	592	464	0	0	0
RTOR Reduction (vph)	0	1	0	0	4	0	0	0	281	0	0	0
Lane Group Flow (vph)	576	515	0	113	979	0	0	637	183	0	0	0
Confl. Peds. (#/hr)			100			100	100		100			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.2	54.8		9.5	46.1			26.8	26.8			
Effective Green, g (s)	18.2	54.8		9.5	46.1			26.8	26.8			
Actuated g/C Ratio	0.17	0.50		0.09	0.42			0.24	0.24			
Clearance Time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	741	1526		257	1269			1345	301			
v/s Ratio Prot	c0.13	0.17		0.04	c0.32							
v/s Ratio Perm								0.12	c0.15			
v/c Ratio	0.78	0.34		0.44	0.77			0.47	0.61			
Uniform Delay, d1	44.0	16.6		47.7	27.4			35.6	36.9			
Progression Factor	0.55	0.26		1.13	0.37			1.00	1.00			
Incremental Delay, d2	4.5	0.5		0.4	0.9			0.3	3.4			
Delay (s)	28.8	4.9		54.1	11.0			35.8	40.4			
Level of Service	C	A		D	B			D	D			
Approach Delay (s)		17.5			15.5			37.7			0.0	
Approach LOS		B			B			D			A	

Intersection Summary			
HCM 2000 Control Delay	23.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.9
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	78	837	21	40	725	36	12	30	30	39	181	171
Ideal Flow (vphpl)	1400	1400	1400	1400	1400	1400	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.97			1.00	0.63	1.00	0.86	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.91	1.00	0.67	1.00	1.00
Frt	1.00	1.00		1.00	0.99			1.00	0.85	1.00	0.96	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1134	3218		1134	2186			1448	853	1027	2448	580
Flt Permitted	0.95	1.00		0.95	1.00			0.83	1.00	0.72	1.00	1.00
Satd. Flow (perm)	1134	3218		1134	2186			1224	853	783	2448	580
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	93	996	25	48	863	43	14	36	36	46	215	204
RTOR Reduction (vph)	0	2	0	0	2	0	0	0	31	0	38	108
Lane Group Flow (vph)	93	1019	0	48	904	0	0	50	5	46	252	21
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.5	61.7		11.9	57.5			16.5	16.5	17.5	17.5	17.5
Effective Green, g (s)	14.5	61.7		11.9	57.5			16.5	16.5	17.5	17.5	17.5
Actuated g/C Ratio	0.13	0.56		0.11	0.52			0.15	0.15	0.16	0.16	0.16
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	149	1805		122	1142			183	127	124	389	92
v/s Ratio Prot	0.08	c0.32		0.04	c0.41						c0.10	
v/s Ratio Perm								0.04	0.01	0.06		0.04
v/c Ratio	0.62	0.56		0.39	0.79			0.27	0.04	0.37	0.65	0.22
Uniform Delay, d1	45.2	15.5		45.7	21.4			41.4	40.0	41.3	43.4	40.3
Progression Factor	0.86	1.09		0.67	0.44			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.1	0.8		1.3	2.5			0.8	0.1	1.9	3.7	1.2
Delay (s)	44.0	17.7		31.9	11.8			42.2	40.1	43.2	47.1	41.6
Level of Service	D	B		C	B			D	D	D	D	D
Approach Delay (s)		19.9			12.8			41.4			45.2	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	22.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	112.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	925	62	0	908	28	11
Ideal Flow (vphpl)	1100	1100	1000	1000	1000	1000
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	1764			1621	810	714
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	1764			1621	810	714
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	1101	74	0	1081	33	13
RTOR Reduction (vph)	2	0	0	0	0	12
Lane Group Flow (vph)	1173	0	0	1081	33	1
Confl. Peds. (#/hr)		10	10			3
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	91.2			91.2	7.5	7.5
Effective Green, g (s)	91.2			91.2	7.5	7.5
Actuated g/C Ratio	0.83			0.83	0.07	0.07
Clearance Time (s)	4.9			4.9	6.4	6.4
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1462			1343	55	48
v/s Ratio Prot	0.67			c0.67	c0.04	
v/s Ratio Perm						0.00
v/c Ratio	0.80			0.80	0.60	0.02
Uniform Delay, d1	4.8			4.8	49.8	47.8
Progression Factor	1.00			1.53	1.00	1.00
Incremental Delay, d2	4.7			2.5	16.4	0.2
Delay (s)	9.6			9.9	66.2	48.0
Level of Service	A			A	E	D
Approach Delay (s)	9.6			9.9	61.0	
Approach LOS	A			A	E	

Intersection Summary			
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	143	771	99	35	123	323	194	89	208	92
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		3.5			3.0	3.0			3.0	3.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.99	1.00
Flpb, ped/bikes		0.99			0.99	1.00			1.00	1.00
Frt		0.99			1.00	0.94			1.00	0.85
Flt Protected		0.99			0.99	1.00			0.95	1.00
Satd. Flow (prot)		5762			2834	2410			4076	1122
Flt Permitted		0.99			0.77	1.00			0.95	1.00
Satd. Flow (perm)		5762			2212	2410			4076	1122
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	168	907	116	41	145	380	228	105	245	108
RTOR Reduction (vph)	0	24	0	0	0	24	0	0	0	0
Lane Group Flow (vph)	0	1167	0	0	186	584	0	0	361	97
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Prot
Protected Phases		6			4	4		7	7	7
Permitted Phases	6			4						
Actuated Green, G (s)		24.1			21.3	21.3			12.1	12.1
Effective Green, g (s)		26.1			24.3	24.3			15.1	15.1
Actuated g/C Ratio		0.35			0.32	0.32			0.20	0.20
Clearance Time (s)		5.5			6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		2005			716	780			820	225
v/s Ratio Prot						c0.24			c0.09	0.09
v/s Ratio Perm		0.20			0.08					
v/c Ratio		0.58			0.26	0.75			0.44	0.43
Uniform Delay, d1		20.0			18.7	22.6			26.2	26.2
Progression Factor		1.00			0.49	1.00			1.00	1.00
Incremental Delay, d2		0.4			0.1	4.0			0.4	1.3
Delay (s)		20.4			9.4	26.6			26.6	27.5
Level of Service		C			A	C			C	C
Approach Delay (s)		20.4			9.4	26.6			26.8	
Approach LOS		C			A	C			C	

Intersection Summary			
HCM 2000 Control Delay	22.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

4/22/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	27	776	210	22	131	112	14	170	20	365
Ideal Flow (vphpl)	1000	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	1.00		0.87		1.00		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.99		0.93		0.85		1.00	1.00
Flt Protected		0.95	0.97		1.00		1.00		0.95	1.00
Satd. Flow (prot)		1214	1877		2248		1188		1327	2553
Flt Permitted		0.95	0.97		1.00		1.00		0.52	0.95
Satd. Flow (perm)		1214	1877		2248		1188		720	2431
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	28	817	221	23	138	118	15	179	21	384
RTOR Reduction (vph)	0	0	6	0	1	0	10	0	0	0
Lane Group Flow (vph)	0	567	516	0	257	0	3	0	181	403
Confl. Peds. (#/hr)	25			60		200				
Bus Blockages (#/hr)	0	0	8	0	5	0	0	0	0	5
Parking (#/hr)		10	10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		18.5	18.5		16.0		16.0		31.0	31.0
Effective Green, g (s)		18.5	21.0		17.5		16.0		32.5	32.5
Actuated g/C Ratio		0.25	0.28		0.23		0.21		0.43	0.43
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		299	525		524		253		413	1073
v/s Ratio Prot		c0.47	0.27		c0.11				c0.07	0.06
v/s Ratio Perm							0.00		0.12	0.10
v/c Ratio		1.90	1.60dl		0.49		0.01		0.44	0.38
Uniform Delay, d1		28.2	26.8		24.9		23.3		17.3	14.4
Progression Factor		1.00	1.00		1.00		1.00		1.04	1.03
Incremental Delay, d2		415.7	35.4		3.3		0.1		2.6	0.8
Delay (s)		444.0	62.2		28.2		23.3		20.6	15.7
Level of Service		F	E		C		C		C	B
Approach Delay (s)			261.0		27.9					17.2
Approach LOS			F		C					B

Intersection Summary			
HCM 2000 Control Delay	155.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	81.2%	ICU Level of Service	D
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

Warriors Arena 2015 Existing Plus Project (With Basketball Game), Weekday Late Evening, No Giants Game — Synchro 8 Report

Fehr & Peers — Page 5

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	10	37	66	711	253	5	362	4	1	61	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.96		1.00	1.00		1.00	0.99	
Flt Protected		0.96	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1547	1356		2938		1272	2536		1540	3036	
Flt Permitted		0.16	1.00		0.92		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		263	1356		2713		1272	2536		1540	3036	
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	152	12	45	80	867	309	6	441	5	1	74	6
RTOR Reduction (vph)	0	0	23	0	26	0	0	1	0	0	4	0
Lane Group Flow (vph)	0	164	22	0	1230	0	6	445	0	1	76	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		32.6	32.6		32.6		1.0	16.4		0.8	16.5	
Effective Green, g (s)		32.6	32.6		32.6		1.0	16.4		0.8	16.5	
Actuated g/C Ratio		0.50	0.50		0.50		0.02	0.25		0.01	0.25	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Vehicle Extension (s)		3.0	3.0		3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		130	672		1346		19	633		18	762	
v/s Ratio Prot							0.00	c0.18		0.00	c0.02	
v/s Ratio Perm		c0.62	0.02		0.45							
v/c Ratio		1.26	0.03		0.91		0.32	0.70		0.06	0.10	
Uniform Delay, d1		16.6	8.5		15.3		32.0	22.4		32.1	18.9	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		165.3	0.0		9.7		3.5	3.5		0.5	0.1	
Delay (s)		181.8	8.5		24.9		35.5	26.0		32.5	18.9	
Level of Service		F	A		C		D	C		C	B	
Approach Delay (s)		144.5			24.9			26.1			19.1	
Approach LOS		F			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	37.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	65.7	Sum of lost time (s)	15.9
Intersection Capacity Utilization	75.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Warriors Arena 2015 Existing Plus Project (With Basketball Game), Weekday Late Evening, No Giants Game — Synchro 8 Report

Fehr & Peers — Page 6

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	62	3	1	711	9	2	20	61	48	47	8
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00	0.96	1.00	0.95		1.00	0.95	
Flpb, ped/bikes		1.00			1.00	1.00	0.73	1.00		1.00	1.00	
Frt		0.99			1.00	0.85	1.00	0.89		1.00	0.98	
Flt Protected		1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2573			1450	1186	1007	1227		1377	1353	
Flt Permitted		0.86			1.00	1.00	0.71	1.00		0.95	1.00	
Satd. Flow (perm)		2222			1450	1186	755	1227		1377	1353	
Peak-hour factor, PHF	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Adj. Flow (vph)	6	78	4	1	900	11	3	25	77	61	59	10
RTOR Reduction (vph)	0	2	0	0	0	4	0	69	0	0	7	0
Lane Group Flow (vph)	0	86	0	0	901	7	3	33	0	61	62	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Parking (#/hr)		2										
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		29.4			29.4	37.0	6.4	6.4		7.6	19.0	
Effective Green, g (s)		29.4			29.4	37.0	6.4	6.4		7.6	19.0	
Actuated g/C Ratio		0.50			0.50	0.63	0.11	0.11		0.13	0.33	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	2.0	3.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		1118			729	852	82	134		179	440	
v/s Ratio Prot						0.00		c0.03		c0.04	0.05	
v/s Ratio Perm		0.04			0.62	0.00	0.00					
v/c Ratio		0.08			1.24	0.01	0.04	0.25		0.34	0.14	
Uniform Delay, d1		7.5			14.5	3.9	23.2	23.8		23.1	13.9	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.0			117.8	0.0	0.2	1.0		0.4	0.1	
Delay (s)		7.5			132.3	3.9	23.4	24.8		23.5	14.1	
Level of Service		A			F	A	C	C		C	B	
Approach Delay (s)		7.5			130.8			24.7			18.5	
Approach LOS		A			F			C			B	

Intersection Summary			
HCM 2000 Control Delay	101.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	58.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.

4/22/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	6	911	356	11	65	68
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1747	1535	846	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1747	1535	846	1134	1194
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	7	1085	424	13	77	81
RTOR Reduction (vph)	0	556	0	6	0	0
Lane Group Flow (vph)	7	529	424	7	77	81
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	34.8	34.8	40.2	35.2	10.5	55.7
Effective Green, g (s)	34.8	34.8	40.2	35.2	10.5	55.7
Actuated g/C Ratio	0.35	0.35	0.40	0.35	0.10	0.55
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	392	604	614	338	118	661
v/s Ratio Prot	0.01		c0.28	0.00	c0.07	0.07
v/s Ratio Perm		c0.30		0.00		
v/c Ratio	0.02	0.88	0.69	0.02	0.65	0.12
Uniform Delay, d1	21.6	30.8	25.0	21.4	43.2	10.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	13.4	3.3	0.0	12.2	0.1
Delay (s)	21.6	44.2	28.3	21.4	55.5	10.8
Level of Service	C	D	C	C	E	B
Approach Delay (s)	44.0		28.1			32.6
Approach LOS	D		C			C

Intersection Summary			
HCM 2000 Control Delay	38.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	100.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
9: Terry A Francois Blvd/Terry A Francois Blvd. & South St.

4/22/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	308	281	2	46	68	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frpb, ped/bikes	0.97		1.00	1.00	0.96	
Flpb, ped/bikes	1.00		0.97	1.00	1.00	
Frt	0.94		1.00	1.00	0.93	
Flt Protected	0.97		0.95	1.00	1.00	
Satd. Flow (prot)	1599		1657	1531	2818	
Flt Permitted	0.97		0.63	1.00	1.00	
Satd. Flow (perm)	1599		1104	1531	2818	
Peak-hour factor, PHF	0.67	0.67	0.67	0.67	0.67	0.67
Adj. Flow (vph)	460	419	3	69	101	88
RTOR Reduction (vph)	31	0	0	0	74	0
Lane Group Flow (vph)	848	0	3	69	115	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	35.9		8.6	8.6	8.6	
Effective Green, g (s)	35.9		8.6	8.6	8.6	
Actuated g/C Ratio	0.66		0.16	0.16	0.16	
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	1053		174	241	444	
v/s Ratio Prot	c0.53			c0.05	0.04	
v/s Ratio Perm			0.00			
v/c Ratio	0.81		0.02	0.29	0.26	
Uniform Delay, d1	6.8		19.4	20.2	20.2	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	4.6		0.0	0.7	0.3	
Delay (s)	11.3		19.4	20.9	20.5	
Level of Service	B		B	C	C	
Approach Delay (s)	11.3			20.8	20.5	
Approach LOS	B			C	C	

Intersection Summary			
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	54.5	Sum of lost time (s)	10.0
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: Third St. & South St.

4/22/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	0	0	0	0	312
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)						4.9
Lane Util. Factor						0.95
Frpb, ped/bikes						1.00
Flpb, ped/bikes						1.00
Frt						1.00
Flt Protected						1.00
Satd. Flow (prot)						3421
Flt Permitted						1.00
Satd. Flow (perm)						3421
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	0	0	0	0	0	359
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	0	359
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm			Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)						49.9
Effective Green, g (s)						49.9
Actuated g/C Ratio						1.00
Clearance Time (s)						4.9
Vehicle Extension (s)						3.0
Lane Grp Cap (vph)						3421
v/s Ratio Prot						c0.10
v/s Ratio Perm						
v/c Ratio						0.10
Uniform Delay, d1						0.0
Progression Factor						1.00
Incremental Delay, d2						0.1
Delay (s)						0.1
Level of Service						A
Approach Delay (s)	0.0		0.0			0.1
Approach LOS	A		A			A

Intersection Summary			
HCM 2000 Control Delay	0.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.15		
Actuated Cycle Length (s)	49.9	Sum of lost time (s)	15.3
Intersection Capacity Utilization	40.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	15	0	48	350	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0	
Lane Util. Factor		1.00		0.95	0.95	
Frpb, ped/bikes		0.97		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00	
Frt		0.85		1.00	1.00	
Flt Protected		1.00		1.00	1.00	
Satd. Flow (prot)		1342		2887	2887	
Flt Permitted		1.00		1.00	1.00	
Satd. Flow (perm)		1342		2887	2887	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	0	18	0	56	412	0
RTOR Reduction (vph)	0	18	0	0	0	0
Lane Group Flow (vph)	0	0	0	56	412	0
Confl. Peds. (#/hr)	1	1	25			25
Parking (#/hr)				5	5	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)		0.6		11.8	11.8	
Effective Green, g (s)		0.6		11.8	11.8	
Actuated g/C Ratio		0.01		0.25	0.25	
Clearance Time (s)		5.0		5.0	5.0	
Vehicle Extension (s)		3.0		3.0	3.0	
Lane Grp Cap (vph)		16		712	712	
v/s Ratio Prot				0.02	c0.14	
v/s Ratio Perm		c0.00				
v/c Ratio		0.01		0.08	0.58	
Uniform Delay, d1		23.3		13.8	15.8	
Progression Factor		1.00		1.00	1.00	
Incremental Delay, d2		0.4		0.0	1.1	
Delay (s)		23.7		13.9	17.0	
Level of Service		C		B	B	
Approach Delay (s)	23.7			13.9	17.0	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	47.8	Sum of lost time (s)	15.0
Intersection Capacity Utilization	25.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	0	0	0	0	0	29	74	0	0	278	132
Peak Hour Factor	0.92	0.83	0.83	0.83	0.83	0.92	0.83	0.92	0.83	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0	35	80	0	0	302	143

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	0	0	0	0	115	302	143
Volume Left (vph)	0	0	0	0	35	0	0
Volume Right (vph)	0	0	0	0	0	0	143
Hadj (s)	0.00	0.00	0.00	0.00	0.09	0.03	-0.67
Departure Headway (s)	5.7	5.7	5.7	5.7	5.0	4.6	3.9
Degree Utilization, x	0.00	0.00	0.00	0.00	0.16	0.39	0.16
Capacity (veh/h)	587	587	587	587	710	768	905
Control Delay (s)	7.5	7.5	7.5	7.5	8.9	9.3	6.4
Approach Delay (s)	0.0		0.0		8.9	8.4	
Approach LOS	A		A		A	A	

Intersection Summary			
Delay	8.5		
Level of Service	A		
Intersection Capacity Utilization	47.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰↰	↑↱		↰	↑↱	
Volume (vph)	0	0	100	0	161	0	121	0	0	0	192	120
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)			5.5		5.5		5.0				5.2	
Lane Util. Factor			1.00		1.00		0.97				0.95	
Frpb, ped/bikes			0.97		1.00		1.00				0.99	
Flpb, ped/bikes			1.00		1.00		1.00				1.00	
Frt			0.85		1.00		1.00				0.94	
Flt Protected			1.00		1.00		0.95				1.00	
Satd. Flow (prot)			1130		1365		2515				2417	
Flt Permitted			1.00		1.00		0.95				1.00	
Satd. Flow (perm)			1130		1365		2515				2417	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	0	0	118	0	189	0	142	0	0	0	226	141
RTOR Reduction (vph)	0	0	86	0	0	0	0	0	0	0	104	0
Lane Group Flow (vph)	0	0	32	0	189	0	142	0	0	0	263	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm		Perm	Perm	NA	Perm	Prot			Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)			12.7		12.7		6.7				12.4	
Effective Green, g (s)			12.7		12.7		6.7				12.4	
Actuated g/C Ratio			0.27		0.27		0.14				0.26	
Clearance Time (s)			5.5		5.5		5.0				5.2	
Vehicle Extension (s)			3.0		3.0		3.0				3.0	
Lane Grp Cap (vph)			302		364		354				630	
v/s Ratio Prot					c0.14		c0.06				c0.11	
v/s Ratio Perm			0.03									
v/c Ratio			0.10		0.52		0.40				0.42	
Uniform Delay, d1			13.1		14.8		18.6				14.6	
Progression Factor			1.00		1.00		1.00				1.00	
Incremental Delay, d2			0.2		1.3		0.7				0.4	
Delay (s)			13.3		16.1		19.3				15.0	
Level of Service			B		B		B				B	
Approach Delay (s)		13.3			16.1			19.3			15.0	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	47.5	Sum of lost time (s)	15.7
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↱		↰	↑↱	
Volume (vph)	98	88	3	4	387	10	5	6	1	11	2	47
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.86	1.00	1.00		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1252	1621	1674		1491	1360	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.72	1.00		0.75	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1252	1230	1674		1181	1360	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	110	99	3	4	435	11	6	7	1	12	2	53
RTOR Reduction (vph)	0	0	1	0	0	6	0	1	0	0	43	0
Lane Group Flow (vph)	110	99	2	4	435	5	6	7	0	12	12	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	11.7	48.1	48.1	2.5	38.9	38.9	15.0	15.0		15.0	15.0	
Effective Green, g (s)	11.7	48.1	48.1	2.5	38.9	38.9	15.0	15.0		15.0	15.0	
Actuated g/C Ratio	0.15	0.60	0.60	0.03	0.48	0.48	0.19	0.19		0.19	0.19	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	235	1018	865	50	823	604	228	311		219	253	
v/s Ratio Prot	c0.07	0.06		0.00	c0.26			0.00			0.01	
v/s Ratio Perm			0.00			0.00	0.00			c0.01		
v/c Ratio	0.47	0.10	0.00	0.08	0.53	0.01	0.03	0.02		0.05	0.05	
Uniform Delay, d1	31.6	7.0	6.6	37.9	14.5	10.8	26.8	26.8		27.0	26.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	0.2	0.0	0.7	0.6	0.0	0.0	0.0		0.1	0.1	
Delay (s)	33.1	7.1	6.6	38.6	15.1	10.8	26.9	26.8		27.1	27.0	
Level of Service	C	A	A	D	B	B	C	C		C	C	
Approach Delay (s)		20.6			15.2			26.9			27.0	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	80.6	Sum of lost time (s)	15.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↑▸			◂↑↑	↱
Volume (vph)	23	141	6	11	414	13	19	97	14	32	455	101
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1047	1540	3021			3069	1072
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.30	1.00			0.93	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1047	485	3021			2848	1072
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	28	172	7	13	505	16	23	118	17	39	555	123
RTOR Reduction (vph)	0	0	3	0	0	8	0	11	0	0	0	86
Lane Group Flow (vph)	28	172	4	13	505	8	23	124	0	0	594	37
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	2.1	49.2	49.2	0.8	46.9	46.9	28.2	28.2			27.2	27.2
Effective Green, g (s)	2.1	49.2	49.2	0.8	46.9	46.9	28.2	28.2			27.2	27.2
Actuated g/C Ratio	0.02	0.54	0.54	0.01	0.51	0.51	0.31	0.31			0.30	0.30
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	27	655	743	13	624	538	149	934			849	319
v/s Ratio Prot	c0.02	0.14		0.01	c0.42			0.04				
v/s Ratio Perm			0.00			0.01	0.05				c0.21	0.03
v/c Ratio	1.04	0.26	0.01	1.00	0.81	0.02	0.15	0.13			0.70	0.11
Uniform Delay, d1	44.6	11.3	9.7	45.2	18.4	10.8	22.9	22.7			28.4	23.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	184.9	0.2	0.0	249.6	7.6	0.0	0.5	0.1			2.5	0.2
Delay (s)	229.5	11.5	9.7	294.8	26.1	10.9	23.3	22.8			30.9	23.4
Level of Service	F	B	A	F	C	B	C	C			C	C
Approach Delay (s)		40.9			32.2			22.8			29.6	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	91.2	Sum of lost time (s)	15.0
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑▸		↰	↑	↱	↰	↑	↱	↰	↑▸	
Volume (vph)	20	121	56	14	296	224	15	99	12	37	23	6
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.93	1.00	1.00	0.96	1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1332	901		1331	1126	886	1070	957	916	1070	1080	
Flt Permitted	0.24	1.00		0.60	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	331	901		834	1126	886	1070	957	916	1070	1080	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	24	146	67	17	357	270	18	119	14	45	28	7
RTOR Reduction (vph)	0	17	0	0	0	124	0	0	11	0	5	0
Lane Group Flow (vph)	24	196	0	17	357	146	18	119	3	45	30	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	30.9	30.9		31.3	31.3	42.8	3.0	15.5	15.5	11.5	24.0	
Effective Green, g (s)	30.9	30.9		31.3	31.3	42.8	3.0	15.5	15.5	11.5	24.0	
Actuated g/C Ratio	0.39	0.39		0.39	0.39	0.54	0.04	0.20	0.20	0.14	0.30	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	142	350		338	443	533	40	186	178	154	326	
v/s Ratio Prot	0.00	c0.22		0.00	c0.32	c0.04	0.02	c0.12		0.04	0.03	
v/s Ratio Perm	0.06			0.02		0.12			0.00			
v/c Ratio	0.17	0.56		0.05	0.81	0.27	0.45	0.64	0.02	0.29	0.09	
Uniform Delay, d1	16.7	18.9		14.9	21.4	9.9	37.4	29.4	25.8	30.3	19.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	1.9		0.1	10.3	0.3	7.9	7.0	0.0	1.1	0.1	
Delay (s)	17.3	20.9		14.9	31.6	10.2	45.2	36.4	25.8	31.4	20.0	
Level of Service	B	C		B	C	B	D	D	C	C	C	
Approach Delay (s)		20.5			22.2			36.5			26.4	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	24.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	79.4	Sum of lost time (s)	20.0
Intersection Capacity Utilization	44.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	77	25	19	341	47	1	5	17	9	0	11	284
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	99	32	24	437	60	1	6	22	12	0	14	364

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	155	437	62	28	12	378
Volume Left (vph)	99	437	0	6	0	0
Volume Right (vph)	24	0	1	0	12	364
Hadj (s)	0.07	0.53	0.02	0.15	-0.67	-0.54
Departure Headway (s)	6.8	6.7	6.2	7.6	6.7	6.0
Degree Utilization, x	0.30	0.81	0.11	0.06	0.02	0.64
Capacity (veh/h)	488	530	569	428	472	570
Control Delay (s)	12.7	31.0	8.7	9.8	8.7	19.0
Approach Delay (s)	12.7	28.2		9.5		19.0
Approach LOS	B	D		A		C

Intersection Summary			
Delay	22.0		
Level of Service	C		
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	80	25	23	299	14	82	72	6	34	133	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	0.98	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.99		1.00	0.99		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1680	3272		1679	3391		1260	2485		1260	2301	
Flt Permitted	0.49	1.00		0.67	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	866	3272		1188	3391		1260	2485		1260	2301	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	42	96	30	28	360	17	99	87	7	41	160	148
RTOR Reduction (vph)	0	20	0	0	4	0	0	4	0	0	96	0
Lane Group Flow (vph)	42	106	0	28	373	0	99	90	0	41	212	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	29.7	29.7		29.7	29.7		12.9	35.9		8.9	31.9	
Effective Green, g (s)	29.7	29.7		29.7	29.7		12.9	35.9		8.9	31.9	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.14	0.40		0.10	0.35	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	285	1079		392	1119		180	991		124	815	
v/s Ratio Prot		0.03			c0.11		c0.08	0.04		0.03	c0.09	
v/s Ratio Perm	0.05			0.02								
v/c Ratio	0.15	0.10		0.07	0.33		0.55	0.09		0.33	0.26	
Uniform Delay, d1	21.2	20.9		20.7	22.7		35.9	16.9		37.8	20.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.0		0.1	0.2		3.6	0.2		1.6	0.2	
Delay (s)	21.5	20.9		20.8	22.9		39.5	17.1		39.3	20.8	
Level of Service	C	C		C	C		D	B		D	C	
Approach Delay (s)		21.1			22.7			28.5			23.0	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	87.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	143	11	3	589	3	13	0	4	6	0	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00			0.97		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3384		1711	3419			1681		1711	1531	
Flt Permitted	0.41	1.00		0.65	1.00			0.80		0.75	1.00	
Satd. Flow (perm)	734	3384		1164	3419			1403		1343	1531	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	155	12	3	640	3	14	0	4	7	0	11
RTOR Reduction (vph)	0	7	0	0	1	0	0	13	0	0	8	0
Lane Group Flow (vph)	7	160	0	3	642	0	0	5	0	7	3	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	12.7	12.7		12.7	12.7			7.8		7.8	7.8	
Effective Green, g (s)	12.7	12.7		12.7	12.7			7.8		7.8	7.8	
Actuated g/C Ratio	0.42	0.42		0.42	0.42			0.26		0.26	0.26	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	305	1409		484	1423			358		343	391	
v/s Ratio Prot		0.05			c0.19						0.00	
v/s Ratio Perm	0.01			0.00				0.00		c0.01		
v/c Ratio	0.02	0.11		0.01	0.45			0.01		0.02	0.01	
Uniform Delay, d1	5.2	5.5		5.2	6.4			8.5		8.5	8.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.0		0.0	0.2			0.0		0.0	0.0	
Delay (s)	5.3	5.5		5.2	6.6			8.5		8.5	8.5	
Level of Service	A	A		A	A			A		A	A	
Approach Delay (s)		5.5			6.6			8.5			8.5	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	30.5	Sum of lost time (s)	10.0
Intersection Capacity Utilization	32.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	75	0	0	530	14	65	31	121	0	0	502
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frt		1.00			1.00		1.00	0.88				0.85
Flt Protected		0.99			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3398			5112		1711	3012				2694
Flt Permitted		0.89			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3061			5112		1711	3012				2694
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	14	87	0	0	616	16	76	36	141	0	0	584
RTOR Reduction (vph)	0	0	0	0	4	0	0	83	0	0	0	553
Lane Group Flow (vph)	0	101	0	0	628	0	76	94	0	0	0	31
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		35.5			26.5		31.0	31.0				4.0
Effective Green, g (s)		35.5			26.5		31.0	31.0				4.0
Actuated g/C Ratio		0.47			0.35		0.41	0.41				0.05
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1447			1782		697	1228				141
v/s Ratio Prot		0.00			c0.12		c0.04	0.03				c0.01
v/s Ratio Perm		0.03										
v/c Ratio		0.07			0.35		0.11	0.08				0.22
Uniform Delay, d1		11.2			18.4		13.9	13.7				34.5
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			0.5		0.3	0.1				3.5
Delay (s)		11.2			18.9		14.3	13.9				38.0
Level of Service		B			B		B	B				D
Approach Delay (s)		11.2			18.9			14.0			38.0	
Approach LOS		B			B			B			D	

Intersection Summary			
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	48.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.

4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	87	144	912	184	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.96	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1629	1426	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1629	1426	3319	1801		
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	104	171	1086	219	0	0
RTOR Reduction (vph)	9	9	0	0	0	0
Lane Group Flow (vph)	136	121	1086	219	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	24.8	24.8	25.2	60.0		
Effective Green, g (s)	24.8	24.8	25.2	60.0		
Actuated g/C Ratio	0.41	0.41	0.42	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	673	589	1393	1801		
v/s Ratio Prot	0.08		c0.33	0.12		
v/s Ratio Perm		c0.08				
v/c Ratio	0.20	0.20	0.78	0.12		
Uniform Delay, d1	11.3	11.3	15.0	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.1	0.2	2.8	0.0		
Delay (s)	11.4	11.5	17.8	0.0		
Level of Service	B	B	B	A		
Approach Delay (s)	11.4			14.9	0.0	
Approach LOS	B			B	A	

Intersection Summary			
HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	43.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	69	111	4	66	3	120	113	2	5	197	82
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	6.7	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.95		1.00	1.00		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	0.97	1.00		0.95	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.99		1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1183	1960		1152	1267		1215	2422		1215	2268	
Flt Permitted	0.44	1.00		0.63	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	550	1960		759	1267		1215	2422		1215	2268	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	43	77	123	4	73	3	133	126	2	6	219	91
RTOR Reduction (vph)	0	83	0	0	2	0	0	1	0	0	38	0
Lane Group Flow (vph)	43	117	0	4	74	0	133	127	0	6	272	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	22.5	22.5		11.1	11.1		10.8	26.0		4.0	19.2	
Effective Green, g (s)	22.5	22.5		11.1	11.1		10.8	26.0		4.0	19.2	
Actuated g/C Ratio	0.33	0.33		0.16	0.16		0.16	0.38		0.06	0.28	
Clearance Time (s)	6.7	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	223	640		122	204		190	915		70	632	
v/s Ratio Prot	0.01	c0.06			c0.06		c0.11	0.05		0.00	c0.12	
v/s Ratio Perm	0.05			0.01								
v/c Ratio	0.19	0.18		0.03	0.36		0.70	0.14		0.09	0.43	
Uniform Delay, d1	16.5	16.6		24.3	25.7		27.5	14.1		30.7	20.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.1		0.1	1.1		10.7	0.1		0.5	0.5	
Delay (s)	16.9	16.7		24.4	26.8		38.2	14.1		31.2	20.8	
Level of Service	B	B		C	C		D	B		C	C	
Approach Delay (s)		16.7			26.7			26.4			21.0	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	68.8	Sum of lost time (s)	23.0
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

EXISTING 2015 PLUS PROJECT – BASKETBALL GAME WITH SF GIANTS GAME AT AT&T PARK WEEKDAY LATE EVENING

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	425	146	8	40	439	109	107	776	373	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00	0.90			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	0.99		1.00	0.97			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00			
Satd. Flow (prot)	4480	3037		2987	2920			5485	1239			
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00			
Satd. Flow (perm)	4480	3037		2987	2920			5485	1239			
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	512	176	10	48	529	131	129	935	449	0	0	0
RTOR Reduction (vph)	0	3	0	0	11	0	0	0	303	0	0	0
Lane Group Flow (vph)	512	183	0	48	649	0	0	1064	146	0	0	0
Confl. Peds. (#/hr)			100			100	100		100			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	24.3	49.3		6.1	31.1			35.7	35.7			
Effective Green, g (s)	24.3	49.3		6.1	31.1			35.7	35.7			
Actuated g/C Ratio	0.22	0.45		0.06	0.28			0.32	0.32			
Clearance Time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	989	1361		165	825			1780	402			
v/s Ratio Prot	c0.11	0.06		0.02	c0.22							
v/s Ratio Perm								0.19	0.12			
v/c Ratio	0.52	0.13		0.29	0.79			0.60	0.36			
Uniform Delay, d1	37.7	17.8		49.9	36.4			31.1	28.4			
Progression Factor	1.00	1.00		0.96	0.40			1.46	5.78			
Incremental Delay, d2	0.5	0.2		0.3	1.6			0.5	0.5			
Delay (s)	38.2	18.0		48.2	16.2			46.1	164.8			
Level of Service	D	B		D	B			D	F			
Approach Delay (s)		32.8			18.3			81.3			0.0	
Approach LOS		C			B			F			A	

Intersection Summary			
HCM 2000 Control Delay	54.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.9
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	87	489	41	56	473	17	34	102	47	43	197	436
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.97		1.00	0.98			1.00	0.62	1.00	0.72	0.46
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.94	1.00	0.72	1.00	1.00
Frt	1.00	0.99		1.00	0.99			1.00	0.85	1.00	0.92	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	4239		1296	2523			1508	842	1101	1943	562
Flt Permitted	0.95	1.00		0.95	1.00			0.55	1.00	0.60	1.00	1.00
Satd. Flow (perm)	1540	4239		1296	2523			837	842	694	1943	562
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	104	582	49	67	563	20	40	121	56	51	235	519
RTOR Reduction (vph)	0	6	0	0	2	0	0	0	44	0	200	199
Lane Group Flow (vph)	104	625	0	67	581	0	0	161	12	51	295	60
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	12.5	63.5		9.9	59.3			26.7	26.7	27.7	27.7	27.7
Effective Green, g (s)	12.5	63.5		9.9	59.3			26.7	26.7	27.7	27.7	27.7
Actuated g/C Ratio	0.10	0.53		0.08	0.49			0.22	0.22	0.23	0.23	0.23
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	160	2243		106	1246			186	187	160	448	129
v/s Ratio Prot	c0.07	0.15		c0.05	c0.23						0.15	
v/s Ratio Perm								c0.19	0.01	0.07		0.11
v/c Ratio	0.65	0.28		0.63	0.47			0.87	0.07	0.32	0.66	0.46
Uniform Delay, d1	51.6	15.6		53.3	20.0			44.9	36.8	38.3	41.9	39.7
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.1	0.3		11.7	0.3			31.7	0.2	1.2	3.5	2.6
Delay (s)	60.7	15.9		65.0	20.2			76.6	37.0	39.5	45.3	42.4
Level of Service	E	B		E	C			E	D	D	D	D
Approach Delay (s)		22.3			24.8			66.4			44.0	
Approach LOS		C			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	34.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	112.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	597	80	2	941	99	20
Ideal Flow (vphpl)	1400	1400	1000	1000	1400	1400
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.98			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2224			1620	1134	1000
Flt Permitted	1.00			0.95	0.95	1.00
Satd. Flow (perm)	2224			1547	1134	1000
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	711	95	2	1120	118	24
RTOR Reduction (vph)	6	0	0	0	0	20
Lane Group Flow (vph)	800	0	0	1122	118	4
Confl. Peds. (#/hr)		10	10			3
Confl. Bikes (#/hr)		1				
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Actuated Green, G (s)	81.8			81.8	16.9	16.9
Effective Green, g (s)	81.8			81.8	16.9	16.9
Actuated g/C Ratio	0.74			0.74	0.15	0.15
Clearance Time (s)	4.9			4.9	6.4	6.4
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1653			1150	174	153
v/s Ratio Prot	0.36				c0.10	
v/s Ratio Perm				c0.73		0.00
v/c Ratio	0.48			0.98	0.68	0.02
Uniform Delay, d1	5.6			13.2	44.0	39.5
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	1.0			20.7	10.0	0.1
Delay (s)	6.7			33.8	54.0	39.6
Level of Service	A			C	D	D
Approach Delay (s)	6.7			33.8	51.6	
Approach LOS	A			C	D	

Intersection Summary			
HCM 2000 Control Delay	24.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

4/22/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	19	302	53	13	179	395	159	98	235	116
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		3.5			3.0	3.0			3.0	3.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.98			1.00	0.97			0.99	1.00
Flpb, ped/bikes		1.00			1.00	1.00			1.00	1.00
Frt		0.98			1.00	0.96			0.99	0.85
Flt Protected		1.00			1.00	1.00			0.95	1.00
Satd. Flow (prot)		5745			2872	2470			4071	1122
Flt Permitted		1.00			0.90	1.00			0.95	1.00
Satd. Flow (perm)		5745			2600	2470			4071	1122
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	22	355	62	15	211	465	187	115	276	136
RTOR Reduction (vph)	0	40	0	0	0	50	0	0	0	0
Lane Group Flow (vph)	0	399	0	0	226	602	0	0	406	121
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Prot
Protected Phases		6			4	4		7	7	7
Permitted Phases	6			4						
Actuated Green, G (s)		20.8			22.4	22.4			14.3	14.3
Effective Green, g (s)		22.8			25.4	25.4			17.3	17.3
Actuated g/C Ratio		0.30			0.34	0.34			0.23	0.23
Clearance Time (s)		5.5			6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1746			880	836			939	258
v/s Ratio Prot						c0.24			0.10	c0.11
v/s Ratio Perm		0.07			0.09					
v/c Ratio		0.23			0.26	0.72			0.43	0.47
Uniform Delay, d1		19.5			18.0	21.7			24.7	24.9
Progression Factor		1.00			0.72	1.00			1.00	1.00
Incremental Delay, d2		0.1			0.1	3.1			0.3	1.3
Delay (s)		19.6			12.9	24.8			25.0	26.2
Level of Service		B			B	C			C	C
Approach Delay (s)		19.6			12.9	24.8			25.3	
Approach LOS		B			B	C			C	

Intersection Summary			
HCM 2000 Control Delay	22.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

4/22/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	37	831	196	35	155	125	25	166	48	298
Ideal Flow (vphpl)	1000	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.87		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.99		0.93		0.85		1.00	1.00
Flt Protected		0.95	0.97		1.00		1.00		0.95	0.99
Satd. Flow (prot)		1214	1864		2249		1161		1327	2543
Flt Permitted		0.95	0.97		1.00		1.00		0.47	0.91
Satd. Flow (perm)		1214	1864		2249		1161		658	2328
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	39	875	206	37	163	132	26	175	51	314
RTOR Reduction (vph)	0	0	9	0	1	0	18	0	0	0
Lane Group Flow (vph)	0	608	540	0	297	0	5	0	180	360
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	8	0	5	0	0	0	0	5
Parking (#/hr)		10	10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		18.5	18.5		16.0		16.0		31.0	31.0
Effective Green, g (s)		18.5	21.0		17.5		16.0		32.5	32.5
Actuated g/C Ratio		0.25	0.28		0.23		0.21		0.43	0.43
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		299	521		524		247		396	1044
v/s Ratio Prot		c0.50	0.29		c0.13				c0.08	0.06
v/s Ratio Perm							0.00		0.12	0.09
v/c Ratio		2.03	1.72dl		0.57		0.02		0.45	0.34
Uniform Delay, d1		28.2	27.0		25.4		23.3		18.1	14.2
Progression Factor		1.00	1.00		1.00		1.00		0.74	0.74
Incremental Delay, d2		476.6	49.0		4.4		0.1		2.9	0.7
Delay (s)		504.9	76.0		29.8		23.5		16.4	11.2
Level of Service		F	E		C		C		B	B
Approach Delay (s)			301.4		29.4					12.9
Approach LOS			F		C					B

Intersection Summary			
HCM 2000 Control Delay	180.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	83.4%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	335	1	76	181	19	319	10	531	4	4	437	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1700	1700	1700	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		0.99	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.91		1.00	1.00		1.00	0.99	
Flt Protected		0.95	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1534	1354		2698		1377	2748		1540	3041	
Flt Permitted		0.33	1.00		0.65		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		535	1354		1776		1377	2748		1540	3041	
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	409	1	93	221	23	389	12	648	5	5	533	38
RTOR Reduction (vph)	0	0	44	0	183	0	0	1	0	0	5	0
Lane Group Flow (vph)	0	410	49	0	450	0	12	652	0	5	566	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		49.6	49.6		49.6		1.2	27.0		1.0	27.1	
Effective Green, g (s)		49.6	49.6		49.6		1.2	27.0		1.0	27.1	
Actuated g/C Ratio		0.53	0.53		0.53		0.01	0.29		0.01	0.29	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Vehicle Extension (s)		3.0	3.0		3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		283	718		942		17	793		16	881	
v/s Ratio Prot							0.01	c0.24		0.00	c0.19	
v/s Ratio Perm		c0.77	0.04		0.25							
v/c Ratio		1.45	0.07		0.48		0.71	0.82		0.31	0.64	
Uniform Delay, d1		21.9	10.7		13.8		46.0	31.0		45.9	29.0	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		220.7	0.0		0.4		72.3	6.9		4.0	1.6	
Delay (s)		242.7	10.7		14.2		118.3	37.9		49.9	30.6	
Level of Service		F	B		B		F	D		D	C	
Approach Delay (s)		199.8			14.2			39.4			30.8	
Approach LOS		F			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	64.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.24		
Actuated Cycle Length (s)	93.5	Sum of lost time (s)	15.9
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	282	20	5	11	44	4	28	64	65	71	23
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00	0.98	1.00	0.97		1.00	0.94	
Flpb, ped/bikes		1.00			1.00	1.00	0.82	1.00		1.00	1.00	
Frt		0.99			1.00	0.85	1.00	0.90		1.00	0.96	
Flt Protected		1.00			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2566			1428	1202	1127	1254		1377	1316	
Flt Permitted		0.94			0.86	1.00	0.68	1.00		0.95	1.00	
Satd. Flow (perm)		2422			1251	1202	807	1254		1377	1316	
Peak-hour factor, PHF	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Adj. Flow (vph)	22	357	25	6	14	56	5	35	81	82	90	29
RTOR Reduction (vph)	0	6	0	0	0	28	0	69	0	0	16	0
Lane Group Flow (vph)	0	398	0	0	20	28	5	47	0	82	103	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Parking (#/hr)		2										
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		12.9			12.9	21.2	6.1	6.1		8.3	19.4	
Effective Green, g (s)		12.9			12.9	21.2	6.1	6.1		8.3	19.4	
Actuated g/C Ratio		0.30			0.30	0.50	0.14	0.14		0.20	0.46	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	2.0	3.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		738			381	744	116	180		270	603	
v/s Ratio Prot						0.01		c0.04		c0.06	0.08	
v/s Ratio Perm		c0.16			0.02	0.02	0.01					
v/c Ratio		0.54			0.05	0.04	0.04	0.26		0.30	0.17	
Uniform Delay, d1		12.2			10.4	5.4	15.6	16.1		14.5	6.7	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8			0.1	0.0	0.2	0.8		0.2	0.1	
Delay (s)		13.0			10.4	5.4	15.7	16.9		14.8	6.9	
Level of Service		B			B	A	B	B		B	A	
Approach Delay (s)		13.0			6.7			16.8			10.1	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	42.3	Sum of lost time (s)	15.0
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.

4/22/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	15	907	759	12	64	111
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1746	1535	842	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1746	1535	842	1134	1194
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	18	1080	904	14	76	132
RTOR Reduction (vph)	0	378	0	3	0	0
Lane Group Flow (vph)	18	702	904	11	76	132
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	47.3	47.3	47.2	42.2	11.6	63.8
Effective Green, g (s)	47.3	47.3	47.2	42.2	11.6	63.8
Actuated g/C Ratio	0.39	0.39	0.39	0.35	0.10	0.53
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	442	681	598	328	108	629
v/s Ratio Prot	0.02		c0.59	0.01	c0.07	0.11
v/s Ratio Perm		c0.40		0.01		
v/c Ratio	0.04	1.03	1.51	0.03	0.70	0.21
Uniform Delay, d1	22.9	36.9	36.9	26.0	53.1	15.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	42.7	238.8	0.0	18.7	0.2
Delay (s)	22.9	79.6	275.8	26.1	71.8	15.4
Level of Service	C	E	F	C	E	B
Approach Delay (s)	78.7		272.0			36.0
Approach LOS	E		F			D

Intersection Summary			
HCM 2000 Control Delay	154.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	121.1	Sum of lost time (s)	20.0
Intersection Capacity Utilization	93.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
9: Terry A Francois Blvd/Terry A Francois Blvd. & South St.

4/22/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	332	293	4	21	432	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frpb, ped/bikes	0.96		1.00	1.00	0.99	
Flpb, ped/bikes	1.00		0.98	1.00	1.00	
Frt	0.94		1.00	1.00	0.98	
Flt Protected	0.97		0.95	1.00	1.00	
Satd. Flow (prot)	1585		1682	1531	3077	
Flt Permitted	0.97		0.23	1.00	1.00	
Satd. Flow (perm)	1585		404	1531	3077	
Peak-hour factor, PHF	0.67	0.67	0.67	0.67	0.67	0.67
Adj. Flow (vph)	496	437	6	31	645	85
RTOR Reduction (vph)	31	0	0	0	13	0
Lane Group Flow (vph)	902	0	6	31	717	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	45.2		25.6	25.6	25.6	
Effective Green, g (s)	45.2		25.6	25.6	25.6	
Actuated g/C Ratio	0.56		0.32	0.32	0.32	
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	886		128	485	974	
v/s Ratio Prot	c0.57			0.02	c0.23	
v/s Ratio Perm			0.01			
v/c Ratio	1.02		0.05	0.06	0.74	
Uniform Delay, d1	17.8		19.1	19.2	24.6	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	34.9		0.2	0.1	2.9	
Delay (s)	52.7		19.3	19.3	27.5	
Level of Service	D		B	B	C	
Approach Delay (s)	52.7			19.3	27.5	
Approach LOS	D			B	C	

Intersection Summary			
HCM 2000 Control Delay	41.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	80.8	Sum of lost time (s)	10.0
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: Third St. & South St.

4/22/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	0	0	0	0	445
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)						4.9
Lane Util. Factor						0.95
Frpb, ped/bikes						1.00
Flpb, ped/bikes						1.00
Frt						1.00
Flt Protected						1.00
Satd. Flow (prot)						3421
Flt Permitted						1.00
Satd. Flow (perm)						3421
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	0	0	0	0	0	511
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	0	511
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm			Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)						120.0
Effective Green, g (s)						120.0
Actuated g/C Ratio						1.00
Clearance Time (s)						4.9
Vehicle Extension (s)						3.0
Lane Grp Cap (vph)						3421
v/s Ratio Prot						c0.15
v/s Ratio Perm						
v/c Ratio						0.15
Uniform Delay, d1						0.0
Progression Factor						1.00
Incremental Delay, d2						0.1
Delay (s)						0.1
Level of Service						A
Approach Delay (s)	0.0		0.0			0.1
Approach LOS	A		A			A

Intersection Summary			
HCM 2000 Control Delay	0.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
11: Terry A Francois Blvd./Terry A Francois Blvd & 16th

4/22/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	15	0	25	725	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0	
Lane Util. Factor		1.00		0.95	0.95	
Frpb, ped/bikes		0.97		1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00	
Frt		0.85		1.00	1.00	
Flt Protected		1.00		1.00	1.00	
Satd. Flow (prot)		1338		2887	2887	
Flt Permitted		1.00		1.00	1.00	
Satd. Flow (perm)		1338		2887	2887	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	0	18	0	29	853	0
RTOR Reduction (vph)	0	18	0	0	0	0
Lane Group Flow (vph)	0	0	0	29	853	0
Confl. Peds. (#/hr)	1	1	25			25
Parking (#/hr)				5	5	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)		0.7		19.7	19.7	
Effective Green, g (s)		0.7		19.7	19.7	
Actuated g/C Ratio		0.01		0.35	0.35	
Clearance Time (s)		5.0		5.0	5.0	
Vehicle Extension (s)		3.0		3.0	3.0	
Lane Grp Cap (vph)		16		1022	1022	
v/s Ratio Prot				0.01	c0.30	
v/s Ratio Perm		c0.00				
v/c Ratio		0.01		0.03	0.83	
Uniform Delay, d1		27.1		11.7	16.5	
Progression Factor		1.00		1.00	1.00	
Incremental Delay, d2		0.4		0.0	6.0	
Delay (s)		27.5		11.7	22.4	
Level of Service		C		B	C	
Approach Delay (s)	27.5			11.7	22.4	
Approach LOS	C			B	C	

Intersection Summary			
HCM 2000 Control Delay	22.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	55.6	Sum of lost time (s)	15.0
Intersection Capacity Utilization	33.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
12: Illinois St & 16th

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	0	0	0	0	0	33	74	0	0	301	142
Peak Hour Factor	0.92	0.83	0.83	0.83	0.83	0.92	0.83	0.92	0.83	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0	40	80	0	0	327	154

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	0	0	0	0	120	327	154
Volume Left (vph)	0	0	0	0	40	0	0
Volume Right (vph)	0	0	0	0	0	0	154
Hadj (s)	0.00	0.00	0.00	0.00	0.10	0.03	-0.67
Departure Headway (s)	5.8	5.8	5.8	5.8	5.0	4.6	3.9
Degree Utilization, x	0.00	0.00	0.00	0.00	0.17	0.42	0.17
Capacity (veh/h)	577	577	577	577	705	768	905
Control Delay (s)	7.6	7.6	7.6	7.6	9.0	9.7	6.5
Approach Delay (s)	0.0		0.0		9.0	8.7	
Approach LOS	A		A		A	A	

Intersection Summary			
Delay	8.8		
Level of Service	A		
Intersection Capacity Utilization	49.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰↰	↑↱		↰	↑↱	
Volume (vph)	0	0	120	0	175	0	149	0	0	0	304	141
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)			5.5		5.5		5.0				5.2	
Lane Util. Factor			1.00		1.00		0.97				0.95	
Frpb, ped/bikes			0.96		1.00		1.00				0.99	
Flpb, ped/bikes			1.00		1.00		1.00				1.00	
Frt			0.85		1.00		1.00				0.95	
Flt Protected			1.00		1.00		0.95				1.00	
Satd. Flow (prot)			1118		1365		2515				2452	
Flt Permitted			1.00		1.00		0.95				1.00	
Satd. Flow (perm)			1118		1365		2515				2452	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	0	0	141	0	206	0	175	0	0	0	358	166
RTOR Reduction (vph)	0	0	114	0	0	0	0	0	0	0	34	0
Lane Group Flow (vph)	0	0	27	0	206	0	175	0	0	0	490	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm		Perm	Perm	NA	Perm	Prot			Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)			23.4		23.4		13.6				67.3	
Effective Green, g (s)			23.4		23.4		13.6				67.3	
Actuated g/C Ratio			0.19		0.19		0.11				0.56	
Clearance Time (s)			5.5		5.5		5.0				5.2	
Vehicle Extension (s)			3.0		3.0		3.0				3.0	
Lane Grp Cap (vph)			218		266		285				1375	
v/s Ratio Prot					c0.15		c0.07				c0.20	
v/s Ratio Perm			0.02									
v/c Ratio			0.13		0.77		0.61				0.36	
Uniform Delay, d1			39.9		45.8		50.7				14.5	
Progression Factor			1.00		1.00		1.00				1.00	
Incremental Delay, d2			0.3		13.1		3.9				0.2	
Delay (s)			40.1		58.9		54.6				14.6	
Level of Service			D		E		D				B	
Approach Delay (s)		40.1			58.9			54.6			14.6	
Approach LOS		D			E			D			B	

Intersection Summary			
HCM 2000 Control Delay	33.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↱		↰	↑↱	
Volume (vph)	102	94	2	3	447	14	4	6	1	25	2	73
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.91	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1239	1621	1674		1481	1355	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.70	1.00		0.75	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1239	1198	1674		1173	1355	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	115	106	2	3	502	16	4	7	1	28	2	82
RTOR Reduction (vph)	0	0	1	0	0	9	0	1	0	0	61	0
Lane Group Flow (vph)	115	106	1	3	502	7	4	7	0	28	23	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	10.9	47.4	47.4	2.7	39.2	39.2	21.9	21.9		21.9	21.9	
Effective Green, g (s)	10.9	47.4	47.4	2.7	39.2	39.2	21.9	21.9		21.9	21.9	
Actuated g/C Ratio	0.13	0.54	0.54	0.03	0.45	0.45	0.25	0.25		0.25	0.25	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	203	929	790	50	768	558	301	421		295	341	
v/s Ratio Prot	c0.07	0.06		0.00	c0.29			0.00			0.02	
v/s Ratio Perm			0.00			0.01	0.00			c0.02		
v/c Ratio	0.57	0.11	0.00	0.06	0.65	0.01	0.01	0.02		0.09	0.07	
Uniform Delay, d1	35.8	9.6	9.0	40.9	18.6	13.2	24.4	24.5		25.0	24.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.6	0.2	0.0	0.5	2.0	0.0	0.0	0.0		0.1	0.1	
Delay (s)	39.4	9.9	9.0	41.4	20.6	13.2	24.5	24.5		25.1	24.9	
Level of Service	D	A	A	D	C	B	C	C		C	C	
Approach Delay (s)		25.1			20.5			24.5			24.9	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	87.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	74.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	147	6	11	504	8	29	193	14	35	339	141
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1049	1540	3048			3065	1072
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.37	1.00			0.89	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1049	595	3048			2752	1072
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	15	179	7	13	615	10	35	235	17	43	413	172
RTOR Reduction (vph)	0	0	3	0	0	4	0	6	0	0	0	132
Lane Group Flow (vph)	15	179	4	13	615	6	35	246	0	0	456	40
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	0.7	53.4	53.4	0.8	52.5	52.5	22.0	22.0			21.0	21.0
Effective Green, g (s)	0.7	53.4	53.4	0.8	52.5	52.5	22.0	22.0			21.0	21.0
Actuated g/C Ratio	0.01	0.60	0.60	0.01	0.59	0.59	0.25	0.25			0.24	0.24
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	9	727	824	13	715	617	146	751			647	252
v/s Ratio Prot	c0.01	0.15		0.01	c0.51			0.08				
v/s Ratio Perm			0.00			0.01	0.06				c0.17	0.04
v/c Ratio	1.67	0.25	0.01	1.00	0.86	0.01	0.24	0.33			0.70	0.16
Uniform Delay, d1	44.2	8.4	7.2	44.2	15.3	7.6	26.9	27.5			31.3	27.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	565.3	0.2	0.0	249.6	10.3	0.0	0.9	0.3			3.5	0.3
Delay (s)	609.6	8.6	7.2	293.8	25.6	7.6	27.8	27.8			34.8	27.4
Level of Service	F	A	A	F	C	A	C	C			C	C
Approach Delay (s)		53.4			30.8			27.8			32.7	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	33.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	89.2	Sum of lost time (s)	15.0
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	118	59	25	334	315	19	123	9	38	51	13
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.91	1.00	1.00	0.96	1.00	0.99	
Flpb, ped/bikes	1.00	1.00		0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1334	897		1330	1126	875	1070	957	921	1070	1078	
Flt Permitted	0.16	1.00		0.60	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	218	897		833	1126	875	1070	957	921	1070	1078	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	18	142	71	30	402	380	23	148	11	46	61	16
RTOR Reduction (vph)	0	19	0	0	0	188	0	0	8	0	8	0
Lane Group Flow (vph)	18	194	0	30	402	192	23	148	3	46	69	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	31.4	31.4		34.5	34.5	44.0	5.5	22.0	22.0	9.5	26.0	
Effective Green, g (s)	31.4	31.4		34.5	34.5	44.0	5.5	22.0	22.0	9.5	26.0	
Actuated g/C Ratio	0.36	0.36		0.40	0.40	0.50	0.06	0.25	0.25	0.11	0.30	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	93	323		354	445	491	67	241	232	116	321	
v/s Ratio Prot	0.00	c0.22		0.00	c0.36	c0.04	0.02	c0.15		0.04	0.06	
v/s Ratio Perm	0.07			0.03		0.18			0.00			
v/c Ratio	0.19	0.60		0.08	0.90	0.39	0.34	0.61	0.01	0.40	0.21	
Uniform Delay, d1	20.6	22.8		16.5	24.8	13.3	39.1	28.8	24.4	36.2	22.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	3.1		0.1	21.3	0.5	3.1	4.6	0.0	2.2	0.3	
Delay (s)	21.6	25.9		16.6	46.1	13.8	42.2	33.4	24.5	38.4	23.3	
Level of Service	C	C		B	D	B	D	C	C	D	C	
Approach Delay (s)		25.6			29.9			34.0			28.9	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	87.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	55.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	76	36	10	602	154	12	5	17	13	2	10	307
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	97	46	13	772	197	15	6	22	17	3	13	394

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	156	772	213	28	17	409
Volume Left (vph)	97	772	0	6	0	3
Volume Right (vph)	13	0	15	0	17	394
Hadj (s)	0.11	0.53	-0.02	0.15	-0.67	-0.54
Departure Headway (s)	7.2	6.9	6.3	8.0	7.2	6.3
Degree Utilization, x	0.31	1.0	0.37	0.06	0.03	0.72
Capacity (veh/h)	475	530	562	418	461	560
Control Delay (s)	13.5	242.8	11.9	10.4	9.3	23.7
Approach Delay (s)	13.5	192.9		10.0		23.7
Approach LOS	B	F		A		C

Intersection Summary			
Delay	126.7		
Level of Service	F		
Intersection Capacity Utilization	75.8%	ICU Level of Service	D
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	78	23	31	428	7	100	105	9	34	134	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	0.99	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	1.00		1.00	0.99		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1686	3275		1676	3411		1260	2482		1260	2221	
Flt Permitted	0.34	1.00		0.67	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	609	3275		1190	3411		1260	2482		1260	2221	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	45	94	28	37	516	8	120	127	11	41	161	307
RTOR Reduction (vph)	0	20	0	0	1	0	0	7	0	0	130	0
Lane Group Flow (vph)	45	102	0	37	523	0	120	131	0	41	338	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	29.7	29.7		29.7	29.7		16.9	39.9		14.9	37.9	
Effective Green, g (s)	29.7	29.7		29.7	29.7		16.9	39.9		14.9	37.9	
Actuated g/C Ratio	0.30	0.30		0.30	0.30		0.17	0.40		0.15	0.38	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Grp Cap (vph)	180	972		353	1013		212	990		187	841	
v/s Ratio Prot		0.03			c0.15		c0.10	0.05		0.03	c0.15	
v/s Ratio Perm	0.07			0.03								
v/c Ratio	0.25	0.11		0.10	0.52		0.57	0.13		0.22	0.40	
Uniform Delay, d1	26.7	25.5		25.5	29.2		38.2	19.1		37.4	22.7	
Progression Factor	1.00	1.00		1.00	1.00		0.84	0.76		1.00	1.00	
Incremental Delay, d2	3.3	0.2		0.6	1.9		6.9	0.2		2.7	1.4	
Delay (s)	30.0	25.7		26.1	31.1		38.8	14.7		40.1	24.2	
Level of Service	C	C		C	C		D	B		D	C	
Approach Delay (s)		26.9			30.7			25.9			25.5	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	128	11	3	869	3	13	0	4	9	0	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00			0.97		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3380		1711	3420			1681		1711	1531	
Flt Permitted	0.27	1.00		0.66	1.00			0.80		0.75	1.00	
Satd. Flow (perm)	487	3380		1182	3420			1399		1343	1531	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	139	12	3	945	3	14	0	4	10	0	11
RTOR Reduction (vph)	0	6	0	0	0	0	0	14	0	0	9	0
Lane Group Flow (vph)	7	145	0	3	948	0	0	4	0	10	2	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	18.1	18.1		18.1	18.1			7.9		7.9	7.9	
Effective Green, g (s)	18.1	18.1		18.1	18.1			7.9		7.9	7.9	
Actuated g/C Ratio	0.50	0.50		0.50	0.50			0.22		0.22	0.22	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	244	1699		594	1719			307		294	335	
v/s Ratio Prot		0.04			c0.28						0.00	
v/s Ratio Perm	0.01			0.00				0.00		c0.01		
v/c Ratio	0.03	0.09		0.01	0.55			0.01		0.03	0.01	
Uniform Delay, d1	4.5	4.6		4.5	6.2			11.0		11.0	11.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.0		0.0	0.4			0.0		0.0	0.0	
Delay (s)	4.6	4.7		4.5	6.5			11.0		11.1	11.0	
Level of Service	A	A		A	A			B		B	B	
Approach Delay (s)		4.7			6.5			11.0			11.0	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	6.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	36.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	43	0	0	809	14	70	31	126	0	0	449
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frt		1.00			1.00		1.00	0.88				0.85
Flt Protected		0.99			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3384			5119		1711	3009				2694
Flt Permitted		0.85			1.00		0.95	1.00				1.00
Satd. Flow (perm)		2917			5119		1711	3009				2694
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	14	50	0	0	941	16	81	36	147	0	0	522
RTOR Reduction (vph)	0	0	0	0	3	0	0	87	0	0	0	495
Lane Group Flow (vph)	0	64	0	0	954	0	81	96	0	0	0	27
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		35.5			26.5		31.0	31.0				4.0
Effective Green, g (s)		35.5			26.5		31.0	31.0				4.0
Actuated g/C Ratio		0.47			0.35		0.41	0.41				0.05
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1387			1784		697	1227				141
v/s Ratio Prot		0.00			c0.19		c0.05	0.03				c0.01
v/s Ratio Perm		0.02										
v/c Ratio		0.05			0.53		0.12	0.08				0.19
Uniform Delay, d1		11.0			19.8		14.0	13.8				34.5
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			1.2		0.3	0.1				3.1
Delay (s)		11.1			21.0		14.3	13.9				37.5
Level of Service		B			C		B	B				D
Approach Delay (s)		11.1			21.0			14.0			37.5	
Approach LOS		B			C			B			D	

Intersection Summary			
HCM 2000 Control Delay	24.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	52.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.
4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	55	196	1121	207	0	0
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	*0.85	*0.85	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.91	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1091	1007	2620	1422		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1091	1007	2620	1422		
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	65	233	1335	246	0	0
RTOR Reduction (vph)	4	4	0	0	0	0
Lane Group Flow (vph)	150	140	1335	246	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	18.4	18.4	31.6	60.0		
Effective Green, g (s)	18.4	18.4	31.6	60.0		
Actuated g/C Ratio	0.31	0.31	0.53	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	334	308	1379	1422		
v/s Ratio Prot	0.14		c0.51	0.17		
v/s Ratio Perm		c0.14				
v/c Ratio	0.45	0.45	0.97	0.17		
Uniform Delay, d1	16.7	16.8	13.7	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	1.0	1.1	17.0	0.1		
Delay (s)	17.7	17.8	30.7	0.1		
Level of Service	B	B	C	A		
Approach Delay (s)	17.7			25.9	0.0	
Approach LOS	B			C	A	

Intersection Summary			
HCM 2000 Control Delay	24.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	60.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	42	85	6	191	1	105	87	5	0	178	276
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5			5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95			0.95	
Frpb, ped/bikes	1.00	0.91		1.00	1.00		1.00	0.99			0.92	
Flpb, ped/bikes	0.97	1.00		0.90	1.00		1.00	1.00			1.00	
Frt	1.00	0.90		1.00	1.00		1.00	0.99			0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1183	1866		1096	1278		1215	2391			2039	
Flt Permitted	0.36	1.00		0.66	1.00		0.95	1.00			1.00	
Satd. Flow (perm)	452	1866		764	1278		1215	2391			2039	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	27	47	94	7	212	1	117	97	6	0	198	307
RTOR Reduction (vph)	0	66	0	0	0	0	0	2	0	0	176	0
Lane Group Flow (vph)	27	75	0	7	213	0	117	101	0	0	329	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	36.2	36.2		25.1	25.1		16.3	73.0			51.2	
Effective Green, g (s)	36.2	36.2		25.1	25.1		16.3	73.0			51.2	
Actuated g/C Ratio	0.30	0.30		0.21	0.21		0.14	0.61			0.43	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5			5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)	171	562		159	267		165	1454			869	
v/s Ratio Prot	0.01	c0.04			c0.17		c0.10	0.04			c0.16	
v/s Ratio Perm	0.04			0.01								
v/c Ratio	0.16	0.13		0.04	0.80		0.71	0.07			0.38	
Uniform Delay, d1	30.6	30.5		37.9	45.0		49.6	9.6			23.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.4	0.1		0.1	15.2		13.1	0.1			1.3	
Delay (s)	31.1	30.6		38.0	60.2		62.6	9.7			24.8	
Level of Service	C	C		D	E		E	A			C	
Approach Delay (s)		30.7			59.5			37.9			24.8	
Approach LOS		C			E			D			C	

Intersection Summary			
HCM 2000 Control Delay	35.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

EXISTING 2015 PLUS PROJECT – BASKETBALL GAME
NO SF GIANTS GAME AT AT&T PARK
SATURDAY EVENING

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰↰	↑↱		↰↰	↑↱			↰↑↑↑	↱			
Volume (vph)	637	670	58	422	569	78	43	497	162	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	0.90			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	0.99		1.00	0.98			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	3017		2987	2982			5515	1233			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	3017		2987	2982			5515	1233			
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	708	744	64	469	632	87	48	552	180	0	0	0
RTOR Reduction (vph)	0	6	0	0	8	0	0	0	147	0	0	0
Lane Group Flow (vph)	708	802	0	469	711	0	0	600	33	0	0	0
Confl. Peds. (#/hr)			100			100	100		100			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	25.5	41.4		29.5	45.4			20.2	20.2			
Effective Green, g (s)	25.5	41.4		29.5	45.4			20.2	20.2			
Actuated g/C Ratio	0.23	0.38		0.27	0.41			0.18	0.18			
Clearance Time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	1038	1135		801	1230			1012	226			
v/s Ratio Prot	0.16	c0.27		0.16	c0.24							
v/s Ratio Perm								0.11	0.03			
v/c Ratio	0.68	0.71		0.59	0.58			0.59	0.15			
Uniform Delay, d1	38.6	29.1		34.9	24.9			41.1	37.7			
Progression Factor	0.58	0.50		0.81	0.28			1.13	3.39			
Incremental Delay, d2	1.4	2.9		0.4	0.3			0.8	0.3			
Delay (s)	23.8	17.4		28.7	7.2			47.3	128.1			
Level of Service	C	B		C	A			D	F			
Approach Delay (s)		20.4			15.7			65.9			0.0	
Approach LOS		C			B			E			A	

Intersection Summary			
HCM 2000 Control Delay	29.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.9
Intersection Capacity Utilization	91.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑↱		↰	↑↱			↰	↱	↰	↑↱	↱
Volume (vph)	152	1277	79	51	517	44	7	49	28	60	555	97
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.98		1.00	0.95			1.00	0.63	1.00	0.99	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00	0.67	1.00	1.00
Frt	1.00	0.99		1.00	0.99			1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	4288		1296	2436			1574	857	1033	2916	581
Flt Permitted	0.95	1.00		0.95	1.00			0.91	1.00	0.72	1.00	1.00
Satd. Flow (perm)	1540	4288		1296	2436			1449	857	781	2916	581
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	162	1359	84	54	550	47	7	52	30	64	590	103
RTOR Reduction (vph)	0	5	0	0	5	0	0	0	22	0	1	67
Lane Group Flow (vph)	162	1438	0	54	592	0	0	59	8	64	599	26
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	16.0	51.2		9.5	43.1			29.4	29.4	30.4	30.4	30.4
Effective Green, g (s)	16.0	51.2		9.5	43.1			29.4	29.4	30.4	30.4	30.4
Actuated g/C Ratio	0.15	0.47		0.09	0.39			0.27	0.27	0.28	0.28	0.28
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	224	1995		111	954			387	229	215	805	160
v/s Ratio Prot	0.11	c0.34		0.04	c0.24						c0.21	
v/s Ratio Perm								0.04	0.01	0.08		0.04
v/c Ratio	0.72	0.72		0.49	0.62			0.15	0.04	0.30	0.74	0.16
Uniform Delay, d1	44.9	23.7		47.9	26.9			30.8	29.8	31.4	36.2	30.1
Progression Factor	0.92	1.24		0.85	0.69			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.6	1.8		2.8	1.1			0.2	0.1	0.8	3.7	0.5
Delay (s)	49.7	31.1		43.7	19.7			31.0	29.9	32.2	40.0	30.6
Level of Service	D	C		D	B			C	C	C	D	C
Approach Delay (s)		33.0			21.7			30.6			38.2	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	31.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	110.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1458	80	3	618	30	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3052			3078	1540	1357
Flt Permitted	1.00			0.95	0.95	1.00
Satd. Flow (perm)	3052			2922	1540	1357
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	1602	88	3	679	33	55
RTOR Reduction (vph)	1	0	0	0	0	21
Lane Group Flow (vph)	1689	0	0	682	33	35
Confl. Peds. (#/hr)		10	10			3
Confl. Bikes (#/hr)		1				
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Actuated Green, G (s)	91.2			91.2	7.5	7.5
Effective Green, g (s)	91.2			91.2	7.5	7.5
Actuated g/C Ratio	0.83			0.83	0.07	0.07
Clearance Time (s)	4.9			4.9	6.4	6.4
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	2530			2422	105	92
v/s Ratio Prot	c0.55				0.02	
v/s Ratio Perm				0.23		c0.03
v/c Ratio	0.67			0.28	0.31	0.38
Uniform Delay, d1	3.6			2.1	48.8	49.0
Progression Factor	1.00			0.15	1.00	1.00
Incremental Delay, d2	1.4			0.1	1.7	2.6
Delay (s)	5.0			0.4	50.5	51.6
Level of Service	A			A	D	D
Approach Delay (s)	5.0			0.4	51.2	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	5.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	262	1267	145	34	172	356	188	403	981	262
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		3.5			3.0	3.0			3.0	3.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.95			1.00	1.00
Flpb, ped/bikes		0.99			0.99	1.00			1.00	1.00
Frt		0.99			1.00	0.95			1.00	0.85
Flt Protected		0.99			0.99	1.00			0.95	1.00
Satd. Flow (prot)		5749			2844	2411			4102	1122
Flt Permitted		0.99			0.78	1.00			0.95	1.00
Satd. Flow (perm)		5749			2224	2411			4102	1122
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	270	1306	149	35	177	367	194	415	1011	270
RTOR Reduction (vph)	0	18	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	1707	0	0	212	558	0	0	1453	243
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Prot
Protected Phases		6			4	4		7	7	7
Permitted Phases	6			4						
Actuated Green, G (s)		24.0			21.5	21.5			27.0	27.0
Effective Green, g (s)		26.0			24.5	24.5			30.0	30.0
Actuated g/C Ratio		0.29			0.27	0.27			0.33	0.33
Clearance Time (s)		5.5			6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1660			605	656			1367	374
v/s Ratio Prot						c0.23			c0.35	0.22
v/s Ratio Perm		0.30			0.10					
v/c Ratio		1.03			0.35	0.85			1.06	0.65
Uniform Delay, d1		32.0			26.3	31.0			30.0	25.5
Progression Factor		1.55			1.00	1.00			1.00	1.00
Incremental Delay, d2		25.9			0.4	10.3			43.0	3.9
Delay (s)		75.5			26.7	41.3			73.0	29.4
Level of Service		E			C	D			E	C
Approach Delay (s)		75.5			26.7	41.3			66.7	
Approach LOS		E			C	D			E	

Intersection Summary			
HCM 2000 Control Delay	64.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	102.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

4/27/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	51	317	276	49	155	105	14	231	55	735
Ideal Flow (vphpl)	1400	1400	1400	1400	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.88		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.98		0.94		0.85		1.00	1.00
Flt Protected		0.95	0.99		1.00		1.00		0.95	1.00
Satd. Flow (prot)		1700	2620		2297		1161		1327	2558
Flt Permitted		0.95	0.99		1.00		1.00		0.44	0.95
Satd. Flow (perm)		1700	2620		2297		1161		621	2444
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	63	391	341	60	191	130	17	285	68	907
RTOR Reduction (vph)	0	0	19	0	1	0	12	0	0	0
Lane Group Flow (vph)	0	337	499	0	322	0	3	0	346	914
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	8	0	5	0	0	0	0	5
Parking (#/hr)		10	10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		18.5	18.5		16.0		16.0		31.0	31.0
Effective Green, g (s)		18.5	21.0		17.5		16.0		32.5	32.5
Actuated g/C Ratio		0.25	0.28		0.23		0.21		0.43	0.43
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		419	733		535		247		386	1078
v/s Ratio Prot		c0.20	0.19		0.14				0.15	c0.14
v/s Ratio Perm							0.00		c0.24	0.23
v/c Ratio		0.80	0.68		0.60		0.01		0.90	0.85
Uniform Delay, d1		26.5	24.0		25.6		23.3		21.1	19.0
Progression Factor		1.00	1.00		1.00		1.00		1.00	1.00
Incremental Delay, d2		15.1	5.1		5.0		0.1		25.9	8.3
Delay (s)		41.6	29.1		30.6		23.4		47.0	27.3
Level of Service		D	C		C		C		D	C
Approach Delay (s)			34.0		30.3					32.7
Approach LOS			C		C					C

Intersection Summary			
HCM 2000 Control Delay	32.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	982	120	8	4	14	9	343	74	137	228	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.98		1.00	0.97		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.93		1.00	0.97		1.00	0.99	
Flt Protected		1.00	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1619	1353		1455		1272	2390		1540	3055	
Flt Permitted		1.00	1.00		0.62		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1618	1353		914		1272	2390		1540	3055	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	10	1012	124	8	4	14	9	354	76	141	235	10
RTOR Reduction (vph)	0	0	56	0	6	0	0	17	0	0	3	0
Lane Group Flow (vph)	0	1022	68	0	20	0	9	413	0	141	242	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		61.2	61.2		61.2		1.0	22.1		12.7	34.1	
Effective Green, g (s)		61.2	61.2		61.2		1.0	22.1		12.7	34.1	
Actuated g/C Ratio		0.55	0.55		0.55		0.01	0.20		0.11	0.30	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Vehicle Extension (s)		3.0	3.0		3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		884	739		499		11	472		174	930	
v/s Ratio Prot							0.01	c0.17		c0.09	0.08	
v/s Ratio Perm		c0.63	0.05		0.02							
v/c Ratio		1.16	0.09		0.04		0.82	0.88		0.81	0.26	
Uniform Delay, d1		25.4	12.1		11.7		55.4	43.6		48.4	29.4	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		83.0	0.1		0.0		162.4	16.4		22.9	0.1	
Delay (s)		108.4	12.1		11.8		217.7	60.0		71.3	29.5	
Level of Service		F	B		B		F	E		E	C	
Approach Delay (s)		97.9			11.8			63.2			44.8	
Approach LOS		F			B			E			D	

Intersection Summary			
HCM 2000 Control Delay	78.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	111.9	Sum of lost time (s)	15.9
Intersection Capacity Utilization	98.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	828	7	2	5	16	5	29	1	282	166	13
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00	0.96	1.00	1.00		1.00	0.97	
Flpb, ped/bikes		1.00			1.00	1.00	0.75	1.00		1.00	1.00	
Frt		1.00			1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected		1.00			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2598			1432	1187	1037	1440		1377	1398	
Flt Permitted		0.95			0.90	1.00	0.93	1.00		0.95	1.00	
Satd. Flow (perm)		2479			1300	1187	1015	1440		1377	1398	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	8	952	8	2	6	18	6	33	1	324	191	15
RTOR Reduction (vph)	0	0	0	0	0	5	0	1	0	0	4	0
Lane Group Flow (vph)	0	968	0	0	8	13	6	33	0	324	202	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Parking (#/hr)		2										
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		33.2			33.2	45.6	4.3	4.3		12.4	21.7	
Effective Green, g (s)		33.2			33.2	45.6	4.3	4.3		12.4	21.7	
Actuated g/C Ratio		0.51			0.51	0.70	0.07	0.07		0.19	0.33	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	2.0	3.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		1268			665	925	67	95		263	467	
v/s Ratio Prot						0.00		0.02		c0.24	c0.14	
v/s Ratio Perm		c0.39			0.01	0.01	0.01					
v/c Ratio		0.76			0.01	0.01	0.09	0.35		1.23	0.43	
Uniform Delay, d1		12.7			7.8	2.9	28.5	29.0		26.3	16.8	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.8			0.0	0.0	0.6	2.2		132.9	0.6	
Delay (s)		15.5			7.8	2.9	29.0	31.2		159.2	17.5	
Level of Service		B			A	A	C	C		F	B	
Approach Delay (s)		15.5			4.4			30.9			104.1	
Approach LOS		B			A			C			F	

Intersection Summary			
HCM 2000 Control Delay	45.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	64.9	Sum of lost time (s)	15.0
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.

4/27/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	20	104	199	25	834	153
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.97	1.00	0.93	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1741	1535	809	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1741	1535	809	1134	1194
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	23	120	229	29	959	176
RTOR Reduction (vph)	0	110	0	24	0	0
Lane Group Flow (vph)	23	10	229	5	959	176
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	7.9	7.9	20.0	15.0	53.0	78.0
Effective Green, g (s)	7.9	7.9	20.0	15.0	53.0	78.0
Actuated g/C Ratio	0.08	0.08	0.21	0.16	0.55	0.81
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	93	143	320	168	626	971
v/s Ratio Prot	c0.02		c0.15	0.00	c0.85	0.15
v/s Ratio Perm		0.01		0.00		
v/c Ratio	0.25	0.07	0.72	0.03	1.53	0.18
Uniform Delay, d1	41.2	40.6	35.3	34.3	21.5	2.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	0.2	7.4	0.1	247.4	0.1
Delay (s)	42.6	40.8	42.7	34.4	268.8	2.0
Level of Service	D	D	D	C	F	A
Approach Delay (s)	41.1		41.8			227.5
Approach LOS	D		D			F

Intersection Summary			
HCM 2000 Control Delay	178.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	95.9	Sum of lost time (s)	20.0
Intersection Capacity Utilization	98.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
9: Terry A Francois Blvd/Terry A Francois Blvd. & South St.

4/27/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	3	1	211	94	43	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frpb, ped/bikes	0.98		1.00	1.00	1.00	
Flpb, ped/bikes	0.97		0.98	1.00	1.00	
Frt	0.97		1.00	1.00	0.99	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1591		1669	1531	3119	
Flt Permitted	0.96		0.72	1.00	1.00	
Satd. Flow (perm)	1591		1263	1531	3119	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	4	1	251	112	51	4
RTOR Reduction (vph)	1	0	0	0	1	0
Lane Group Flow (vph)	4	0	251	112	54	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	0.8		24.6	24.6	24.6	
Effective Green, g (s)	0.8		24.6	24.6	24.6	
Actuated g/C Ratio	0.02		0.69	0.69	0.69	
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	35		877	1063	2167	
v/s Ratio Prot	c0.00			0.07	0.02	
v/s Ratio Perm			c0.20			
v/c Ratio	0.11		0.29	0.11	0.02	
Uniform Delay, d1	17.0		2.1	1.8	1.7	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	1.5		0.2	0.0	0.0	
Delay (s)	18.4		2.2	1.8	1.7	
Level of Service	B		A	A	A	
Approach Delay (s)	18.4			2.1	1.7	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	2.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	35.4	Sum of lost time (s)	10.0
Intersection Capacity Utilization	40.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: Third St. & South St.

4/27/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	10	42	359	54	275	226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.94	0.98		1.00	1.00
Flpb, ped/bikes	0.95	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1628	1437	3302		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1628	1437	3302		1711	3421
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	11	45	386	58	296	243
RTOR Reduction (vph)	0	42	11	0	0	0
Lane Group Flow (vph)	11	3	433	0	296	243
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	4.1	4.1	30.4		15.2	50.7
Effective Green, g (s)	4.1	4.1	30.4		15.2	50.7
Actuated g/C Ratio	0.06	0.06	0.47		0.23	0.78
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	102	90	1544		400	2668
v/s Ratio Prot			c0.13		c0.17	0.07
v/s Ratio Perm	c0.01	0.00				
v/c Ratio	0.11	0.03	0.28		0.74	0.09
Uniform Delay, d1	28.7	28.6	10.6		23.1	1.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.5	0.1	0.5		7.0	0.1
Delay (s)	29.2	28.7	11.1		30.1	1.8
Level of Service	C	C	B		C	A
Approach Delay (s)	28.8		11.1			17.3
Approach LOS	C		B			B

Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	59.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
11: Terry A Francois Blvd./Terry A Francois Blvd & 16th

4/27/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	10	7	7	295	34	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.97		1.00	0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.97	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1519	1342		2882	2768	
Flt Permitted	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1519	1342		2739	2768	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	12	8	8	347	40	12
RTOR Reduction (vph)	0	8	0	0	9	0
Lane Group Flow (vph)	12	0	0	355	43	0
Confl. Peds. (#/hr)	1	1	25			25
Parking (#/hr)				5	5	
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	0.6	0.6		11.2	11.2	
Effective Green, g (s)	0.6	0.6		11.2	11.2	
Actuated g/C Ratio	0.01	0.01		0.24	0.24	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	19	17		649	656	
v/s Ratio Prot	c0.01				0.02	
v/s Ratio Perm		0.00		c0.13		
v/c Ratio	0.63	0.01		0.55	0.07	
Uniform Delay, d1	23.2	23.0		15.8	13.9	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	52.7	0.1		0.9	0.0	
Delay (s)	75.9	23.1		16.7	14.0	
Level of Service	E	C		B	B	
Approach Delay (s)	54.8			16.7	14.0	
Approach LOS	D			B	B	

Intersection Summary			
HCM 2000 Control Delay	18.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	47.2	Sum of lost time (s)	15.0
Intersection Capacity Utilization	24.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
12: Illinois St & 16th

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	129	1	20	4	2	5	28	222	8	5	53	38
Peak Hour Factor	0.92	0.79	0.79	0.79	0.79	0.92	0.79	0.92	0.79	0.92	0.92	0.92
Hourly flow rate (vph)	140	1	25	5	3	5	35	241	10	5	58	41

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	140	27	5	8	287	63	41
Volume Left (vph)	140	0	5	0	35	5	0
Volume Right (vph)	0	25	0	5	10	0	41
Hadj (s)	0.53	-0.63	0.53	-0.44	0.04	0.08	-0.67
Departure Headway (s)	6.1	4.9	6.3	5.3	5.2	5.4	4.6
Degree Utilization, x	0.24	0.04	0.01	0.01	0.41	0.09	0.05
Capacity (veh/h)	559	687	525	618	676	634	733
Control Delay (s)	9.7	6.9	8.2	7.2	11.8	7.8	6.7
Approach Delay (s)	9.3		7.6		11.8	7.3	
Approach LOS	A		A		B	A	

Intersection Summary			
Delay	10.1		
Level of Service	B		
Intersection Capacity Utilization	41.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	152	133	99	1	61	6	68	255	16	1	163	71
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1274	1365	1131	1290	1365	1116	2515	2565		1296	2454	
Flt Permitted	0.71	1.00	1.00	0.66	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	955	1365	1131	899	1365	1116	2515	2565		1296	2454	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	171	149	111	1	69	7	76	287	18	1	183	80
RTOR Reduction (vph)	0	0	77	0	0	5	0	5	0	0	53	0
Lane Group Flow (vph)	171	149	34	1	69	2	76	300	0	1	210	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	14.8	14.8	14.8	14.8	14.8	14.8	4.0	16.9		0.9	13.8	
Effective Green, g (s)	14.8	14.8	14.8	14.8	14.8	14.8	4.0	16.9		0.9	13.8	
Actuated g/C Ratio	0.31	0.31	0.31	0.31	0.31	0.31	0.08	0.35		0.02	0.29	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	292	418	346	275	418	341	208	897		24	701	
v/s Ratio Prot		0.11			0.05		0.03	c0.12		0.00	c0.09	
v/s Ratio Perm	c0.18		0.03	0.00		0.00						
v/c Ratio	0.59	0.36	0.10	0.00	0.17	0.01	0.37	0.33		0.04	0.30	
Uniform Delay, d1	14.2	13.0	12.0	11.6	12.2	11.6	20.9	11.6		23.3	13.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.0	0.5	0.1	0.0	0.2	0.0	1.1	0.2		0.7	0.2	
Delay (s)	17.1	13.6	12.1	11.6	12.4	11.6	22.0	11.8		24.0	13.7	
Level of Service	B	B	B	B	B	B	C	B		C	B	
Approach Delay (s)		14.6			12.3			13.8			13.8	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	48.3	Sum of lost time (s)	15.7
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	145	365	1	2	179	18	3	5	1	17	1	44
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.86	1.00	1.00		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1250	1621	1663		1492	1356	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.73	1.00		0.75	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1250	1239	1663		1184	1356	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	151	380	1	2	186	19	3	5	1	18	1	46
RTOR Reduction (vph)	0	0	0	0	0	12	0	1	0	0	37	0
Lane Group Flow (vph)	151	380	1	2	186	7	3	5	0	18	10	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	20.5	47.7	47.7	2.5	29.7	29.7	15.0	15.0		15.0	15.0	
Effective Green, g (s)	20.5	47.7	47.7	2.5	29.7	29.7	15.0	15.0		15.0	15.0	
Actuated g/C Ratio	0.26	0.59	0.59	0.03	0.37	0.37	0.19	0.19		0.19	0.19	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	414	1014	862	50	631	462	231	311		221	253	
v/s Ratio Prot	c0.09	c0.22		0.00	0.11			0.00			0.01	
v/s Ratio Perm			0.00			0.01	0.00			c0.02		
v/c Ratio	0.36	0.37	0.00	0.04	0.29	0.02	0.01	0.02		0.08	0.04	
Uniform Delay, d1	24.5	8.5	6.6	37.7	17.8	16.0	26.6	26.6		26.9	26.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	1.1	0.0	0.3	0.3	0.0	0.0	0.0		0.2	0.1	
Delay (s)	25.1	9.5	6.6	38.0	18.1	16.0	26.6	26.6		27.1	26.8	
Level of Service	C	A	A	D	B	B	C	C		C	C	
Approach Delay (s)		13.9			18.1			26.6			26.8	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	80.2	Sum of lost time (s)	15.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↱			↰↑	↱
Volume (vph)	16	387	3	5	217	5	11	482	104	21	14	39
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.97	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1046	1540	2997			2989	1073
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.73	1.00			0.74	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1046	1182	2997			2271	1073
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	18	435	3	6	244	6	12	542	117	24	16	44
RTOR Reduction (vph)	0	0	2	0	0	3	0	17	0	0	0	29
Lane Group Flow (vph)	18	435	1	6	244	3	12	642	0	0	40	15
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	2.1	32.1	32.1	0.9	29.9	29.9	24.5	24.5			23.5	23.5
Effective Green, g (s)	2.1	32.1	32.1	0.9	29.9	29.9	24.5	24.5			23.5	23.5
Actuated g/C Ratio	0.03	0.46	0.46	0.01	0.42	0.42	0.35	0.35			0.33	0.33
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	36	553	627	19	515	443	410	1041			757	357
v/s Ratio Prot	c0.01	c0.36		0.00	0.20			c0.21				
v/s Ratio Perm			0.00			0.00	0.01				0.02	0.01
v/c Ratio	0.50	0.79	0.00	0.32	0.47	0.01	0.03	0.62			0.05	0.04
Uniform Delay, d1	33.7	16.3	10.5	34.5	14.6	11.7	15.2	19.1			15.9	15.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	10.5	7.3	0.0	9.3	0.7	0.0	0.0	1.1			0.0	0.0
Delay (s)	44.2	23.6	10.5	43.8	15.3	11.7	15.2	20.2			16.0	15.9
Level of Service	D	C	B	D	B	B	B	C			B	B
Approach Delay (s)		24.3			15.9			20.1			16.0	
Approach LOS		C			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	70.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑	↱	↰	↑	↱	↰	↑↱	
Volume (vph)	20	300	60	8	197	62	31	91	8	97	40	24
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.92	1.00	1.00	0.95	1.00	0.97	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1320	927		1335	1126	882	1070	957	908	1070	1034	
Flt Permitted	0.45	1.00		0.39	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	625	927		544	1126	882	1070	957	908	1070	1034	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	24	353	71	9	232	73	36	107	9	114	47	28
RTOR Reduction (vph)	0	7	0	0	0	30	0	0	8	0	24	0
Lane Group Flow (vph)	24	417	0	9	232	43	36	107	1	114	51	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	37.1	37.1		36.4	36.4	46.0	9.3	11.5	11.5	9.6	11.8	
Effective Green, g (s)	37.1	37.1		36.4	36.4	46.0	9.3	11.5	11.5	9.6	11.8	
Actuated g/C Ratio	0.47	0.47		0.46	0.46	0.58	0.12	0.15	0.15	0.12	0.15	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	305	436		257	520	570	126	139	132	130	154	
v/s Ratio Prot	0.00	c0.45		0.00	c0.21	0.01	0.03	c0.11		c0.11	0.05	
v/s Ratio Perm	0.04			0.02		0.04			0.00			
v/c Ratio	0.08	0.96		0.04	0.45	0.07	0.29	0.77	0.01	0.88	0.33	
Uniform Delay, d1	11.7	20.1		15.1	14.4	7.1	31.7	32.4	28.8	34.0	30.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	31.9		0.1	0.6	0.1	1.3	22.2	0.0	43.7	1.3	
Delay (s)	11.8	51.9		15.2	15.0	7.2	33.0	54.6	28.8	77.7	31.3	
Level of Service	B	D		B	B	A	C	D	C	E	C	
Approach Delay (s)		49.8			13.2			48.0			59.3	
Approach LOS		D			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	40.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	78.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	224	270	27	26	54	7	22	24	30	5	24	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		1.00		1.00	0.99			1.00	0.97		0.98	
Flpb, ped/bikes		0.99		0.99	1.00			0.99	1.00		1.00	
Frt		0.99		1.00	0.98			1.00	0.85		0.91	
Flt Protected		0.98		0.95	1.00			0.98	1.00		1.00	
Satd. Flow (prot)		1469		1696	1760			1745	1492		1357	
Flt Permitted		0.83		0.42	1.00			0.86	1.00		0.99	
Satd. Flow (perm)		1238		758	1760			1529	1492		1342	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	280	338	34	32	68	9	28	30	38	6	30	75
RTOR Reduction (vph)	0	1	0	0	4	0	0	0	31	0	62	0
Lane Group Flow (vph)	0	651	0	32	73	0	0	58	7	0	49	0
Confl. Peds. (#/hr)	13		16	16		13	16		19	19		16
Parking (#/hr)		10	10								10	10
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4		4	8		
Actuated Green, G (s)		43.1		43.1	43.1			14.6	14.6		14.6	
Effective Green, g (s)		43.1		43.1	43.1			14.6	14.6		14.6	
Actuated g/C Ratio		0.52		0.52	0.52			0.18	0.18		0.18	
Clearance Time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		649		397	923			271	265		238	
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.53		0.04				c0.04	0.00		0.04	
v/c Ratio		1.00		0.08	0.08			0.21	0.03		0.21	
Uniform Delay, d1		19.5		9.7	9.7			28.8	27.9		28.8	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		35.9		0.1	0.0			0.4	0.0		0.4	
Delay (s)		55.4		9.8	9.7			29.2	27.9		29.2	
Level of Service		E		A	A			C	C		C	
Approach Delay (s)		55.4			9.7			28.7			29.2	
Approach LOS		E			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	44.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	82.1	Sum of lost time (s)	14.0
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	46	468	21	22	101	13	16	280	41	12	179	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	0.97	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.98		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1666	3394		1695	3344		1260	2459		1260	2390	
Flt Permitted	0.67	1.00		0.34	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1173	3394		607	3344		1260	2459		1260	2390	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	53	538	24	25	116	15	18	322	47	14	206	83
RTOR Reduction (vph)	0	3	0	0	9	0	0	10	0	0	40	0
Lane Group Flow (vph)	53	559	0	25	122	0	18	359	0	14	249	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	30.1	30.1		30.1	30.1		6.8	43.9		2.6	39.7	
Effective Green, g (s)	30.1	30.1		30.1	30.1		6.8	43.9		2.6	39.7	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.07	0.48		0.03	0.43	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	383	1109		198	1092		93	1172		35	1030	
v/s Ratio Prot		c0.16			0.04		0.01	c0.15		0.01	c0.10	
v/s Ratio Perm	0.05			0.04								
v/c Ratio	0.14	0.50		0.13	0.11		0.19	0.31		0.40	0.24	
Uniform Delay, d1	21.9	25.0		21.8	21.7		40.1	14.8		44.0	16.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.4		0.3	0.0		1.0	0.7		7.3	0.1	
Delay (s)	22.0	25.3		22.1	21.7		41.1	15.4		51.3	16.8	
Level of Service	C	C		C	C		D	B		D	B	
Approach Delay (s)		25.1			21.8			16.6			18.4	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	21.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	92.1	Sum of lost time (s)	15.5
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	558	11	2	184	1	13	0	1	2	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00			0.99		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3411		1711	3419			1705		1711	1621	
Flt Permitted	0.63	1.00		0.42	1.00			0.78		0.75	1.00	
Satd. Flow (perm)	1126	3411		751	3419			1388		1346	1621	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	607	12	2	200	1	14	0	1	2	1	2
RTOR Reduction (vph)	0	2	0	0	1	0	0	11	0	0	1	0
Lane Group Flow (vph)	2	617	0	2	200	0	0	4	0	2	2	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	12.4	12.4		12.4	12.4			7.7		7.7	7.7	
Effective Green, g (s)	12.4	12.4		12.4	12.4			7.7		7.7	7.7	
Actuated g/C Ratio	0.41	0.41		0.41	0.41			0.26		0.26	0.26	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	463	1405		309	1408			355		344	414	
v/s Ratio Prot		c0.18			0.06						0.00	
v/s Ratio Perm	0.00			0.00				c0.00		0.00		
v/c Ratio	0.00	0.44		0.01	0.14			0.01		0.01	0.00	
Uniform Delay, d1	5.2	6.4		5.2	5.5			8.4		8.3	8.3	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.2		0.0	0.0			0.0		0.0	0.0	
Delay (s)	5.2	6.6		5.2	5.6			8.4		8.4	8.3	
Level of Service	A	A		A	A			A		A	A	
Approach Delay (s)		6.6			5.6			8.4			8.3	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	30.1	Sum of lost time (s)	10.0
Intersection Capacity Utilization	31.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	85	0	0	254	12	155	574	494	0	0	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frt		1.00			0.99		1.00	0.93				0.85
Flt Protected		0.99			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3401			5097		1711	3184				2694
Flt Permitted		0.92			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3150			5097		1711	3184				2694
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	14	106	0	0	318	15	194	718	618	0	0	31
RTOR Reduction (vph)	0	0	0	0	7	0	0	205	0	0	0	29
Lane Group Flow (vph)	0	120	0	0	326	0	194	1131	0	0	0	2
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		35.5			26.5		31.0	31.0				4.0
Effective Green, g (s)		35.5			26.5		31.0	31.0				4.0
Actuated g/C Ratio		0.47			0.35		0.41	0.41				0.05
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1484			1777		697	1298				141
v/s Ratio Prot		c0.00			c0.06		0.11	c0.36				0.00
v/s Ratio Perm		0.03										
v/c Ratio		0.08			0.18		0.28	0.87				0.01
Uniform Delay, d1		11.2			17.2		15.0	20.7				34.1
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			0.2		1.0	8.2				0.1
Delay (s)		11.3			17.4		16.0	28.9				34.3
Level of Service		B			B		B	C				C
Approach Delay (s)		11.3			17.4			27.3			34.3	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	24.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	50.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.

4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	96	169	195	239	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.95	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1620	1428	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1620	1428	3319	1801		
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	117	206	238	291	0	0
RTOR Reduction (vph)	18	50	0	0	0	0
Lane Group Flow (vph)	153	102	238	291	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	40.4	40.4	9.6	60.0		
Effective Green, g (s)	40.4	40.4	9.6	60.0		
Actuated g/C Ratio	0.67	0.67	0.16	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	1090	961	531	1801		
v/s Ratio Prot	0.09		c0.07	c0.16		
v/s Ratio Perm		0.07				
v/c Ratio	0.14	0.11	0.45	0.16		
Uniform Delay, d1	3.5	3.4	22.8	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.1	0.0	0.6	0.0		
Delay (s)	3.6	3.5	23.4	0.0		
Level of Service	A	A	C	A		
Approach Delay (s)	3.5			10.6	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	7.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	23.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	61	33	105	2	25	0	85	212	0	6	163	55
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.94		1.00	1.00		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	0.98	1.00		0.95	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	1.00		1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1189	1902		1159	1279		1215	2431		1215	2297	
Flt Permitted	0.40	1.00		0.83	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	496	1902		1017	1279		1215	2431		1215	2297	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	69	37	118	2	28	0	96	238	0	7	183	62
RTOR Reduction (vph)	0	86	0	0	0	0	0	0	0	0	25	0
Lane Group Flow (vph)	69	69	0	2	28	0	96	238	0	7	220	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	15.4	15.4		4.8	4.8		6.0	23.7		2.0	19.7	
Effective Green, g (s)	15.4	15.4		4.8	4.8		6.0	23.7		2.0	19.7	
Actuated g/C Ratio	0.27	0.27		0.08	0.08		0.10	0.41		0.03	0.34	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	197	510		85	106		127	1003		42	788	
v/s Ratio Prot	c0.03	0.04			0.02		c0.08	0.10		0.01	c0.10	
v/s Ratio Perm	c0.06			0.00								
v/c Ratio	0.35	0.13		0.02	0.26		0.76	0.24		0.17	0.28	
Uniform Delay, d1	16.6	15.9		24.1	24.6		25.0	11.0		26.9	13.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	0.1		0.1	1.3		22.3	0.1		1.9	0.2	
Delay (s)	17.7	16.1		24.3	26.0		47.2	11.1		28.8	13.9	
Level of Service	B	B		C	C		D	B		C	B	
Approach Delay (s)		16.6			25.9			21.5			14.3	
Approach LOS		B			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	18.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	57.4	Sum of lost time (s)	21.6
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

EXISTING 2015 PLUS PROJECT – BASKETBALL GAME WITH SF GIANTS GAME AT AT&T PARK SATURDAY EVENING

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	462	634	215	465	575	87	26	433	91	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.97		1.00	0.99			1.00	0.89			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00			
Frt	1.00	0.96		1.00	0.98			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	2884		2987	2974			5533	1232			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	2884		2987	2974			5533	1232			
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	570	783	265	574	710	107	32	535	112	0	0	0
RTOR Reduction (vph)	0	30	0	0	9	0	0	0	93	0	0	0
Lane Group Flow (vph)	570	1018	0	574	808	0	0	567	19	0	0	0
Confl. Peds. (#/hr)			100			100	100		100			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	22.7	38.8		33.7	49.8			18.6	18.6			
Effective Green, g (s)	22.7	38.8		33.7	49.8			18.6	18.6			
Actuated g/C Ratio	0.21	0.35		0.31	0.45			0.17	0.17			
Clearance Time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	924	1017		915	1346			935	208			
v/s Ratio Prot	0.13	c0.35		0.19	c0.27							
v/s Ratio Perm								0.10	0.02			
v/c Ratio	0.62	1.00		0.63	0.60			0.61	0.09			
Uniform Delay, d1	39.7	35.6		32.8	22.6			42.3	38.6			
Progression Factor	1.00	1.00		0.74	0.36			1.09	6.15			
Incremental Delay, d2	1.2	28.4		0.8	0.5			1.0	0.2			
Delay (s)	40.9	64.0		25.1	8.7			47.3	237.4			
Level of Service	D	E		C	A			D	F			
Approach Delay (s)		55.8			15.4			78.7			0.0	
Approach LOS		E			B			E			A	

Intersection Summary			
HCM 2000 Control Delay	44.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.9
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	108	1034	45	50	492	59	11	72	40	237	694	241
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.98		1.00	0.93			1.00	0.63	1.00	0.98	0.46
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00	0.68	1.00	1.00
Frt	1.00	0.99		1.00	0.98			1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	4324		1296	2376			1583	844	1043	2882	563
Flt Permitted	0.95	1.00		0.95	1.00			0.88	1.00	0.70	1.00	1.00
Satd. Flow (perm)	1540	4324		1296	2376			1396	844	764	2882	563
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	123	1175	51	57	559	67	12	82	45	269	789	274
RTOR Reduction (vph)	0	4	0	0	7	0	0	0	28	0	2	98
Lane Group Flow (vph)	123	1222	0	57	619	0	0	94	17	269	814	149
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	13.0	43.1		11.3	39.8			45.7	45.7	46.7	46.7	46.7
Effective Green, g (s)	13.0	43.1		11.3	39.8			45.7	45.7	46.7	46.7	46.7
Actuated g/C Ratio	0.11	0.36		0.09	0.33			0.38	0.38	0.39	0.39	0.39
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	166	1553		122	788			531	321	297	1121	219
v/s Ratio Prot	0.08	c0.28		0.04	c0.26						0.28	
v/s Ratio Perm								0.07	0.02	c0.35		0.26
v/c Ratio	0.74	0.79		0.47	0.79			0.18	0.05	0.91	0.73	0.68
Uniform Delay, d1	51.9	34.3		51.5	36.2			24.7	23.5	34.6	31.2	30.4
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.2	4.1		2.8	5.2			0.2	0.1	29.0	2.4	8.1
Delay (s)	68.1	38.5		54.3	41.4			24.8	23.5	63.6	33.6	38.5
Level of Service	E	D		D	D			C	C	E	C	D
Approach Delay (s)		41.2			42.5			24.4			40.6	
Approach LOS		D			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	40.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	110.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1150	105	0	744	48	37
Ideal Flow (vphpl)	1000	1000	1000	1000	1000	1000
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	1598			1621	810	714
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	1598			1621	810	714
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	1264	115	0	818	53	41
RTOR Reduction (vph)	3	0	0	0	0	35
Lane Group Flow (vph)	1376	0	0	818	53	6
Confl. Peds. (#/hr)		10	10			3
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	83.8			83.8	14.9	14.9
Effective Green, g (s)	83.8			83.8	14.9	14.9
Actuated g/C Ratio	0.76			0.76	0.14	0.14
Clearance Time (s)	4.9			4.9	6.4	6.4
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1217			1234	109	96
v/s Ratio Prot	c0.86			0.50	c0.07	
v/s Ratio Perm						0.01
v/c Ratio	1.13			0.66	0.49	0.06
Uniform Delay, d1	13.1			6.3	44.0	41.4
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	69.5			1.4	3.4	0.3
Delay (s)	82.6			7.7	47.4	41.7
Level of Service	F			A	D	D
Approach Delay (s)	82.6			7.7	44.9	
Approach LOS	F			A	D	

Intersection Summary			
HCM 2000 Control Delay	54.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	91.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

4/27/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	31	352	98	28	284	654	209	497	1065	249
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		3.5			3.0	3.0			3.0	3.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.97			1.00	0.97			1.00	1.00
Flpb, ped/bikes		1.00			1.00	1.00			1.00	1.00
Frt		0.97			1.00	0.96			1.00	0.85
Flt Protected		1.00			1.00	1.00			0.95	1.00
Satd. Flow (prot)		5634			2870	2501			4106	1122
Flt Permitted		1.00			0.76	1.00			0.95	1.00
Satd. Flow (perm)		5634			2186	2501			4106	1122
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	33	371	103	29	299	688	220	523	1121	262
RTOR Reduction (vph)	0	70	0	0	0	31	0	0	0	0
Lane Group Flow (vph)	0	437	0	0	328	877	0	0	1670	236
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Prot
Protected Phases		6			4	4		7	7	7
Permitted Phases	6			4						
Actuated Green, G (s)		13.3			22.0	22.0			22.2	22.2
Effective Green, g (s)		15.3			25.0	25.0			25.2	25.2
Actuated g/C Ratio		0.20			0.33	0.33			0.34	0.34
Clearance Time (s)		5.5			6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1149			728	833			1379	376
v/s Ratio Prot						c0.35			c0.41	0.21
v/s Ratio Perm		0.08			0.15					
v/c Ratio		0.38			0.45	1.05			1.21	0.63
Uniform Delay, d1		25.8			19.6	25.0			24.9	21.0
Progression Factor		1.00			0.89	1.00			1.00	1.00
Incremental Delay, d2		0.2			0.1	46.1			101.9	3.3
Delay (s)		26.0			17.7	71.1			126.8	24.2
Level of Service		C			B	E			F	C
Approach Delay (s)		26.0			17.7	71.1			114.1	
Approach LOS		C			B	E			F	

Intersection Summary			
HCM 2000 Control Delay	82.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	98.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	70	408	558	56	242	215	40	322	61	799
Ideal Flow (vphpl)	1400	1400	1400	1400	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.87		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.99		0.93		0.85		1.00	1.00
Flt Protected		0.95	1.00		1.00		1.00		0.95	1.00
Satd. Flow (prot)		1700	2661		2224		1161		1327	2553
Flt Permitted		0.95	1.00		1.00		1.00		0.29	0.93
Satd. Flow (perm)		1700	2661		2224		1161		401	2382
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	74	434	594	60	257	229	43	343	65	850
RTOR Reduction (vph)	0	0	12	0	1	0	31	0	0	0
Lane Group Flow (vph)	0	456	694	0	489	0	8	0	367	891
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	8	0	5	0	0	0	0	5
Parking (#/hr)		10	10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		18.5	18.5		16.0		16.0		31.0	31.0
Effective Green, g (s)		18.5	21.0		17.5		16.0		32.5	32.5
Actuated g/C Ratio		0.25	0.28		0.23		0.21		0.43	0.43
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		419	745		518		247		328	1060
v/s Ratio Prot		c0.27	0.26		0.22				c0.19	0.14
v/s Ratio Perm							0.01		c0.30	0.22
v/c Ratio		1.09	0.93		0.94		0.03		1.12	0.84
Uniform Delay, d1		28.2	26.3		28.3		23.4		24.1	18.9
Progression Factor		1.00	1.00		1.00		1.00		0.79	0.75
Incremental Delay, d2		69.9	19.9		27.9		0.3		57.8	0.8
Delay (s)		98.1	46.2		56.2		23.6		76.9	15.1
Level of Service		F	D		E		C		E	B
Approach Delay (s)			66.6		53.8					33.1
Approach LOS			E		D					C

Intersection Summary			
HCM 2000 Control Delay	50.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	58	28	137	0	3	3	20	427	25	99	333	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1700	1700	1700	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.98		1.00	0.99		1.00	0.99	
Flpb, ped/bikes		0.99	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.93		1.00	0.99		1.00	0.97	
Flt Protected		0.97	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1546	1348		1485		1377	2703		1540	2951	
Flt Permitted		0.79	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1268	1348		1485		1377	2703		1540	2951	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	65	31	154	0	3	3	22	480	28	111	374	109
RTOR Reduction (vph)	0	0	136	0	3	0	0	2	0	0	10	0
Lane Group Flow (vph)	0	96	18	0	3	0	22	506	0	111	473	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm		NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		14.2	14.2		14.2		4.6	74.9		15.0	85.6	
Effective Green, g (s)		14.2	14.2		14.2		4.6	74.9		15.0	85.6	
Actuated g/C Ratio		0.12	0.12		0.12		0.04	0.62		0.12	0.71	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Vehicle Extension (s)		3.0	3.0		3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		150	159		175		52	1687		192	2105	
v/s Ratio Prot					0.00		0.02	c0.19		c0.07	0.16	
v/s Ratio Perm		c0.08	0.01									
v/c Ratio		0.64	0.11		0.02		0.42	0.30		0.58	0.22	
Uniform Delay, d1		50.5	47.3		46.7		56.4	10.4		49.5	5.9	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		9.0	0.3		0.0		2.0	0.5		2.6	0.1	
Delay (s)		59.4	47.6		46.8		58.4	10.9		52.1	5.9	
Level of Service		E	D		D		E	B		D	A	
Approach Delay (s)		52.1			46.8			12.9			14.6	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	20.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.9
Intersection Capacity Utilization	53.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	35	9	3	73	44	1	36	5	182	219	142
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00	0.99	1.00	0.99		1.00	0.89	
Flpb, ped/bikes		1.00			1.00	1.00	0.87	1.00		1.00	1.00	
Frt		0.97			1.00	0.85	1.00	0.98		1.00	0.94	
Flt Protected		1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2505			1447	1218	1198	1412		1377	1218	
Flt Permitted		0.93			0.99	1.00	0.71	1.00		0.95	1.00	
Satd. Flow (perm)		2349			1430	1218	901	1412		1377	1218	
Peak-hour factor, PHF	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Adj. Flow (vph)	4	47	12	4	97	59	1	48	7	243	292	189
RTOR Reduction (vph)	0	10	0	0	0	24	0	6	0	0	22	0
Lane Group Flow (vph)	0	53	0	0	101	35	1	49	0	243	459	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Parking (#/hr)		2										
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		8.1			8.1	29.6	5.6	5.6		21.5	32.1	
Effective Green, g (s)		8.1			8.1	29.6	5.6	5.6		21.5	32.1	
Actuated g/C Ratio		0.16			0.16	0.59	0.11	0.11		0.43	0.64	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	2.0	3.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		379			230	839	100	157		589	778	
v/s Ratio Prot						0.02		0.03		0.18	c0.38	
v/s Ratio Perm		0.02			c0.07	0.01	0.00					
v/c Ratio		0.14			0.44	0.04	0.01	0.31		0.41	0.59	
Uniform Delay, d1		18.1			19.0	4.3	19.8	20.5		10.0	5.2	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.2			1.3	0.0	0.0	1.1		0.2	1.2	
Delay (s)		18.2			20.3	4.3	19.9	21.7		10.1	6.4	
Level of Service		B			C	A	B	C		B	A	
Approach Delay (s)		18.2			14.4			21.6			7.7	
Approach LOS		B			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	50.2	Sum of lost time (s)	15.0
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.
4/27/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	26	136	318	19	827	192
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1743	1535	851	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1743	1535	851	1134	1194
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	33	174	408	24	1060	246
RTOR Reduction (vph)	0	155	0	11	0	0
Lane Group Flow (vph)	33	19	408	13	1060	246
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	8.4	8.4	34.2	29.2	20.1	59.3
Effective Green, g (s)	8.4	8.4	34.2	29.2	20.1	59.3
Actuated g/C Ratio	0.11	0.11	0.44	0.38	0.26	0.76
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	122	188	675	374	293	911
v/s Ratio Prot	c0.03		c0.27	0.01	c0.93	0.21
v/s Ratio Perm		0.01		0.01		
v/c Ratio	0.27	0.10	0.60	0.04	3.62	0.27
Uniform Delay, d1	31.8	31.2	16.6	15.3	28.8	2.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.2	0.2	1.5	0.0	1186.4	0.2
Delay (s)	33.0	31.5	18.1	15.4	1215.2	2.9
Level of Service	C	C	B	B	F	A
Approach Delay (s)	31.7		18.0			986.9
Approach LOS	C		B			F

Intersection Summary			
HCM 2000 Control Delay	670.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.66		
Actuated Cycle Length (s)	77.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	103.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
9: Terry A Francois Blvd/Terry A Francois Blvd. & South St.

4/27/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	6	3	284	93	63	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frpb, ped/bikes	0.95		1.00	1.00	0.99	
Flpb, ped/bikes	0.97		0.97	1.00	1.00	
Frt	0.95		1.00	1.00	0.98	
Flt Protected	0.97		0.95	1.00	1.00	
Satd. Flow (prot)	1533		1665	1531	3064	
Flt Permitted	0.97		0.68	1.00	1.00	
Satd. Flow (perm)	1533		1193	1531	3064	
Peak-hour factor, PHF	0.66	0.66	0.66	0.66	0.66	0.66
Adj. Flow (vph)	9	5	430	141	95	18
RTOR Reduction (vph)	5	0	0	0	5	0
Lane Group Flow (vph)	9	0	430	141	108	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	0.9		30.4	30.4	30.4	
Effective Green, g (s)	0.9		30.4	30.4	30.4	
Actuated g/C Ratio	0.02		0.74	0.74	0.74	
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	33		878	1126	2255	
v/s Ratio Prot	c0.01			0.09	0.04	
v/s Ratio Perm			c0.36			
v/c Ratio	0.28		0.49	0.13	0.05	
Uniform Delay, d1	19.9		2.2	1.6	1.5	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	4.5		0.4	0.1	0.0	
Delay (s)	24.4		2.7	1.6	1.5	
Level of Service	C		A	A	A	
Approach Delay (s)	24.4			2.4	1.5	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	2.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	41.3	Sum of lost time (s)	10.0
Intersection Capacity Utilization	44.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: Third St. & South St.

4/27/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	15	48	358	80	291	321
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.92	0.99		1.00	1.00
Flpb, ped/bikes	0.91	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.97		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1558	1410	3284		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1558	1410	3284		1711	3421
Peak-hour factor, PHF	0.77	0.77	0.77	0.77	0.77	0.77
Adj. Flow (vph)	19	62	465	104	378	417
RTOR Reduction (vph)	0	59	17	0	0	0
Lane Group Flow (vph)	19	3	553	0	378	417
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	6.4	6.4	65.0		33.3	103.4
Effective Green, g (s)	6.4	6.4	65.0		33.3	103.4
Actuated g/C Ratio	0.05	0.05	0.54		0.28	0.86
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	83	75	1778		474	2947
v/s Ratio Prot			c0.17		c0.22	0.12
v/s Ratio Perm	c0.01	0.00				
v/c Ratio	0.23	0.04	0.31		0.80	0.14
Uniform Delay, d1	54.4	53.9	15.2		40.2	1.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.4	0.2	0.5		9.1	0.1
Delay (s)	55.8	54.1	15.6		49.3	1.4
Level of Service	E	D	B		D	A
Approach Delay (s)	54.5		15.6			24.2
Approach LOS	D		B			C

Intersection Summary			
HCM 2000 Control Delay	22.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	95.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
11: Terry A Francois Blvd./Terry A Francois Blvd & 16th

4/27/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	10	7	7	367	56	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.97		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.98	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1518	1341		2883	2807	
Flt Permitted	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1518	1341		2743	2807	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	12	8	8	432	66	12
RTOR Reduction (vph)	0	8	0	0	9	0
Lane Group Flow (vph)	12	0	0	440	69	0
Confl. Peds. (#/hr)	1	1	25			25
Parking (#/hr)				5	5	
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	0.6	0.6		13.3	13.3	
Effective Green, g (s)	0.6	0.6		13.3	13.3	
Actuated g/C Ratio	0.01	0.01		0.27	0.27	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	18	16		738	755	
v/s Ratio Prot	c0.01				0.02	
v/s Ratio Perm		0.00		c0.16		
v/c Ratio	0.67	0.01		0.60	0.09	
Uniform Delay, d1	24.3	24.1		15.7	13.5	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	66.1	0.2		1.3	0.1	
Delay (s)	90.4	24.3		17.0	13.6	
Level of Service	F	C		B	B	
Approach Delay (s)	63.9			17.0	13.6	
Approach LOS	E			B	B	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	49.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	26.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
12: Illinois St & 16th

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	130	2	56	5	2	5	46	225	9	5	53	38
Peak Hour Factor	0.92	0.91	0.91	0.91	0.91	0.92	0.91	0.92	0.91	0.92	0.92	0.92
Hourly flow rate (vph)	141	2	62	5	2	5	51	245	10	5	58	41

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	141	64	5	8	305	63	41
Volume Left (vph)	141	0	5	0	51	5	0
Volume Right (vph)	0	62	0	5	10	0	41
Hadj (s)	0.53	-0.64	0.53	-0.46	0.05	0.08	-0.67
Departure Headway (s)	6.1	5.0	6.4	5.4	5.3	5.5	4.8
Degree Utilization, x	0.24	0.09	0.01	0.01	0.45	0.10	0.05
Capacity (veh/h)	553	680	514	603	663	618	711
Control Delay (s)	9.9	7.2	8.3	7.3	12.5	7.9	6.8
Approach Delay (s)	9.1		7.7		12.5	7.5	
Approach LOS	A		A		B	A	

Intersection Summary			
Delay	10.4		
Level of Service	B		
Intersection Capacity Utilization	42.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	111	157	112	1	65	20	127	307	23	8	194	133
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.94	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.97	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1252	1365	1120	1284	1365	1091	2515	2556		1296	2409	
Flt Permitted	0.71	1.00	1.00	0.52	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	930	1365	1120	708	1365	1091	2515	2556		1296	2409	
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	135	191	137	1	79	24	155	374	28	10	237	162
RTOR Reduction (vph)	0	0	109	0	0	19	0	3	0	0	79	0
Lane Group Flow (vph)	135	191	28	1	79	5	155	399	0	10	320	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	20.1	20.1	20.1	20.1	20.1	20.1	11.3	59.0		1.9	49.6	
Effective Green, g (s)	20.1	20.1	20.1	20.1	20.1	20.1	11.3	59.0		1.9	49.6	
Actuated g/C Ratio	0.21	0.21	0.21	0.21	0.21	0.21	0.12	0.61		0.02	0.51	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	193	283	232	147	283	226	293	1559		25	1235	
v/s Ratio Prot		0.14			0.06		c0.06	0.16		0.01	c0.13	
v/s Ratio Perm	c0.15		0.03	0.00		0.00						
v/c Ratio	0.70	0.67	0.12	0.01	0.28	0.02	0.53	0.26		0.40	0.26	
Uniform Delay, d1	35.5	35.3	31.1	30.4	32.2	30.5	40.2	8.7		46.8	13.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.6	6.2	0.2	0.0	0.5	0.0	1.7	0.4		10.2	0.1	
Delay (s)	46.1	41.5	31.4	30.4	32.7	30.5	41.9	9.1		57.0	13.3	
Level of Service	D	D	C	C	C	C	D	A		E	B	
Approach Delay (s)		39.8			32.2			18.2			14.4	
Approach LOS		D			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	96.7	Sum of lost time (s)	15.7
Intersection Capacity Utilization	64.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	81	350	1	1	296	27	3	5	1	28	1	56
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.86	1.00	1.00		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.91	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1241	1621	1669		1483	1353	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.72	1.00		0.75	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1241	1220	1669		1175	1353	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	91	393	1	1	333	30	3	6	1	31	1	63
RTOR Reduction (vph)	0	0	0	0	0	17	0	1	0	0	47	0
Lane Group Flow (vph)	91	393	1	1	333	13	3	6	0	31	17	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	11.0	46.4	46.4	2.7	38.1	38.1	21.9	21.9		21.9	21.9	
Effective Green, g (s)	11.0	46.4	46.4	2.7	38.1	38.1	21.9	21.9		21.9	21.9	
Actuated g/C Ratio	0.13	0.54	0.54	0.03	0.44	0.44	0.25	0.25		0.25	0.25	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	207	920	782	50	755	549	310	425		299	344	
v/s Ratio Prot	c0.06	c0.23		0.00	0.20			0.00			0.01	
v/s Ratio Perm			0.00			0.01	0.00			c0.03		
v/c Ratio	0.44	0.43	0.00	0.02	0.44	0.02	0.01	0.01		0.10	0.05	
Uniform Delay, d1	34.7	11.8	9.1	40.4	16.6	13.5	23.9	24.0		24.5	24.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	1.5	0.0	0.2	0.4	0.0	0.0	0.0		0.2	0.1	
Delay (s)	36.1	13.3	9.1	40.5	17.0	13.5	24.0	24.0		24.7	24.3	
Level of Service	D	B	A	D	B	B	C	C		C	C	
Approach Delay (s)		17.6			16.8			24.0			24.4	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	86.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↱			↰↑	↱
Volume (vph)	71	376	32	47	280	28	11	272	42	15	191	20
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1048	1540	3018			3068	1072
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.59	1.00			0.90	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1048	960	3018			2785	1072
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	89	470	40	59	350	35	14	340	52	19	239	25
RTOR Reduction (vph)	0	0	19	0	0	18	0	13	0	0	0	20
Lane Group Flow (vph)	89	470	21	59	350	17	14	379	0	0	258	5
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	7.5	37.9	37.9	5.2	34.6	34.6	15.8	15.8			14.8	14.8
Effective Green, g (s)	7.5	37.9	37.9	5.2	34.6	34.6	15.8	15.8			14.8	14.8
Actuated g/C Ratio	0.10	0.53	0.53	0.07	0.48	0.48	0.22	0.22			0.21	0.21
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	126	640	726	111	584	504	210	663			573	220
v/s Ratio Prot	c0.07	c0.39		0.04	0.29			c0.13				
v/s Ratio Perm			0.02			0.02	0.01				0.09	0.00
v/c Ratio	0.71	0.73	0.03	0.53	0.60	0.03	0.07	0.57			0.45	0.02
Uniform Delay, d1	31.1	13.1	8.2	32.2	13.6	9.8	22.2	25.0			25.0	22.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	16.5	4.4	0.0	4.8	1.7	0.0	0.1	1.2			0.6	0.0
Delay (s)	47.6	17.5	8.2	37.0	15.3	9.9	22.3	26.2			25.6	22.8
Level of Service	D	B	A	D	B	A	C	C			C	C
Approach Delay (s)		21.3			17.7			26.1			25.3	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	71.9	Sum of lost time (s)	15.0
Intersection Capacity Utilization	65.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑	↱	↰	↑	↱	↰	↑↱	
Volume (vph)	15	348	58	7	194	110	48	158	3	127	45	20
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.91	1.00	1.00	0.96	1.00	0.97	
Flpb, ped/bikes	0.98	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1315	931		1335	1126	870	1070	957	916	1070	1042	
Flt Permitted	0.46	1.00		0.31	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	642	931		430	1126	870	1070	957	916	1070	1042	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	17	405	67	8	226	128	56	184	3	148	52	23
RTOR Reduction (vph)	0	5	0	0	0	51	0	0	2	0	17	0
Lane Group Flow (vph)	17	467	0	8	226	77	56	184	1	148	58	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	52.1	52.1		51.2	51.2	65.2	24.7	21.0	21.0	14.0	10.3	
Effective Green, g (s)	52.1	52.1		51.2	51.2	65.2	24.7	21.0	21.0	14.0	10.3	
Actuated g/C Ratio	0.48	0.48		0.47	0.47	0.60	0.23	0.19	0.19	0.13	0.10	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	320	449		210	534	566	245	186	178	138	99	
v/s Ratio Prot	0.00	c0.50		0.00	c0.20	0.02	c0.05	c0.19		c0.14	0.06	
v/s Ratio Perm	0.02			0.02		0.07			0.00			
v/c Ratio	0.05	1.04		0.04	0.42	0.14	0.23	0.99	0.00	1.07	0.58	
Uniform Delay, d1	15.1	27.8		24.5	18.6	9.2	33.8	43.3	35.0	46.9	46.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	53.2		0.1	0.5	0.1	0.5	62.2	0.0	97.3	8.5	
Delay (s)	15.2	81.0		24.5	19.1	9.3	34.3	105.5	35.0	144.2	55.2	
Level of Service	B	F		C	B	A	C	F	C	F	E	
Approach Delay (s)		78.7			15.8			88.2			114.3	
Approach LOS		E			B			F			F	

Intersection Summary			
HCM 2000 Control Delay	69.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	107.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	228	346	34	42	63	9	35	39	60	9	41	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		1.00		1.00	0.99			1.00	0.97		0.98	
Flpb, ped/bikes		0.99		0.99	1.00			0.99	1.00		1.00	
Frt		0.99		1.00	0.98			1.00	0.85		0.93	
Flt Protected		0.98		0.95	1.00			0.98	1.00		1.00	
Satd. Flow (prot)		1473		1697	1757			1746	1491		1387	
Flt Permitted		0.84		0.40	1.00			0.85	1.00		0.98	
Satd. Flow (perm)		1265		718	1757			1520	1491		1360	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	253	384	38	47	70	10	39	43	67	10	46	67
RTOR Reduction (vph)	0	2	0	0	4	0	0	0	53	0	53	0
Lane Group Flow (vph)	0	673	0	47	76	0	0	82	14	0	70	0
Confl. Peds. (#/hr)	13		16	16		13	16		19	19		16
Parking (#/hr)		10	10								10	10
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4		4	8		
Actuated Green, G (s)		42.5		42.5	42.5			16.9	16.9		16.9	
Effective Green, g (s)		42.5		42.5	42.5			16.9	16.9		16.9	
Actuated g/C Ratio		0.51		0.51	0.51			0.20	0.20		0.20	
Clearance Time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		643		365	893			307	301		274	
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.53		0.07				c0.05	0.01		0.05	
v/c Ratio		1.05		0.13	0.08			0.27	0.04		0.26	
Uniform Delay, d1		20.5		10.8	10.6			28.1	26.9		28.1	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		48.3		0.2	0.0			0.5	0.1		0.5	
Delay (s)		68.9		11.0	10.6			28.6	26.9		28.6	
Level of Service		E		B	B			C	C		C	
Approach Delay (s)		68.9			10.7			27.8			28.6	
Approach LOS		E			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	51.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	83.6	Sum of lost time (s)	14.0
Intersection Capacity Utilization	73.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	93	572	45	20	123	15	54	349	14	21	204	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1668	3375		1700	3347		1260	2498		1260	2387	
Flt Permitted	0.65	1.00		0.17	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1138	3375		297	3347		1260	2498		1260	2387	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	111	681	54	24	146	18	64	415	17	25	243	98
RTOR Reduction (vph)	0	5	0	0	9	0	0	2	0	0	43	0
Lane Group Flow (vph)	111	730	0	24	155	0	64	430	0	25	298	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	33.9	33.9		33.9	33.9		37.1	67.0		5.6	35.5	
Effective Green, g (s)	33.9	33.9		33.9	33.9		37.1	67.0		5.6	35.5	
Actuated g/C Ratio	0.28	0.28		0.28	0.28		0.30	0.55		0.05	0.29	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	316	937		82	930		383	1371		57	694	
v/s Ratio Prot		c0.22			0.05		0.05	c0.17		0.02	c0.13	
v/s Ratio Perm	0.10			0.08								
v/c Ratio	0.35	0.78		0.29	0.17		0.17	0.31		0.44	0.43	
Uniform Delay, d1	35.3	40.6		34.6	33.4		31.1	15.0		56.7	35.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	4.1		2.0	0.1		0.2	0.6		5.3	0.4	
Delay (s)	35.9	44.7		36.6	33.4		31.3	15.6		62.0	35.5	
Level of Service	D	D		D	C		C	B		E	D	
Approach Delay (s)		43.6			33.8			17.6			37.3	
Approach LOS		D			C			B			D	

Intersection Summary			
HCM 2000 Control Delay	34.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	122.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	729	11	2	247	1	13	0	1	2	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00			0.99		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3414		1711	3419			1705		1711	1621	
Flt Permitted	0.59	1.00		0.34	1.00			0.78		0.75	1.00	
Satd. Flow (perm)	1055	3414		608	3419			1386		1346	1621	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	792	12	2	268	1	14	0	1	2	1	2
RTOR Reduction (vph)	0	2	0	0	1	0	0	12	0	0	2	0
Lane Group Flow (vph)	2	802	0	2	268	0	0	3	0	2	1	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	15.8	15.8		15.8	15.8			7.8		7.8	7.8	
Effective Green, g (s)	15.8	15.8		15.8	15.8			7.8		7.8	7.8	
Actuated g/C Ratio	0.47	0.47		0.47	0.47			0.23		0.23	0.23	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	496	1605		285	1607			321		312	376	
v/s Ratio Prot		c0.24			0.08						0.00	
v/s Ratio Perm	0.00			0.00				c0.00		0.00		
v/c Ratio	0.00	0.50		0.01	0.17			0.01		0.01	0.00	
Uniform Delay, d1	4.7	6.2		4.7	5.1			9.9		9.9	9.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.2		0.0	0.0			0.0		0.0	0.0	
Delay (s)	4.7	6.4		4.7	5.2			9.9		9.9	9.9	
Level of Service	A	A		A	A			A		A	A	
Approach Delay (s)		6.4			5.2			9.9			9.9	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	33.6	Sum of lost time (s)	10.0
Intersection Capacity Utilization	36.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	74	0	0	302	21	209	440	665	0	0	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frt		1.00			0.99		1.00	0.91				0.85
Flt Protected		0.99			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3399			5082		1711	3112				2694
Flt Permitted		0.92			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3147			5082		1711	3112				2694
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	12	81	0	0	332	23	230	484	731	0	0	27
RTOR Reduction (vph)	0	0	0	0	10	0	0	361	0	0	0	26
Lane Group Flow (vph)	0	93	0	0	345	0	230	854	0	0	0	1
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		35.5			26.5		31.0	31.0				4.0
Effective Green, g (s)		35.5			26.5		31.0	31.0				4.0
Actuated g/C Ratio		0.47			0.35		0.41	0.41				0.05
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1483			1772		697	1269				141
v/s Ratio Prot		c0.00			c0.07		0.13	c0.27				0.00
v/s Ratio Perm		0.03										
v/c Ratio		0.06			0.19		0.33	0.67				0.01
Uniform Delay, d1		11.1			17.3		15.4	18.4				34.1
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			0.2		1.3	2.9				0.1
Delay (s)		11.2			17.5		16.7	21.2				34.3
Level of Service		B			B		B	C				C
Approach Delay (s)		11.2			17.5			20.5			34.3	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	52.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.

4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	85	175	211	325	0	0
Ideal Flow (vphpl)	1000	1000	1000	1000	1000	1000
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	*0.85	*0.85	*0.60	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.94	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	755	672	1080	948		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	755	672	1080	948		
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	98	201	243	374	0	0
RTOR Reduction (vph)	29	71	0	0	0	0
Lane Group Flow (vph)	127	72	243	374	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	30.2	30.2	19.8	60.0		
Effective Green, g (s)	30.2	30.2	19.8	60.0		
Actuated g/C Ratio	0.50	0.50	0.33	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	380	338	356	948		
v/s Ratio Prot	0.17		c0.22	c0.39		
v/s Ratio Perm		0.11				
v/c Ratio	0.33	0.21	0.68	0.39		
Uniform Delay, d1	8.9	8.3	17.4	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.5	0.3	5.3	0.3		
Delay (s)	9.4	8.6	22.7	0.3		
Level of Service	A	A	C	A		
Approach Delay (s)	9.0			9.1	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	36.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	110	79	150	2	84	4	115	285	5	3	203	97
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.91		1.00	0.99		1.00	1.00		1.00	0.96	
Flpb, ped/bikes	0.95	1.00		0.92	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.90		1.00	0.99		1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1157	1872		1116	1260		1215	2419		1215	2218	
Flt Permitted	0.47	1.00		0.58	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	572	1872		684	1260		1215	2419		1215	2218	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	133	95	181	2	101	5	139	343	6	4	245	117
RTOR Reduction (vph)	0	124	0	0	2	0	0	1	0	0	40	0
Lane Group Flow (vph)	133	152	0	2	104	0	139	348	0	4	322	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	37.5	37.5		15.3	15.3		19.1	61.8		4.4	47.1	
Effective Green, g (s)	37.5	37.5		15.3	15.3		19.1	61.8		4.4	47.1	
Actuated g/C Ratio	0.31	0.31		0.13	0.13		0.16	0.51		0.04	0.39	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	261	585		87	160		193	1245		44	870	
v/s Ratio Prot	c0.07	0.08			c0.08		c0.11	0.14		0.00	c0.15	
v/s Ratio Perm	0.09			0.00								
v/c Ratio	0.51	0.26		0.02	0.65		0.72	0.28		0.09	0.37	
Uniform Delay, d1	32.3	30.9		45.8	49.8		47.9	16.5		55.9	25.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	0.2		0.1	9.1		12.4	0.6		0.9	1.2	
Delay (s)	33.8	31.1		45.9	59.0		60.3	17.0		56.8	27.1	
Level of Service	C	C		D	E		E	B		E	C	
Approach Delay (s)		32.0			58.7			29.4			27.4	
Approach LOS		C			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

2040 Cumulative with Project – No Event
Weekday PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	924	825	48	386	937	47	79	1494	481	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.98		1.00	0.98			1.00	0.68			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00			
Frt	1.00	0.99		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	3001		2987	3010			5476	942			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	3001		2987	3010			5476	942			
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	953	851	49	398	966	48	81	1540	496	0	0	0
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	206	0	0	0
Lane Group Flow (vph)	953	896	0	398	1014	0	0	1621	290	0	0	0
Confl. Peds. (#/hr)			400			400	400		400			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.2	37.2		13.2	33.7			39.2	39.2			
Effective Green, g (s)	18.2	37.2		13.2	33.7			39.2	39.2			
Actuated g/C Ratio	0.17	0.34		0.12	0.31			0.36	0.36			
Clearance Time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	741	1014		358	922			1951	335			
v/s Ratio Prot	c0.21	0.30		0.13	c0.34							
v/s Ratio Perm								0.30	c0.31			
v/c Ratio	1.29	0.88		1.11	1.10			0.83	0.87			
Uniform Delay, d1	45.9	34.4		48.4	38.1			32.4	33.0			
Progression Factor	1.37	1.51		1.43	0.99			0.96	1.16			
Incremental Delay, d2	132.8	4.7		71.8	55.6			3.1	19.8			
Delay (s)	195.8	56.7		141.1	93.3			34.3	58.0			
Level of Service	F	E		F	F			C	E			
Approach Delay (s)		128.2			106.8			39.9			0.0	
Approach LOS		F			F			D			A	

Intersection Summary			
HCM 2000 Control Delay	87.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	98.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	346	1643	36	30	962	24	8	250	107	47	625	592
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	0.64	1.00	0.86	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00	0.77	1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85	1.00	0.96	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1459	4143		1459	2863			1527	813	1123	2319	550
Flt Permitted	0.95	1.00		0.95	1.00			0.97	1.00	0.51	1.00	1.00
Satd. Flow (perm)	1459	4143		1459	2863			1477	813	607	2319	550
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	353	1677	37	31	982	24	8	255	109	48	638	604
RTOR Reduction (vph)	0	2	0	0	1	0	0	0	71	0	29	228
Lane Group Flow (vph)	353	1712	0	31	1005	0	0	263	38	48	832	153
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.4	43.0		8.9	35.9			38.2	38.2	39.2	39.2	39.2
Effective Green, g (s)	14.4	43.0		8.9	35.9			38.2	38.2	39.2	39.2	39.2
Actuated g/C Ratio	0.13	0.39		0.08	0.33			0.35	0.35	0.36	0.36	0.36
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	190	1619		118	934			512	282	216	826	196
v/s Ratio Prot	c0.24	0.41		0.02	c0.35						c0.36	
v/s Ratio Perm								0.18	0.05	0.08		0.28
v/c Ratio	1.86	1.06		0.26	1.08			0.51	0.13	0.22	1.01	0.78
Uniform Delay, d1	47.8	33.5		47.5	37.0			28.5	24.6	24.7	35.4	31.5
Progression Factor	0.59	1.13		0.89	0.88			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	394.4	32.6		0.1	36.4			0.9	0.2	0.5	33.1	17.5
Delay (s)	422.6	70.3		42.2	68.9			29.4	24.8	25.3	68.5	49.0
Level of Service	F	E		D	E			C	C	C	E	D
Approach Delay (s)		130.5			68.1			28.0			61.1	
Approach LOS		F			E			C			E	

Intersection Summary			
HCM 2000 Control Delay	90.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	123.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	2002	157	0	1562	100	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.91			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	4366			3079	1540	1357
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	4366			3079	1540	1357
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	2085	164	0	1627	104	24
RTOR Reduction (vph)	8	0	0	0	0	3
Lane Group Flow (vph)	2241	0	0	1627	104	21
Confl. Peds. (#/hr)		37	37		1	3
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	2464			1738	512	451
v/s Ratio Prot	0.51			c0.53	c0.07	
v/s Ratio Perm						0.02
v/c Ratio	0.91			0.94	0.20	0.05
Uniform Delay, d1	21.4			22.1	26.3	24.9
Progression Factor	1.00			0.75	1.00	1.00
Incremental Delay, d2	6.3			3.1	0.9	0.2
Delay (s)	27.8			19.8	27.2	25.1
Level of Service	C			B	C	C
Approach Delay (s)	27.8			19.8	26.8	
Approach LOS	C			B	C	

Intersection Summary			
HCM 2000 Control Delay	24.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	90.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

4/27/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	250	1050	150	100	570	810	340	336	1371	460
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.0			2.0	2.0			2.0	2.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.99	0.87
Flpb, ped/bikes		0.99			1.00	1.00			1.00	1.00
Frt		0.98			1.00	0.96			1.00	0.85
Flt Protected		0.99			0.99	1.00			0.95	1.00
Satd. Flow (prot)		6062			3026	2596			4316	1033
Flt Permitted		0.99			0.52	1.00			0.95	1.00
Satd. Flow (perm)		6062			1584	2596			4316	1033
Peak-hour factor, PHF	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93
Adj. Flow (vph)	272	1129	161	108	613	871	366	365	1474	495
RTOR Reduction (vph)	0	23	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	1539	0	0	721	1236	0	0	1889	445
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Perm
Protected Phases		6			4	4		7	7	
Permitted Phases	6			4						7
Actuated Green, G (s)		27.0			25.0	25.0			24.0	24.0
Effective Green, g (s)		29.0			28.0	28.0			27.0	27.0
Actuated g/C Ratio		0.32			0.31	0.31			0.30	0.30
Clearance Time (s)		4.0			5.0	5.0			5.0	5.0
Lane Grp Cap (vph)		1953			492	807			1294	309
v/s Ratio Prot						c0.48			c0.44	
v/s Ratio Perm		0.25			0.46					0.43
v/c Ratio		0.79			1.54dl	1.53			1.46	1.44
Uniform Delay, d1		27.7			31.0	31.0			31.5	31.5
Progression Factor		1.56			0.31	1.00			1.00	1.00
Incremental Delay, d2		2.0			210.5	245.3			211.2	215.6
Delay (s)		45.2			220.1	276.3			242.7	247.1
Level of Service		D			F	F			F	F
Approach Delay (s)		45.2			220.1	276.3			243.6	
Approach LOS		D			F	F			F	

Intersection Summary			
HCM 2000 Control Delay	194.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	135.5%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

4/27/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	105	305	1050	110	565	140	500	260	180	956
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.90		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.99		0.95		0.85		1.00	1.00
Flt Protected		0.95	1.00		1.00		1.00		0.95	1.00
Satd. Flow (prot)		2494	3622		2497		1228		1401	2689
Flt Permitted		0.95	1.00		1.00		1.00		0.15	0.60
Satd. Flow (perm)		2494	3622		2497		1228		218	1616
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	113	328	1129	118	608	151	538	280	194	1028
RTOR Reduction (vph)	0	0	12	0	15	0	226	0	0	0
Lane Group Flow (vph)	0	408	1268	0	879	0	177	0	373	1129
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	5	0	5	0	0	0	0	5
Parking (#/hr)			10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		22.5	22.5		23.0		23.0		42.0	42.0
Effective Green, g (s)		22.5	25.0		24.5		23.0		43.5	43.5
Actuated g/C Ratio		0.25	0.28		0.27		0.26		0.48	0.48
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		623	1006		679		313		322	977
v/s Ratio Prot		0.16	c0.35		c0.35				0.21	c0.21
v/s Ratio Perm							0.14		0.35	0.35
v/c Ratio		0.65	1.26		1.29		0.56		1.16	1.16
Uniform Delay, d1		30.3	32.5		32.8		29.1		33.1	23.2
Progression Factor		1.00	1.00		1.00		1.00		1.07	1.08
Incremental Delay, d2		5.3	125.5		143.1		7.2		74.8	71.2
Delay (s)		35.6	158.0		175.9		36.3		110.0	96.3
Level of Service		D	F		F		D		F	F
Approach Delay (s)			128.4		132.5					99.7
Approach LOS			F		F					F

Intersection Summary			
HCM 2000 Control Delay	120.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	99.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	56	98	214	28	30	77	39	1457	106	58	422	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.98		1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.92		1.00	0.99		1.00	0.99	
Flt Protected		0.98	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1585	1353		1457		1540	3023		1540	3051	
Flt Permitted		0.85	1.00		0.92		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1371	1353		1358		1540	3023		1540	3051	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	59	103	225	29	32	81	41	1534	112	61	444	24
RTOR Reduction (vph)	0	0	153	0	48	0	0	5	0	0	4	0
Lane Group Flow (vph)	0	162	72	0	94	0	41	1641	0	61	464	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		32.1	32.1		32.1		8.0	47.5		4.5	44.3	
Effective Green, g (s)		32.1	32.1		32.1		8.0	47.5		4.5	44.3	
Actuated g/C Ratio		0.32	0.32		0.32		0.08	0.48		0.04	0.44	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Grp Cap (vph)		440	434		435		123	1435		69	1351	
v/s Ratio Prot							0.03	c0.54		c0.04	0.15	
v/s Ratio Perm		c0.12	0.05		0.07							
v/c Ratio		0.37	0.17		0.22		0.33	1.14		0.88	0.34	
Uniform Delay, d1		26.1	24.4		24.8		43.5	26.2		47.5	18.3	
Progression Factor		1.00	1.00		1.00		1.24	0.64		1.00	1.00	
Incremental Delay, d2		2.4	0.8		1.1		6.6	72.7		79.1	0.7	
Delay (s)		28.5	25.2		25.9		60.5	89.4		126.6	19.0	
Level of Service		C	C		C		E	F		F	B	
Approach Delay (s)		26.6			25.9			88.7			31.4	
Approach LOS		C			C			F			C	

Intersection Summary			
HCM 2000 Control Delay	65.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.9
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	31	20	8	36	48	18	259	24	313	317	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00	0.99	1.00	1.00		1.00	0.97	
Flpb, ped/bikes		0.99			1.00	1.00	0.86	1.00		1.00	1.00	
Frt		0.97			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.98			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2868			1605	1359	1327	1595		1540	1543	
Flt Permitted		0.83			0.91	1.00	0.53	1.00		0.95	1.00	
Satd. Flow (perm)		2432			1472	1359	745	1595		1540	1543	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	43	33	22	9	39	52	19	278	26	337	341	46
RTOR Reduction (vph)	0	19	0	0	0	33	0	4	0	0	4	0
Lane Group Flow (vph)	0	79	0	0	48	19	19	300	0	337	383	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		5.7			5.7	17.4	14.1	14.1		11.7	30.8	
Effective Green, g (s)		5.7			5.7	17.4	14.1	14.1		11.7	30.8	
Actuated g/C Ratio		0.12			0.12	0.37	0.30	0.30		0.25	0.66	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		298			180	654	225	483		387	1022	
v/s Ratio Prot						0.01		c0.19		c0.22	0.25	
v/s Ratio Perm		0.03			c0.03	0.01	0.03					
v/c Ratio		0.26			0.27	0.03	0.08	0.62		0.87	0.37	
Uniform Delay, d1		18.5			18.5	9.2	11.6	13.9		16.7	3.5	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.5			0.8	0.0	0.2	2.5		18.8	0.2	
Delay (s)		19.0			19.3	9.2	11.7	16.4		35.4	3.8	
Level of Service		B			B	A	B	B		D	A	
Approach Delay (s)		19.0			14.1			16.1			18.5	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	46.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	186	475	995	72	324	295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.95	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1540	2368	2431	1309	1540	1621
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1540	2368	2431	1309	1540	1621
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	202	516	1082	78	352	321
RTOR Reduction (vph)	0	422	0	12	0	0
Lane Group Flow (vph)	202	94	1082	66	352	321
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	4		2		1	6
Permitted Phases		4		2		
Actuated Green, G (s)	19.7	19.7	49.1	49.1	24.1	78.2
Effective Green, g (s)	19.7	19.7	49.1	49.1	24.1	78.2
Actuated g/C Ratio	0.18	0.18	0.46	0.46	0.22	0.72
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	281	432	1106	595	343	1174
v/s Ratio Prot	c0.13		c0.45		c0.23	0.20
v/s Ratio Perm		0.04		0.05		
v/c Ratio	0.72	0.22	0.98	0.11	1.03	0.27
Uniform Delay, d1	41.5	37.5	28.9	16.9	41.9	5.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.5	0.3	21.7	0.1	55.5	0.1
Delay (s)	50.0	37.8	50.6	17.0	97.4	5.2
Level of Service	D	D	D	B	F	A
Approach Delay (s)	41.2		48.3			53.4
Approach LOS	D		D			D

Intersection Summary			
HCM 2000 Control Delay	47.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	107.9	Sum of lost time (s)	15.0
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	24	48	43	195	456	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0	5.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frpb, ped/bikes	0.96		1.00	1.00	1.00	
Flpb, ped/bikes	0.98		0.99	1.00	1.00	
Frt	0.91		1.00	1.00	0.99	
Flt Protected	0.98		0.95	1.00	1.00	
Satd. Flow (prot)	1523		1688	1531	3107	
Flt Permitted	0.98		0.44	1.00	1.00	
Satd. Flow (perm)	1523		787	1531	3107	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	27	53	48	217	507	51
RTOR Reduction (vph)	48	0	0	0	7	0
Lane Group Flow (vph)	32	0	48	217	551	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	10
Turn Type	Perm		Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4		2			
Actuated Green, G (s)	3.9		24.8	24.8	24.8	
Effective Green, g (s)	3.9		24.8	24.8	24.8	
Actuated g/C Ratio	0.10		0.66	0.66	0.66	
Clearance Time (s)	4.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	157		517	1007	2043	
v/s Ratio Prot				0.14	c0.18	
v/s Ratio Perm	c0.02		0.06			
v/c Ratio	0.21		0.09	0.22	0.27	
Uniform Delay, d1	15.5		2.4	2.6	2.7	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.7		0.1	0.1	0.1	
Delay (s)	16.1		2.4	2.7	2.8	
Level of Service	B		A	A	A	
Approach Delay (s)	16.1			2.6	2.8	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	3.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	37.7	Sum of lost time (s)	9.0
Intersection Capacity Utilization	46.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	211	332	1409	17	80	1021
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.96	1.00		1.00	1.00
Flpb, ped/bikes	0.93	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1584	1466	3412		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1584	1466	3412		1711	3421
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	234	369	1566	19	89	1134
RTOR Reduction (vph)	0	142	1	0	0	0
Lane Group Flow (vph)	234	227	1584	0	89	1134
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	28.7	28.7	48.1		7.9	61.1
Effective Green, g (s)	28.7	28.7	48.1		7.9	61.1
Actuated g/C Ratio	0.29	0.29	0.48		0.08	0.61
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	454	420	1641		135	2090
v/s Ratio Prot			c0.46		0.05	c0.33
v/s Ratio Perm	0.15	c0.15				
v/c Ratio	0.52	0.54	0.97		0.66	0.54
Uniform Delay, d1	29.8	30.1	25.1		44.7	11.3
Progression Factor	1.00	1.00	1.66		1.05	1.04
Incremental Delay, d2	1.0	1.4	9.4		11.1	0.3
Delay (s)	30.8	31.5	51.2		57.9	12.1
Level of Service	C	C	D		E	B
Approach Delay (s)	31.2		51.2			15.4
Approach LOS	C		D			B

Intersection Summary			
HCM 2000 Control Delay	34.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	40	30	55	198	409	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.97	
Flt Protected	0.95	1.00		0.99	1.00	
Satd. Flow (prot)	1540	1351		3041	2974	
Flt Permitted	0.95	1.00		0.72	1.00	
Satd. Flow (perm)	1540	1351		2225	2974	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	47	35	65	233	481	112
RTOR Reduction (vph)	0	34	0	0	37	0
Lane Group Flow (vph)	47	1	0	298	556	0
Confl. Peds. (#/hr)	1	1	25			25
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	2.1	2.1		15.4	15.4	
Effective Green, g (s)	2.1	2.1		15.4	15.4	
Actuated g/C Ratio	0.04	0.04		0.29	0.29	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	60	53		645	862	
v/s Ratio Prot	c0.03				c0.19	
v/s Ratio Perm		0.00		0.13		
v/c Ratio	0.78	0.03		0.46	0.65	
Uniform Delay, d1	25.3	24.5		15.5	16.5	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	47.5	0.2		0.5	1.7	
Delay (s)	72.8	24.7		16.0	18.1	
Level of Service	E	C		B	B	
Approach Delay (s)	52.3			16.0	18.1	
Approach LOS	D			B	B	

Intersection Summary			
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	53.1	Sum of lost time (s)	15.0
Intersection Capacity Utilization	40.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	167	67	107	53	87	10	221	45	19	10	197	164
Peak Hour Factor	0.92	0.87	0.87	0.87	0.87	0.92	0.87	0.92	0.87	0.92	0.92	0.92
Hourly flow rate (vph)	182	77	123	61	100	11	254	49	22	11	214	178

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	182	200	61	111	325	225	178
Volume Left (vph)	182	0	61	0	254	11	0
Volume Right (vph)	0	123	0	11	22	0	178
Hadj (s)	0.53	-0.40	0.53	-0.03	0.15	0.06	-0.67
Departure Headway (s)	7.7	6.8	8.2	7.6	7.0	7.0	6.3
Degree Utilization, x	0.39	0.38	0.14	0.23	0.63	0.44	0.31
Capacity (veh/h)	444	505	403	434	492	490	543
Control Delay (s)	14.3	12.6	11.3	11.7	21.4	14.2	10.9
Approach Delay (s)	13.4		11.5		21.4	12.8	
Approach LOS	B		B		C	B	

Intersection Summary			
Delay	15.0		
Level of Service	B		
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰↰	↑↱		↰	↑↱	
Volume (vph)	193	209	313	24	305	143	310	1090	58	73	943	216
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1510	1621	1337	1527	1621	1304	2987	3049		1540	2978	
Flt Permitted	0.40	1.00	1.00	0.54	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	638	1621	1337	867	1621	1304	2987	3049		1540	2978	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	212	230	344	26	335	157	341	1198	64	80	1036	237
RTOR Reduction (vph)	0	0	206	0	0	104	0	4	0	0	20	0
Lane Group Flow (vph)	212	230	138	26	335	53	341	1258	0	80	1253	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	34.0	34.0	34.0	34.0	34.0	34.0	12.5	43.9		6.4	37.8	
Effective Green, g (s)	34.0	34.0	34.0	34.0	34.0	34.0	12.5	43.9		6.4	37.8	
Actuated g/C Ratio	0.34	0.34	0.34	0.34	0.34	0.34	0.12	0.44		0.06	0.38	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	216	551	454	294	551	443	373	1338		98	1125	
v/s Ratio Prot		0.14			0.21		0.11	c0.41		0.05	c0.42	
v/s Ratio Perm	c0.33		0.10	0.03		0.04						
v/c Ratio	0.98	0.42	0.30	0.09	0.61	0.12	0.91	0.94		0.82	1.11	
Uniform Delay, d1	32.7	25.4	24.3	22.5	27.5	22.7	43.2	26.8		46.2	31.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.55	0.92		1.01	1.00	
Incremental Delay, d2	55.7	0.5	0.4	0.1	1.9	0.1	9.2	4.7		34.3	62.2	
Delay (s)	88.4	25.9	24.7	22.6	29.4	22.8	33.2	29.3		81.0	93.5	
Level of Service	F	C	C	C	C	C	C	C		F	F	
Approach Delay (s)		42.2			27.0			30.1			92.7	
Approach LOS		D			C			C			F	

Intersection Summary			
HCM 2000 Control Delay	51.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	102.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↱		↰	↑↱	
Volume (vph)	127	550	14	42	712	77	49	54	77	88	34	228
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.88	1.00	0.98		1.00	0.94	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.94	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1411	1621	1706	1269	1621	1520		1525	1399	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.34	1.00		0.67	1.00	
Satd. Flow (perm)	1621	1706	1411	1621	1706	1269	572	1520		1068	1399	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	138	598	15	46	774	84	53	59	84	96	37	248
RTOR Reduction (vph)	0	0	7	0	0	43	0	68	0	0	200	0
Lane Group Flow (vph)	138	598	8	46	774	41	53	75	0	96	85	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	8.0	38.5	38.5	4.6	35.1	35.1	13.9	13.9		13.9	13.9	
Effective Green, g (s)	8.0	38.5	38.5	4.6	35.1	35.1	13.9	13.9		13.9	13.9	
Actuated g/C Ratio	0.11	0.53	0.53	0.06	0.49	0.49	0.19	0.19		0.19	0.19	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	180	912	754	103	831	618	110	293		206	270	
v/s Ratio Prot	c0.09	c0.35		0.03	c0.45			0.05			0.06	
v/s Ratio Perm			0.01			0.03	c0.09			0.09		
v/c Ratio	0.77	0.66	0.01	0.45	0.93	0.07	0.48	0.26		0.47	0.31	
Uniform Delay, d1	31.1	12.0	7.8	32.5	17.3	9.8	25.8	24.7		25.8	25.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	17.6	3.7	0.0	3.1	16.9	0.0	3.3	0.5		1.7	0.7	
Delay (s)	48.7	15.7	7.9	35.5	34.2	9.8	29.1	25.1		27.4	25.6	
Level of Service	D	B	A	D	C	A	C	C		C	C	
Approach Delay (s)		21.6			32.0			26.2			26.1	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	72.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	94.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	137	400	234	66	831	92	138	173	129	162	329	187
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.98	1.00
Satd. Flow (prot)	1540	1540	1378	1540	1540	1321	1540	2882			3029	1357
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.32	1.00			0.68	1.00
Satd. Flow (perm)	1540	1540	1378	1540	1540	1321	518	2882			2108	1357
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	143	417	244	69	866	96	144	180	134	169	343	195
RTOR Reduction (vph)	0	0	100	0	0	25	0	96	0	0	0	142
Lane Group Flow (vph)	143	417	144	69	866	71	144	218	0	0	512	53
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	9.0	68.6	68.6	6.3	64.9	64.9	34.3	34.3			33.3	33.3
Effective Green, g (s)	9.0	68.6	68.6	6.3	64.9	64.9	34.3	34.3			33.3	33.3
Actuated g/C Ratio	0.07	0.56	0.56	0.05	0.53	0.53	0.28	0.28			0.27	0.27
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	113	864	773	79	817	701	145	808			574	369
v/s Ratio Prot	c0.09	c0.27		0.04	c0.56			0.08				
v/s Ratio Perm			0.10			0.05	c0.28				0.24	0.04
v/c Ratio	1.27	0.48	0.19	0.87	1.06	0.10	0.99	0.27			0.89	0.14
Uniform Delay, d1	56.6	16.1	13.1	57.6	28.6	14.2	43.8	34.2			42.7	33.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	172.2	1.9	0.5	60.4	48.6	0.1	72.3	0.2			16.0	0.2
Delay (s)	228.8	18.1	13.7	118.0	77.3	14.3	116.2	34.4			58.8	33.8
Level of Service	F	B	B	F	E	B	F	C			E	C
Approach Delay (s)		54.2			74.1			60.1			51.9	
Approach LOS		D			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	61.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	122.2	Sum of lost time (s)	15.0
Intersection Capacity Utilization	99.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	72	561	76	58	612	486	75	329	48	162	140	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.95		*0.95	*0.95	*0.95	*0.95	*0.95	*0.95	*0.95	*0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.90	1.00	1.00	0.96	1.00	0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1540	1279		1463	1540	1178	1463	1309	1257	1463	1382	
Flt Permitted	0.10	1.00		0.19	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	168	1279		290	1540	1178	1463	1309	1257	1463	1382	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	77	597	81	62	651	517	80	350	51	172	149	139
RTOR Reduction (vph)	0	4	0	0	0	74	0	0	39	0	31	0
Lane Group Flow (vph)	77	674	0	62	651	443	80	350	12	172	257	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	51.1	51.1		51.1	51.1	61.1	11.6	25.0	25.0	10.0	23.4	
Effective Green, g (s)	51.1	51.1		51.1	51.1	61.1	11.6	25.0	25.0	10.0	23.4	
Actuated g/C Ratio	0.47	0.47		0.47	0.47	0.56	0.11	0.23	0.23	0.09	0.21	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	117	598		169	720	713	155	299	287	133	296	
v/s Ratio Prot	0.02	c0.53		0.01	c0.42	0.06	0.05	c0.27		c0.12	0.19	
v/s Ratio Perm	0.29			0.16		0.32			0.01			
v/c Ratio	0.66	1.13		0.37	0.90	0.62	0.52	1.17	0.04	1.29	0.87	
Uniform Delay, d1	22.9	29.1		35.3	26.8	16.2	46.1	42.1	32.8	49.6	41.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	12.6	76.9		1.4	14.8	1.7	2.9	106.5	0.1	176.6	22.4	
Delay (s)	35.5	105.9		36.6	41.6	17.9	49.0	148.6	32.8	226.2	63.8	
Level of Service	D	F		D	D	B	D	F	C	F	E	
Approach Delay (s)		98.7			31.4			119.8			124.5	
Approach LOS		F			C			F			F	

Intersection Summary			
HCM 2000 Control Delay	77.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	109.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	78	93	49	56	372	17	41	126	109	21	61	268
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor	1.00	0.95		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00			1.00	0.98		0.98	
Flpb, ped/bikes	0.99	1.00		0.98	1.00			1.00	1.00		1.00	
Frt	1.00	0.95		1.00	0.99			1.00	0.85		0.90	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)	1695	3198		1680	1786			1776	1496		1575	
Flt Permitted	0.30	1.00		0.65	1.00			0.78	1.00		0.97	
Satd. Flow (perm)	537	3198		1154	1786			1409	1496		1540	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	87	103	54	62	413	19	46	140	121	23	68	298
RTOR Reduction (vph)	0	36	0	0	2	0	0	0	87	0	153	0
Lane Group Flow (vph)	87	121	0	62	430	0	0	186	34	0	236	0
Confl. Peds. (#/hr)	13		16	16		13	16		19	19		16
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4		4	8		
Actuated Green, G (s)	21.1	21.1		21.1	21.1			18.3	18.3		18.3	
Effective Green, g (s)	21.1	21.1		21.1	21.1			18.3	18.3		18.3	
Actuated g/C Ratio	0.33	0.33		0.33	0.33			0.28	0.28		0.28	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	175	1047		378	585			400	425		437	
v/s Ratio Prot		0.04			c0.24							
v/s Ratio Perm	0.16			0.05				0.13	0.02		c0.15	
v/c Ratio	0.50	0.12		0.16	0.74			0.47	0.08		0.54	
Uniform Delay, d1	17.4	15.1		15.4	19.2			19.0	16.9		19.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	2.2	0.0		0.2	4.8			0.9	0.1		1.3	
Delay (s)	19.6	15.2		15.6	24.0			19.9	17.0		20.8	
Level of Service	B	B		B	C			B	B		C	
Approach Delay (s)		16.8			22.9			18.7			20.8	
Approach LOS		B			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	64.4	Sum of lost time (s)	14.0
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	205	134	106	117	519	45	106	1208	49	36	941	303
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.99		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1689	3143		1682	3367		1711	3398		1711	3269	
Flt Permitted	0.33	1.00		0.59	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	587	3143		1050	3367		1711	3398		1711	3269	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	218	143	113	124	552	48	113	1285	52	38	1001	322
RTOR Reduction (vph)	0	72	0	0	6	0	0	3	0	0	31	0
Lane Group Flow (vph)	218	184	0	124	594	0	113	1334	0	38	1292	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	36.7	36.7		36.7	36.7		9.9	37.9		9.9	37.9	
Effective Green, g (s)	36.7	36.7		36.7	36.7		9.9	37.9		9.9	37.9	
Actuated g/C Ratio	0.37	0.37		0.37	0.37		0.10	0.38		0.10	0.38	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Grp Cap (vph)	215	1153		385	1235		169	1287		169	1238	
v/s Ratio Prot		0.06			0.18		0.07	c0.39		0.02	c0.40	
v/s Ratio Perm	c0.37			0.12								
v/c Ratio	1.01	0.16		0.32	0.48		0.67	1.04		0.22	1.04	
Uniform Delay, d1	31.6	21.3		22.7	24.3		43.5	31.1		41.5	31.1	
Progression Factor	1.00	1.00		1.00	1.00		0.92	0.85		1.49	0.57	
Incremental Delay, d2	65.0	0.3		2.2	1.3		17.7	34.1		1.0	27.8	
Delay (s)	96.7	21.6		24.9	25.7		57.7	60.5		63.1	45.5	
Level of Service	F	C		C	C		E	E		E	D	
Approach Delay (s)		56.1			25.5			60.3			46.0	
Approach LOS		E			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	48.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	95.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	453	76	16	834	105	51	0	24	46	0	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.98			0.96		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00			0.97		0.95	1.00	
Satd. Flow (prot)	1711	3347		1711	3364			1666		1711	1531	
Flt Permitted	0.16	1.00		0.38	1.00			0.76		0.70	1.00	
Satd. Flow (perm)	289	3347		678	3364			1304		1268	1531	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	492	83	17	907	114	55	0	26	50	0	187
RTOR Reduction (vph)	0	15	0	0	11	0	0	14	0	0	36	0
Lane Group Flow (vph)	92	560	0	17	1010	0	0	67	0	50	151	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	39.0	39.0		39.0	39.0			41.0		41.0	41.0	
Effective Green, g (s)	39.0	39.0		39.0	39.0			41.0		41.0	41.0	
Actuated g/C Ratio	0.43	0.43		0.43	0.43			0.46		0.46	0.46	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Grp Cap (vph)	125	1450		293	1457			594		577	697	
v/s Ratio Prot		0.17			0.30						c0.10	
v/s Ratio Perm	c0.32			0.03				0.05		0.04		
v/c Ratio	0.74	0.39		0.06	0.69			0.11		0.09	0.22	
Uniform Delay, d1	21.2	17.4		14.8	20.7			14.1		13.9	14.8	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	31.7	0.8		0.4	2.7			0.4		0.3	0.7	
Delay (s)	52.9	18.1		15.2	23.4			14.4		14.2	15.5	
Level of Service	D	B		B	C			B		B	B	
Approach Delay (s)		22.9			23.3			14.4			15.2	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	129	0	0	1028	99	539	248	498	0	0	606
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				3.5
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Flpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Frt		1.00			0.99		1.00	0.90				0.85
Flt Protected		0.99			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3383			5064		1711	3079				2694
Flt Permitted		0.76			1.00		0.95	1.00				1.00
Satd. Flow (perm)		2611			5064		1711	3079				2694
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	38	132	0	0	1049	101	550	253	508	0	0	618
RTOR Reduction (vph)	0	0	0	0	11	0	0	309	0	0	0	142
Lane Group Flow (vph)	0	170	0	0	1139	0	550	452	0	0	0	476
Confl. Peds. (#/hr)												20
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		57.5			31.5		43.0	43.0				22.5
Effective Green, g (s)		57.5			31.5		43.0	43.0				22.5
Actuated g/C Ratio		0.52			0.29		0.39	0.39				0.20
Clearance Time (s)		4.5			4.5		5.0	5.0				3.5
Lane Grp Cap (vph)		1522			1450		668	1203				551
v/s Ratio Prot		0.02			c0.22		c0.32	0.15				c0.18
v/s Ratio Perm		0.04										
v/c Ratio		0.11			0.79		0.82	0.38				0.86
Uniform Delay, d1		13.3			36.1		30.1	23.9				42.3
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			4.4		11.0	0.9				16.3
Delay (s)		13.5			40.5		41.1	24.8				58.6
Level of Service		B			D		D	C				E
Approach Delay (s)		13.5			40.5			31.7			58.6	
Approach LOS		B			D			C			E	

Intersection Summary			
HCM 2000 Control Delay	38.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	86.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.

4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	166	430	1416	757	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.93	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1575	1424	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1575	1424	3319	1801		
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	171	443	1460	780	0	0
RTOR Reduction (vph)	4	4	0	0	0	0
Lane Group Flow (vph)	318	288	1460	780	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	21.3	21.3	38.7	70.0		
Effective Green, g (s)	21.3	21.3	38.7	70.0		
Actuated g/C Ratio	0.30	0.30	0.55	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	479	433	1834	1801		
v/s Ratio Prot	0.20		c0.44	0.43		
v/s Ratio Perm		c0.20				
v/c Ratio	0.66	0.66	0.80	0.43		
Uniform Delay, d1	21.2	21.2	12.5	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	3.4	3.8	2.5	0.2		
Delay (s)	24.7	25.1	15.0	0.2		
Level of Service	C	C	B	A		
Approach Delay (s)	24.9			9.8	0.0	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	13.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	227	168	188	9	204	13	209	969	29	110	925	275
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.94		1.00	0.99		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	0.98	1.00		0.94	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.92		1.00	0.99		1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1510	2495		1448	1592		1540	3056		1540	2899	
Flt Permitted	0.32	1.00		0.53	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	509	2495		809	1592		1540	3056		1540	2899	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	236	175	196	9	212	14	218	1009	30	115	964	286
RTOR Reduction (vph)	0	139	0	0	2	0	0	2	0	0	28	0
Lane Group Flow (vph)	236	232	0	9	224	0	218	1037	0	115	1222	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	29.2	29.2		18.9	18.9		16.6	42.7		11.8	37.9	
Effective Green, g (s)	29.2	29.2		18.9	18.9		16.6	42.7		11.8	37.9	
Actuated g/C Ratio	0.29	0.29		0.19	0.19		0.17	0.43		0.12	0.38	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	198	728		152	300		255	1304		181	1098	
v/s Ratio Prot	c0.06	0.09			0.14		0.14	c0.34		0.07	c0.42	
v/s Ratio Perm	c0.29			0.01								
v/c Ratio	1.19	0.32		0.06	0.75		0.85	0.80		0.64	1.11	
Uniform Delay, d1	35.9	27.6		33.3	38.3		40.5	24.9		42.0	31.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.92	0.89	
Incremental Delay, d2	125.3	0.3		0.2	9.6		23.3	5.1		6.8	63.3	
Delay (s)	161.2	27.9		33.4	47.9		63.8	29.9		45.4	90.8	
Level of Service	F	C		C	D		E	C		D	F	
Approach Delay (s)		79.7			47.4			35.8			87.0	
Approach LOS		E			D			D			F	

Intersection Summary			
HCM 2000 Control Delay	64.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	104.9%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

2040 Cumulative with Project - No Event
Saturday Evening

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	662	674	232	381	618	102	74	709	281	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.97		1.00	0.98			1.00	0.90			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	0.96		1.00	0.98			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	2882		2987	2966			5505	1238			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	2882		2987	2966			5505	1238			
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	736	749	258	423	687	113	82	788	312	0	0	0
RTOR Reduction (vph)	0	31	0	0	11	0	0	0	227	0	0	0
Lane Group Flow (vph)	736	976	0	423	789	0	0	870	85	0	0	0
Confl. Peds. (#/hr)			100			100	100		100			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	21.3	38.8		22.2	39.7			30.1	30.1			
Effective Green, g (s)	21.3	38.8		22.2	39.7			30.1	30.1			
Actuated g/C Ratio	0.19	0.35		0.20	0.36			0.27	0.27			
Clearance Time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	867	1016		602	1070			1506	338			
v/s Ratio Prot	0.16	c0.34		0.14	c0.27							
v/s Ratio Perm								0.16	0.07			
v/c Ratio	0.85	0.96		0.70	0.74			0.58	0.25			
Uniform Delay, d1	42.8	34.9		40.8	30.6			34.5	31.2			
Progression Factor	0.69	0.56		0.73	0.41			1.40	5.85			
Incremental Delay, d2	5.2	15.0		1.6	1.2			0.5	0.4			
Delay (s)	34.6	34.5		31.3	13.6			48.7	182.8			
Level of Service	C	C		C	B			D	F			
Approach Delay (s)		34.5			19.7			84.1			0.0	
Approach LOS		C			B			F			A	

Intersection Summary			
HCM 2000 Control Delay	44.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.9
Intersection Capacity Utilization	90.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	348	1439	114	64	572	56	16	178	42	87	497	199
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.97		1.00	0.94			1.00	0.63	1.00	0.98	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00	0.74	1.00	1.00
Frt	1.00	0.99		1.00	0.99			1.00	0.85	1.00	0.99	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	4253		1296	2415			1586	857	1147	2874	581
Flt Permitted	0.95	1.00		0.95	1.00			0.89	1.00	0.55	1.00	1.00
Satd. Flow (perm)	1540	4253		1296	2415			1420	857	664	2874	581
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	370	1531	121	68	609	60	17	189	45	93	529	212
RTOR Reduction (vph)	0	7	0	0	6	0	0	0	33	0	3	129
Lane Group Flow (vph)	370	1645	0	68	663	0	0	206	12	93	547	62
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	26.1	50.1		11.4	33.8			28.6	28.6	29.6	29.6	29.6
Effective Green, g (s)	26.1	50.1		11.4	33.8			28.6	28.6	29.6	29.6	29.6
Actuated g/C Ratio	0.24	0.46		0.10	0.31			0.26	0.26	0.27	0.27	0.27
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	365	1937		134	742			369	222	178	773	156
v/s Ratio Prot	0.24	c0.39		0.05	c0.27						c0.19	
v/s Ratio Perm								0.15	0.01	0.14		0.11
v/c Ratio	1.01	0.85		0.51	0.89			0.56	0.05	0.52	0.71	0.40
Uniform Delay, d1	42.0	26.6		46.6	36.4			35.2	30.5	34.2	36.3	32.9
Progression Factor	0.82	1.00		0.75	0.72			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	36.1	2.4		2.1	9.7			1.8	0.1	2.8	3.0	1.7
Delay (s)	70.7	29.0		37.0	35.9			37.1	30.6	36.9	39.3	34.6
Level of Service	E	C		D	D			D	C	D	D	C
Approach Delay (s)		36.6			36.0			35.9			37.9	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	36.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	137.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1748	91	0	787	35	153
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3054			3079	1540	1357
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3054			3079	1540	1357
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	1921	100	0	865	38	168
RTOR Reduction (vph)	2	0	0	0	0	8
Lane Group Flow (vph)	2019	0	0	865	38	160
Confl. Peds. (#/hr)		10	10			3
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	80.4			80.4	18.3	18.3
Effective Green, g (s)	80.4			80.4	18.3	18.3
Actuated g/C Ratio	0.73			0.73	0.17	0.17
Clearance Time (s)	4.9			4.9	6.4	6.4
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	2232			2250	256	225
v/s Ratio Prot	c0.66			0.28	0.02	
v/s Ratio Perm						c0.12
v/c Ratio	0.90			0.38	0.15	0.71
Uniform Delay, d1	11.8			5.5	39.2	43.3
Progression Factor	1.00			0.19	1.00	1.00
Incremental Delay, d2	6.6			0.1	0.3	9.8
Delay (s)	18.4			1.1	39.5	53.2
Level of Service	B			A	D	D
Approach Delay (s)	18.4			1.1	50.6	
Approach LOS	B			A	D	

Intersection Summary			
HCM 2000 Control Delay	15.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

4/27/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	246	1136	135	65	529	548	292	246	855	455
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.0	3.0			3.0	3.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.98	1.00
Flpb, ped/bikes		0.99			1.00	1.00			1.00	1.00
Frt		0.99			1.00	0.95			0.99	0.85
Flt Protected		0.99			0.99	1.00			0.96	1.00
Satd. Flow (prot)		6082			3025	2563			4236	1185
Flt Permitted		0.99			0.66	1.00			0.96	1.00
Satd. Flow (perm)		6082			2004	2563			4236	1185
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	254	1171	139	67	545	565	301	254	881	469
RTOR Reduction (vph)	0	23	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	1541	0	0	612	865	0	0	1233	371
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Prot
Protected Phases		6			4	4		7	7	7
Permitted Phases	6			4						
Actuated Green, G (s)		20.5			22.0	22.0			15.0	15.0
Effective Green, g (s)		22.5			25.0	25.0			18.0	18.0
Actuated g/C Ratio		0.30			0.33	0.33			0.24	0.24
Clearance Time (s)		5.5			6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1824			668	854			1016	284
v/s Ratio Prot						c0.34			0.29	c0.31
v/s Ratio Perm		0.25			0.31					
v/c Ratio		0.84			0.92	1.01			1.21	1.31
Uniform Delay, d1		24.6			24.0	25.0			28.5	28.5
Progression Factor		1.00			0.89	1.00			1.00	1.00
Incremental Delay, d2		3.8			6.9	33.9			105.3	161.0
Delay (s)		28.4			28.2	58.9			133.8	189.5
Level of Service		C			C	E			F	F
Approach Delay (s)		28.4			28.2	58.9			146.7	
Approach LOS		C			C	E			F	

Intersection Summary			
HCM 2000 Control Delay	74.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	110.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp
4/27/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations		↰↰	↰↑↑↱		↑↱		↱		↰	↰↑
Volume (vph)	335	200	510	120	259	41	292	236	77	727
Ideal Flow (vphpl)	1800	1800	1800	1800	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.98		0.90		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.97		0.95		0.85		1.00	1.00
Flt Protected		0.95	0.99		1.00		1.00		0.95	1.00
Satd. Flow (prot)		2186	3343		2476		1225		1401	2697
Flt Permitted		0.95	0.99		1.00		1.00		0.28	0.95
Satd. Flow (perm)		2186	3343		2476		1225		406	2560
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	414	247	630	148	320	51	360	291	95	898
RTOR Reduction (vph)	0	0	34	0	44	0	179	0	0	0
Lane Group Flow (vph)	0	570	835	0	460	0	48	0	362	922
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	8	0	5	0	0	0	0	5
Parking (#/hr)		10	10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		18.5	18.5		16.0		16.0		31.0	31.0
Effective Green, g (s)		18.5	21.0		17.5		16.0		32.5	32.5
Actuated g/C Ratio		0.25	0.28		0.23		0.21		0.43	0.43
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		539	936		577		261		341	1132
v/s Ratio Prot		c0.26	0.25		0.19				c0.18	0.14
v/s Ratio Perm							0.04		c0.28	0.22
v/c Ratio		1.58dl	0.89		0.80		0.19		1.06	0.81
Uniform Delay, d1		28.2	25.9		27.1		24.2		24.3	18.6
Progression Factor		1.00	1.00		1.00		1.00		0.93	0.93
Incremental Delay, d2		54.9	12.6		10.9		1.6		51.8	3.3
Delay (s)		83.1	38.5		38.0		25.7		74.3	20.5
Level of Service		F	D		D		C		E	C
Approach Delay (s)			56.2		34.2					35.7
Approach LOS			E		C					D

Intersection Summary			
HCM 2000 Control Delay	43.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰	↱		↔		↰	↑↑		↰	↑↑	
Volume (vph)	50	13	144	12	12	16	18	555	12	34	202	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		0.99	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.95		1.00	1.00		1.00	0.99	
Flt Protected		0.96	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1549	1354		1497		1272	2532		1540	3050	
Flt Permitted		0.74	1.00		0.88		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1195	1354		1337		1272	2532		1540	3050	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	52	13	148	12	12	16	19	572	12	35	208	12
RTOR Reduction (vph)	0	0	125	0	14	0	0	1	0	0	4	0
Lane Group Flow (vph)	0	65	23	0	26	0	19	583	0	35	216	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		6.6	6.6		6.6		0.9	18.0		2.5	19.9	
Effective Green, g (s)		6.6	6.6		6.6		0.9	18.0		2.5	19.9	
Actuated g/C Ratio		0.15	0.15		0.15		0.02	0.42		0.06	0.46	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Vehicle Extension (s)		3.0	3.0		3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		183	207		205		26	1059		89	1411	
v/s Ratio Prot							0.01	c0.23		c0.02	0.07	
v/s Ratio Perm		c0.05	0.02		0.02							
v/c Ratio		0.36	0.11		0.13		0.73	0.55		0.39	0.15	
Uniform Delay, d1		16.3	15.7		15.7		20.9	9.4		19.5	6.7	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.2	0.2		0.3		62.1	0.6		1.0	0.1	
Delay (s)		17.5	15.9		16.0		83.0	10.1		20.6	6.7	
Level of Service		B	B		B		F	B		C	A	
Approach Delay (s)		16.4			16.0			12.4			8.6	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	43.0	Sum of lost time (s)	15.9
Intersection Capacity Utilization	53.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	13	14	5	11	26	13	89	4	190	164	31
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00	1.00	1.00	1.00		1.00	0.96	
Flpb, ped/bikes		0.99			1.00	1.00	0.84	1.00		1.00	1.00	
Frt		0.95			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.98			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2388			1426	1227	1152	1437		1377	1360	
Flt Permitted		0.95			1.00	1.00	0.62	1.00		0.95	1.00	
Satd. Flow (perm)		2321			1449	1227	749	1437		1377	1360	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	17	15	16	6	13	30	15	102	5	218	189	36
RTOR Reduction (vph)	0	15	0	0	0	15	0	3	0	0	5	0
Lane Group Flow (vph)	0	33	0	0	19	15	15	104	0	218	220	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Parking (#/hr)		2										
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		2.4			2.4	22.1	7.0	7.0		19.7	31.7	
Effective Green, g (s)		2.4			2.4	22.1	7.0	7.0		19.7	31.7	
Actuated g/C Ratio		0.05			0.05	0.50	0.16	0.16		0.45	0.72	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	2.0	3.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		126			78	754	118	228		615	977	
v/s Ratio Prot						0.01		c0.07		c0.16	0.16	
v/s Ratio Perm		c0.01			0.01	0.00	0.02					
v/c Ratio		0.26			0.24	0.02	0.13	0.46		0.35	0.23	
Uniform Delay, d1		20.0			20.0	5.5	15.9	16.8		8.0	2.1	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.1			1.6	0.0	0.5	1.5		0.1	0.1	
Delay (s)		21.1			21.6	5.5	16.4	18.3		8.1	2.2	
Level of Service		C			C	A	B	B		A	A	
Approach Delay (s)		21.1			11.8			18.1			5.1	
Approach LOS		C			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	9.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	44.1	Sum of lost time (s)	15.0
Intersection Capacity Utilization	45.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.

4/27/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	109	214	292	62	193	144
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1745	1535	849	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1745	1535	849	1134	1194
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	125	246	336	71	222	166
RTOR Reduction (vph)	0	202	0	40	0	0
Lane Group Flow (vph)	125	44	336	31	222	166
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	15.0	15.0	33.4	28.4	20.2	58.6
Effective Green, g (s)	15.0	15.0	33.4	28.4	20.2	58.6
Actuated g/C Ratio	0.18	0.18	0.40	0.34	0.24	0.70
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	203	313	613	339	274	836
v/s Ratio Prot	c0.11		c0.22	0.02	c0.20	0.14
v/s Ratio Perm		0.03		0.02		
v/c Ratio	0.62	0.14	0.55	0.09	0.81	0.20
Uniform Delay, d1	31.6	28.9	19.3	18.8	29.9	4.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.5	0.2	1.0	0.1	16.4	0.1
Delay (s)	37.1	29.1	20.3	18.9	46.3	4.5
Level of Service	D	C	C	B	D	A
Approach Delay (s)	31.8		20.1			28.4
Approach LOS	C		C			C

Intersection Summary			
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	83.6	Sum of lost time (s)	20.0
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	13	31	23	139	147	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frpb, ped/bikes	0.95		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		0.98	1.00	1.00	
Frt	0.90		1.00	1.00	1.00	
Flt Protected	0.99		0.95	1.00	1.00	
Satd. Flow (prot)	1525		1676	1531	3151	
Flt Permitted	0.99		0.64	1.00	1.00	
Satd. Flow (perm)	1525		1127	1531	3151	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	15	37	27	165	175	4
RTOR Reduction (vph)	35	0	0	0	1	0
Lane Group Flow (vph)	17	0	27	165	178	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	2.3		22.3	22.3	22.3	
Effective Green, g (s)	2.3		22.3	22.3	22.3	
Actuated g/C Ratio	0.07		0.64	0.64	0.64	
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	101		726	986	2030	
v/s Ratio Prot	c0.01			c0.11	0.06	
v/s Ratio Perm			0.02			
v/c Ratio	0.17		0.04	0.17	0.09	
Uniform Delay, d1	15.3		2.2	2.5	2.3	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.8		0.0	0.1	0.0	
Delay (s)	16.1		2.3	2.5	2.3	
Level of Service	B		A	A	A	
Approach Delay (s)	16.1			2.5	2.3	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	4.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	34.6	Sum of lost time (s)	10.0
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	11	96	470	7	106	474
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.95	1.00		1.00	1.00
Flpb, ped/bikes	0.95	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1631	1454	3407		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1631	1454	3407		1711	3421
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	12	103	505	8	114	510
RTOR Reduction (vph)	0	94	1	0	0	0
Lane Group Flow (vph)	12	9	512	0	114	510
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	5.8	5.8	34.0		7.8	46.9
Effective Green, g (s)	5.8	5.8	34.0		7.8	46.9
Actuated g/C Ratio	0.09	0.09	0.54		0.12	0.75
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	150	134	1841		212	2550
v/s Ratio Prot			c0.15		c0.07	0.15
v/s Ratio Perm	c0.01	0.01				
v/c Ratio	0.08	0.07	0.28		0.54	0.20
Uniform Delay, d1	26.1	26.1	7.8		25.9	2.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	0.2	0.4		2.6	0.2
Delay (s)	26.3	26.3	8.2		28.5	2.6
Level of Service	C	C	A		C	A
Approach Delay (s)	26.3		8.2			7.3
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	62.9	Sum of lost time (s)	15.3
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	40	15	14	122	162	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1540	1353		2869	2840	
Flt Permitted	0.95	1.00		0.90	1.00	
Satd. Flow (perm)	1540	1353		2605	2840	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	47	18	16	144	191	19
RTOR Reduction (vph)	0	17	0	0	16	0
Lane Group Flow (vph)	47	1	0	160	194	0
Confl. Peds. (#/hr)	1	1	25			25
Parking (#/hr)				5	5	
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	2.2	2.2		8.3	8.3	
Effective Green, g (s)	2.2	2.2		8.3	8.3	
Actuated g/C Ratio	0.05	0.05		0.18	0.18	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	73	64		471	513	
v/s Ratio Prot	c0.03				c0.07	
v/s Ratio Perm		0.00		0.06		
v/c Ratio	0.64	0.01		0.34	0.38	
Uniform Delay, d1	21.5	20.8		16.4	16.5	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	17.8	0.1		0.4	0.5	
Delay (s)	39.3	20.9		16.8	17.0	
Level of Service	D	C		B	B	
Approach Delay (s)	34.2			16.8	17.0	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.15		
Actuated Cycle Length (s)	45.9	Sum of lost time (s)	15.0
Intersection Capacity Utilization	27.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	230	32	32	2	18	10	48	68	13	10	159	178
Peak Hour Factor	0.92	0.79	0.79	0.79	0.79	0.92	0.79	0.92	0.79	0.92	0.92	0.92
Hourly flow rate (vph)	250	41	41	3	23	11	61	74	16	11	173	193

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	250	81	3	34	151	184	193
Volume Left (vph)	250	0	3	0	61	11	0
Volume Right (vph)	0	41	0	11	16	0	193
Hadj (s)	0.53	-0.32	0.53	-0.19	0.05	0.06	-0.67
Departure Headway (s)	6.5	5.6	7.0	6.3	6.1	5.9	5.1
Degree Utilization, x	0.45	0.13	0.00	0.06	0.26	0.30	0.28
Capacity (veh/h)	531	605	468	521	561	585	667
Control Delay (s)	13.5	8.3	8.8	8.5	11.2	10.2	8.9
Approach Delay (s)	12.2		8.5		11.2	9.5	
Approach LOS	B		A		B	A	

Intersection Summary			
Delay	10.8		
Level of Service	B		
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	66	210	116	8	214	18	73	387	67	14	384	82
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.96	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1275	1365	1129	1289	1365	1110	2515	2521		1296	2513	
Flt Permitted	0.57	1.00	1.00	0.57	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	759	1365	1129	776	1365	1110	2515	2521		1296	2513	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	74	236	130	9	240	20	82	435	75	16	431	92
RTOR Reduction (vph)	0	0	94	0	0	14	0	12	0	0	17	0
Lane Group Flow (vph)	74	236	36	9	240	6	82	498	0	16	506	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	16.9	16.9	16.9	16.9	16.9	16.9	6.0	26.5		1.5	22.0	
Effective Green, g (s)	16.9	16.9	16.9	16.9	16.9	16.9	6.0	26.5		1.5	22.0	
Actuated g/C Ratio	0.28	0.28	0.28	0.28	0.28	0.28	0.10	0.44		0.02	0.36	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	211	380	314	216	380	309	249	1102		32	912	
v/s Ratio Prot		0.17			c0.18		0.03	c0.20		0.01	c0.20	
v/s Ratio Perm	0.10		0.03	0.01		0.01						
v/c Ratio	0.35	0.62	0.12	0.04	0.63	0.02	0.33	0.45		0.50	0.55	
Uniform Delay, d1	17.5	19.1	16.3	15.9	19.1	15.8	25.4	12.0		29.2	15.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	3.1	0.2	0.1	3.4	0.0	0.8	0.3		11.8	0.7	
Delay (s)	18.5	22.2	16.4	16.0	22.5	15.9	26.2	12.3		40.9	16.1	
Level of Service	B	C	B	B	C	B	C	B		D	B	
Approach Delay (s)		19.9			21.8			14.2			16.9	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	60.6	Sum of lost time (s)	15.7
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	56	332	2	14	326	31	4	11	12	48	11	96
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.86	1.00	1.00		1.00	0.94	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.92		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1248	1621	1572		1491	1385	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.69	1.00		0.74	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1248	1169	1572		1165	1385	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	58	346	2	15	340	32	4	11	12	50	11	100
RTOR Reduction (vph)	0	0	1	0	0	18	0	9	0	0	73	0
Lane Group Flow (vph)	58	346	1	15	340	14	4	14	0	50	38	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	7.8	42.5	42.5	2.6	37.3	37.3	22.3	22.3		22.3	22.3	
Effective Green, g (s)	7.8	42.5	42.5	2.6	37.3	37.3	22.3	22.3		22.3	22.3	
Actuated g/C Ratio	0.09	0.52	0.52	0.03	0.45	0.45	0.27	0.27		0.27	0.27	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	153	879	747	51	772	564	316	425		315	374	
v/s Ratio Prot	c0.04	c0.20		0.01	c0.20			0.01			0.03	
v/s Ratio Perm			0.00			0.01	0.00			c0.04		
v/c Ratio	0.38	0.39	0.00	0.29	0.44	0.03	0.01	0.03		0.16	0.10	
Uniform Delay, d1	35.0	12.1	9.7	39.0	15.4	12.5	22.0	22.1		22.9	22.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	1.3	0.0	3.2	0.4	0.0	0.0	0.0		0.2	0.1	
Delay (s)	36.6	13.4	9.7	42.2	15.8	12.5	22.0	22.2		23.1	22.7	
Level of Service	D	B	A	D	B	B	C	C		C	C	
Approach Delay (s)		16.7			16.6			22.1			22.8	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	17.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	82.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St. 4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	335	60	16	394	18	31	54	27	30	85	50
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.99	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1052	1540	2927			3039	1073
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.67	1.00			0.86	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1052	1085	2927			2637	1073
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	28	376	67	18	443	20	35	61	30	34	96	56
RTOR Reduction (vph)	0	0	26	0	0	9	0	26	0	0	0	49
Lane Group Flow (vph)	28	376	41	18	443	11	35	65	0	0	130	7
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	2.0	32.0	32.0	0.9	29.9	29.9	8.0	8.0			7.0	7.0
Effective Green, g (s)	2.0	32.0	32.0	0.9	29.9	29.9	8.0	8.0			7.0	7.0
Actuated g/C Ratio	0.04	0.59	0.59	0.02	0.55	0.55	0.15	0.15			0.13	0.13
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	45	721	818	25	673	583	161	434			342	139
v/s Ratio Prot	c0.02	0.31		0.01	c0.36			0.02				
v/s Ratio Perm			0.03			0.01	0.03				c0.05	0.01
v/c Ratio	0.62	0.52	0.05	0.72	0.66	0.02	0.22	0.15			0.38	0.05
Uniform Delay, d1	25.6	6.4	4.6	26.4	8.4	5.4	20.2	20.0			21.5	20.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	23.8	0.7	0.0	67.0	2.3	0.0	0.7	0.2			0.7	0.2
Delay (s)	49.4	7.1	4.6	93.3	10.8	5.4	20.9	20.2			22.2	20.7
Level of Service	D	A	A	F	B	A	C	C			C	C
Approach Delay (s)		9.3			13.6			20.4			21.7	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	13.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	53.9	Sum of lost time (s)	15.0
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St. 4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	317	65	14	340	121	38	120	13	87	41	73
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.91	1.00	1.00	0.95	1.00	0.95	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1330	926		1335	1126	868	1070	957	914	1070	965	
Flt Permitted	0.29	1.00		0.35	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	403	926		498	1126	868	1070	957	914	1070	965	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	36	373	76	16	400	142	45	141	15	102	48	86
RTOR Reduction (vph)	0	6	0	0	0	56	0	0	12	0	67	0
Lane Group Flow (vph)	36	443	0	16	400	86	45	141	3	102	67	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	51.8	51.8		51.1	51.1	62.2	15.5	18.3	18.3	11.1	13.9	
Effective Green, g (s)	51.8	51.8		51.1	51.1	62.2	15.5	18.3	18.3	11.1	13.9	
Actuated g/C Ratio	0.50	0.50		0.50	0.50	0.61	0.15	0.18	0.18	0.11	0.14	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	223	467		260	560	567	161	170	162	115	130	
v/s Ratio Prot	0.00	c0.48		0.00	c0.36	0.02	0.04	c0.15		c0.10	0.07	
v/s Ratio Perm	0.08			0.03		0.08			0.00			
v/c Ratio	0.16	0.95		0.06	0.71	0.15	0.28	0.83	0.02	0.89	0.51	
Uniform Delay, d1	15.0	24.2		19.5	20.1	8.8	38.7	40.7	34.8	45.2	41.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	28.5		0.1	4.3	0.1	1.0	27.1	0.0	50.0	3.4	
Delay (s)	15.3	52.7		19.6	24.4	8.9	39.6	67.8	34.8	95.2	44.6	
Level of Service	B	D		B	C	A	D	E	C	F	D	
Approach Delay (s)		49.9			20.3			59.0			66.5	
Approach LOS		D			C			E			E	

Intersection Summary			
HCM 2000 Control Delay	42.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	102.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd. 4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	89	34	32	124	60	29	26	42	10	29	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor	1.00	0.95		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	0.98		0.98	
Flpb, ped/bikes	0.99	1.00		0.99	1.00			1.00	1.00		1.00	
Frt	1.00	0.96		1.00	0.95			1.00	0.85		0.89	
Flt Protected	0.95	1.00		0.95	1.00			0.97	1.00		1.00	
Satd. Flow (prot)	1691	3004		1687	1693			1748	1500		1333	
Flt Permitted	0.60	1.00		0.65	1.00			0.75	1.00		0.99	
Satd. Flow (perm)	1071	3004		1163	1693			1350	1500		1316	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	94	111	42	40	155	75	36	32	52	12	36	212
RTOR Reduction (vph)	0	31	0	0	22	0	0	0	40	0	164	0
Lane Group Flow (vph)	94	122	0	40	208	0	0	68	12	0	96	0
Confl. Peds. (#/hr)	13		16	16		13	16		19	19		16
Parking (#/hr)		10	10								10	10
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4		4	8		
Actuated Green, G (s)	12.6	12.6		12.6	12.6			11.1	11.1		11.1	
Effective Green, g (s)	12.6	12.6		12.6	12.6			11.1	11.1		11.1	
Actuated g/C Ratio	0.26	0.26		0.26	0.26			0.23	0.23		0.23	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	277	778		301	438			308	342		300	
v/s Ratio Prot		0.04			c0.12							
v/s Ratio Perm	0.09			0.03				0.05	0.01		c0.07	
v/c Ratio	0.34	0.16		0.13	0.47			0.22	0.03		0.32	
Uniform Delay, d1	14.6	13.9		13.8	15.2			15.2	14.6		15.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.7	0.1		0.2	0.8			0.4	0.0		0.6	
Delay (s)	15.4	14.0		14.0	16.0			15.6	14.6		16.2	
Level of Service	B	B		B	B			B	B		B	
Approach Delay (s)		14.5			15.7			15.2			16.2	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	48.6	Sum of lost time (s)	14.0
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St. 4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	79	154	44	98	205	25	42	423	20	27	405	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.98		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1672	3280		1682	3348		1260	2501		1260	2449	
Flt Permitted	0.59	1.00		0.61	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1033	3280		1079	3348		1260	2501		1260	2449	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	91	177	51	113	236	29	48	486	23	31	466	87
RTOR Reduction (vph)	0	26	0	0	10	0	0	3	0	0	15	0
Lane Group Flow (vph)	91	202	0	113	255	0	48	506	0	31	538	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	30.1	30.1		30.1	30.1		9.3	40.4		8.2	39.3	
Effective Green, g (s)	30.1	30.1		30.1	30.1		9.3	40.4		8.2	39.3	
Actuated g/C Ratio	0.32	0.32		0.32	0.32		0.10	0.43		0.09	0.42	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	330	1048		344	1069		124	1072		109	1021	
v/s Ratio Prot		0.06			0.08		0.04	c0.20		0.02	c0.22	
v/s Ratio Perm	0.09			c0.10								
v/c Ratio	0.28	0.19		0.33	0.24		0.39	0.47		0.28	0.53	
Uniform Delay, d1	23.9	23.2		24.4	23.6		39.8	19.3		40.3	20.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.1		0.6	0.1		2.0	1.5		1.4	0.5	
Delay (s)	24.4	23.3		24.9	23.7		41.8	20.7		41.7	21.0	
Level of Service	C	C		C	C		D	C		D	C	
Approach Delay (s)		23.6			24.1			22.6			22.1	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	94.2	Sum of lost time (s)	15.5
Intersection Capacity Utilization	104.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	300	22	8	260	53	27	0	2	7	5	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.97			0.99		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3386		1711	3334			1705		1711	1561	
Flt Permitted	0.55	1.00		0.54	1.00			0.73		0.74	1.00	
Satd. Flow (perm)	984	3386		976	3334			1307		1327	1561	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	326	24	9	283	58	29	0	2	8	5	39
RTOR Reduction (vph)	0	10	0	0	34	0	0	22	0	0	28	0
Lane Group Flow (vph)	30	340	0	9	307	0	0	9	0	8	16	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	9.6	9.6		9.6	9.6			7.9		7.9	7.9	
Effective Green, g (s)	9.6	9.6		9.6	9.6			7.9		7.9	7.9	
Actuated g/C Ratio	0.35	0.35		0.35	0.35			0.29		0.29	0.29	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	343	1182		340	1163			375		381	448	
v/s Ratio Prot		c0.10			0.09						c0.01	
v/s Ratio Perm	0.03			0.01				0.01		0.01		
v/c Ratio	0.09	0.29		0.03	0.26			0.02		0.02	0.04	
Uniform Delay, d1	6.0	6.5		5.9	6.4			7.0		7.0	7.1	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.1		0.0	0.1			0.0		0.0	0.0	
Delay (s)	6.1	6.6		5.9	6.5			7.1		7.0	7.1	
Level of Service	A	A		A	A			A		A	A	
Approach Delay (s)		6.6			6.5			7.1			7.1	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	27.5	Sum of lost time (s)	10.0
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	133	0	0	361	33	219	95	227	0	0	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frt		1.00			0.99		1.00	0.89				0.85
Flt Protected		0.99			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3392			5068		1711	3060				2694
Flt Permitted		0.86			1.00		0.95	1.00				1.00
Satd. Flow (perm)		2931			5068		1711	3060				2694
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	34	166	0	0	451	41	274	119	284	0	0	172
RTOR Reduction (vph)	0	0	0	0	15	0	0	168	0	0	0	163
Lane Group Flow (vph)	0	200	0	0	477	0	274	235	0	0	0	9
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		35.5			26.5		31.0	31.0				4.0
Effective Green, g (s)		35.5			26.5		31.0	31.0				4.0
Actuated g/C Ratio		0.47			0.35		0.41	0.41				0.05
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1393			1767		697	1248				141
v/s Ratio Prot		c0.01			c0.09		c0.16	0.08				0.00
v/s Ratio Perm		0.06										
v/c Ratio		0.14			0.27		0.39	0.19				0.06
Uniform Delay, d1		11.6			17.8		15.9	14.4				34.2
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.2			0.4		1.7	0.3				0.9
Delay (s)		11.8			18.2		17.5	14.8				35.1
Level of Service		B			B		B	B				D
Approach Delay (s)		11.8			18.2			15.9			35.1	
Approach LOS		B			B			B			D	

Intersection Summary			
HCM 2000 Control Delay	18.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.
4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	160	128	387	330	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	1.00	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.99	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1689	1428	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1689	1428	3319	1801		
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	195	156	472	402	0	0
RTOR Reduction (vph)	4	55	0	0	0	0
Lane Group Flow (vph)	207	85	472	402	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	36.3	36.3	13.7	60.0		
Effective Green, g (s)	36.3	36.3	13.7	60.0		
Actuated g/C Ratio	0.60	0.60	0.23	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	1021	863	757	1801		
v/s Ratio Prot	0.12		c0.14	c0.22		
v/s Ratio Perm		0.06				
v/c Ratio	0.20	0.10	0.62	0.22		
Uniform Delay, d1	5.3	5.0	20.8	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.1	0.0	1.6	0.1		
Delay (s)	5.4	5.0	22.4	0.1		
Level of Service	A	A	C	A		
Approach Delay (s)	5.3			12.1	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	31.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	83	41	109	3	38	0	101	343	0	39	382	126
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.93		1.00	1.00		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	0.97	1.00		0.94	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	1.00		1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1177	1892		1141	1279		1215	2431		1215	2289	
Flt Permitted	0.44	1.00		0.65	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	541	1892		776	1279		1215	2431		1215	2289	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	93	46	122	3	43	0	113	385	0	44	429	142
RTOR Reduction (vph)	0	87	0	0	0	0	0	0	0	0	24	0
Lane Group Flow (vph)	93	81	0	3	43	0	113	385	0	44	547	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	22.2	22.2		7.9	7.9		10.5	26.8		11.6	27.9	
Effective Green, g (s)	22.2	22.2		7.9	7.9		10.5	26.8		11.6	27.9	
Actuated g/C Ratio	0.29	0.29		0.10	0.10		0.14	0.35		0.15	0.36	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	230	546		79	131		165	847		183	830	
v/s Ratio Prot	c0.05	0.04			0.03		c0.09	0.16		0.04	c0.24	
v/s Ratio Perm	c0.07			0.00								
v/c Ratio	0.40	0.15		0.04	0.33		0.68	0.45		0.24	0.66	
Uniform Delay, d1	21.3	20.3		31.1	32.0		31.6	19.4		28.8	20.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	0.1		0.2	1.5		11.2	0.4		0.7	1.9	
Delay (s)	22.5	20.5		31.3	33.5		42.8	19.8		29.5	22.4	
Level of Service	C	C		C	C		D	B		C	C	
Approach Delay (s)		21.2			33.4			25.0			22.9	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	76.9	Sum of lost time (s)	21.6
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

2040 CUMULATIVE WITH PROJECT–CONVENTION EVENT
WEEKDAY PM PEAK

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	924	825	48	402	937	47	79	1537	531	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.98		1.00	0.98			1.00	0.68			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	0.99		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	3001		2987	3010			5478	942			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	3001		2987	3010			5478	942			
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	953	851	49	414	966	48	81	1585	547	0	0	0
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	206	0	0	0
Lane Group Flow (vph)	953	896	0	414	1014	0	0	1666	341	0	0	0
Confl. Peds. (#/hr)			400			400	400		400			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.2	37.2		13.2	33.7			39.2	39.2			
Effective Green, g (s)	18.2	37.2		13.2	33.7			39.2	39.2			
Actuated g/C Ratio	0.17	0.34		0.12	0.31			0.36	0.36			
Clearance Time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	741	1014		358	922			1952	335			
v/s Ratio Prot	c0.21	0.30		0.14	c0.34							
v/s Ratio Perm								0.30	c0.36			
v/c Ratio	1.29	0.88		1.16	1.10			0.85	1.02			
Uniform Delay, d1	45.9	34.4		48.4	38.1			32.7	35.4			
Progression Factor	1.37	1.51		1.43	0.99			0.97	1.07			
Incremental Delay, d2	132.8	4.7		88.8	55.7			3.8	53.3			
Delay (s)	195.8	56.7		157.8	93.5			35.4	91.2			
Level of Service	F	E		F	F			D	F			
Approach Delay (s)		128.2			112.1			49.2			0.0	
Approach LOS		F			F			D			A	

Intersection Summary			
HCM 2000 Control Delay	92.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	98.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	346	1643	36	30	962	24	8	250	107	47	639	592
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	0.64	1.00	0.87	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00	0.77	1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85	1.00	0.96	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1459	4143		1459	2863			1528	813	1123	2336	550
Flt Permitted	0.95	1.00		0.95	1.00			0.97	1.00	0.51	1.00	1.00
Satd. Flow (perm)	1459	4143		1459	2863			1477	813	607	2336	550
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	353	1677	37	31	982	24	8	255	109	48	652	604
RTOR Reduction (vph)	0	2	0	0	1	0	0	0	71	0	27	228
Lane Group Flow (vph)	353	1712	0	31	1005	0	0	263	38	48	842	159
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.4	43.0		8.9	35.9			38.2	38.2	39.2	39.2	39.2
Effective Green, g (s)	14.4	43.0		8.9	35.9			38.2	38.2	39.2	39.2	39.2
Actuated g/C Ratio	0.13	0.39		0.08	0.33			0.35	0.35	0.36	0.36	0.36
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	190	1619		118	934			512	282	216	832	196
v/s Ratio Prot	c0.24	0.41		0.02	c0.35						c0.36	
v/s Ratio Perm								0.18	0.05	0.08		0.29
v/c Ratio	1.86	1.06		0.26	1.08			0.51	0.13	0.22	1.01	0.81
Uniform Delay, d1	47.8	33.5		47.5	37.0			28.5	24.6	24.7	35.4	32.0
Progression Factor	0.59	1.13		0.89	0.88			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	394.4	32.6		0.1	36.4			0.9	0.2	0.5	34.2	21.2
Delay (s)	422.6	70.3		42.1	68.9			29.4	24.8	25.3	69.6	53.2
Level of Service	F	E		D	E			C	C	C	E	D
Approach Delay (s)		130.5			68.1			28.0			63.1	
Approach LOS		F			E			C			E	

Intersection Summary			
HCM 2000 Control Delay	90.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	123.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	2002	157	0	1562	100	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.91			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	4366			3079	1540	1357
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	4366			3079	1540	1357
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	2085	164	0	1627	104	24
RTOR Reduction (vph)	8	0	0	0	0	3
Lane Group Flow (vph)	2241	0	0	1627	104	21
Confl. Peds. (#/hr)		37	37		1	3
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	2464			1738	512	451
v/s Ratio Prot	0.51			c0.53	c0.07	
v/s Ratio Perm						0.02
v/c Ratio	0.91			0.94	0.20	0.05
Uniform Delay, d1	21.4			22.1	26.3	24.9
Progression Factor	1.00			0.76	1.00	1.00
Incremental Delay, d2	6.3			1.3	0.9	0.2
Delay (s)	27.8			18.0	27.2	25.1
Level of Service	C			B	C	C
Approach Delay (s)	27.8			18.0	26.8	
Approach LOS	C			B	C	

Intersection Summary			
HCM 2000 Control Delay	23.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	90.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	250	1050	150	100	570	810	340	335	1370	460
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.0			2.0	2.0			2.0	2.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.99	0.87
Flpb, ped/bikes		0.99			1.00	1.00			1.00	1.00
Frt		0.98			1.00	0.96			1.00	0.85
Flt Protected		0.99			0.99	1.00			0.95	1.00
Satd. Flow (prot)		6062			3026	2596			4316	1033
Flt Permitted		0.99			0.52	1.00			0.95	1.00
Satd. Flow (perm)		6062			1584	2596			4316	1033
Peak-hour factor, PHF	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93
Adj. Flow (vph)	272	1129	161	108	613	871	366	364	1473	495
RTOR Reduction (vph)	0	23	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	1539	0	0	721	1236	0	0	1887	445
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Perm
Protected Phases		6			4	4		7	7	
Permitted Phases	6			4						7
Actuated Green, G (s)		27.0			25.0	25.0			24.0	24.0
Effective Green, g (s)		29.0			28.0	28.0			27.0	27.0
Actuated g/C Ratio		0.32			0.31	0.31			0.30	0.30
Clearance Time (s)		4.0			5.0	5.0			5.0	5.0
Lane Grp Cap (vph)		1953			492	807			1294	309
v/s Ratio Prot						c0.48			c0.44	
v/s Ratio Perm		0.25			0.46					0.43
v/c Ratio		0.79			1.54dl	1.53			1.46	1.44
Uniform Delay, d1		27.7			31.0	31.0			31.5	31.5
Progression Factor		1.56			0.31	1.00			1.00	1.00
Incremental Delay, d2		2.0			210.5	245.3			210.6	215.6
Delay (s)		45.2			220.0	276.3			242.1	247.1
Level of Service		D			F	F			F	F
Approach Delay (s)		45.2			220.0	276.3			243.0	
Approach LOS		D			F	F			F	

Intersection Summary			
HCM 2000 Control Delay	194.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	135.5%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

4/27/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations		↰↰	↰↑↑↱		↑↑↱		↱		↰	↰↑
Volume (vph)	105	321	1050	110	565	140	500	260	180	955
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.90		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.99		0.95		0.85		1.00	1.00
Flt Protected		0.95	1.00		1.00		1.00		0.95	1.00
Satd. Flow (prot)		2494	3622		2497		1228		1401	2689
Flt Permitted		0.95	1.00		1.00		1.00		0.15	0.60
Satd. Flow (perm)		2494	3622		2497		1228		218	1616
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	113	345	1129	118	608	151	538	280	194	1027
RTOR Reduction (vph)	0	0	12	0	15	0	226	0	0	0
Lane Group Flow (vph)	0	423	1270	0	879	0	177	0	373	1128
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	5	0	5	0	0	0	0	5
Parking (#/hr)			10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		22.5	22.5		23.0		23.0		42.0	42.0
Effective Green, g (s)		22.5	25.0		24.5		23.0		43.5	43.5
Actuated g/C Ratio		0.25	0.28		0.27		0.26		0.48	0.48
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		623	1006		679		313		322	977
v/s Ratio Prot		0.17	c0.35		c0.35				0.21	c0.21
v/s Ratio Perm							0.14		0.35	0.35
v/c Ratio		0.68	1.26		1.29		0.56		1.16	1.15
Uniform Delay, d1		30.5	32.5		32.8		29.1		33.1	23.2
Progression Factor		1.00	1.00		1.00		1.00		1.07	1.08
Incremental Delay, d2		5.9	126.3		143.1		7.2		74.8	70.8
Delay (s)		36.4	158.8		175.9		36.3		110.1	95.9
Level of Service		D	F		F		D		F	F
Approach Delay (s)			128.5		132.5					99.4
Approach LOS			F		F					F

Intersection Summary			
HCM 2000 Control Delay	120.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	99.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑	↱		✥		↰	↑↑		↰	↑↑	
Volume (vph)	56	98	228	28	30	77	39	1550	106	58	438	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.98		1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.92		1.00	0.99		1.00	0.99	
Flt Protected		0.98	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1585	1353		1457		1540	3026		1540	3052	
Flt Permitted		0.85	1.00		0.92		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1371	1353		1358		1540	3026		1540	3052	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	59	103	240	29	32	81	41	1632	112	61	461	24
RTOR Reduction (vph)	0	0	163	0	48	0	0	5	0	0	4	0
Lane Group Flow (vph)	0	162	77	0	94	0	41	1739	0	61	481	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		32.1	32.1		32.1		8.0	47.5		4.5	44.3	
Effective Green, g (s)		32.1	32.1		32.1		8.0	47.5		4.5	44.3	
Actuated g/C Ratio		0.32	0.32		0.32		0.08	0.48		0.04	0.44	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Grp Cap (vph)		440	434		435		123	1437		69	1352	
v/s Ratio Prot							0.03	c0.57		c0.04	0.16	
v/s Ratio Perm		c0.12	0.06		0.07							
v/c Ratio		0.37	0.18		0.22		0.33	1.21		0.88	0.36	
Uniform Delay, d1		26.1	24.4		24.8		43.5	26.2		47.5	18.4	
Progression Factor		1.00	1.00		1.00		1.23	0.66		1.00	1.00	
Incremental Delay, d2		2.4	0.9		1.1		6.7	100.8		79.1	0.7	
Delay (s)		28.5	25.3		25.9		60.1	118.1		126.6	19.1	
Level of Service		C	C		C		E	F		F	B	
Approach Delay (s)		26.6			25.9			116.8			31.1	
Approach LOS		C			C			F			C	

Intersection Summary			
HCM 2000 Control Delay	83.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.9
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	31	20	8	36	48	18	259	24	327	317	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00	0.99	1.00	1.00		1.00	0.97	
Flpb, ped/bikes		0.99			1.00	1.00	0.85	1.00		1.00	1.00	
Frt		0.97			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.98			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2864			1605	1361	1303	1595		1540	1538	
Flt Permitted		0.83			0.91	1.00	0.53	1.00		0.95	1.00	
Satd. Flow (perm)		2427			1472	1361	731	1595		1540	1538	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	43	33	22	9	39	52	19	278	26	352	341	46
RTOR Reduction (vph)	0	19	0	0	0	30	0	5	0	0	5	0
Lane Group Flow (vph)	0	79	0	0	48	22	19	299	0	352	382	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		5.9			5.9	21.7	15.1	15.1		15.8	35.9	
Effective Green, g (s)		5.9			5.9	21.7	15.1	15.1		15.8	35.9	
Actuated g/C Ratio		0.11			0.11	0.42	0.29	0.29		0.31	0.69	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		276			167	701	213	464		469	1065	
v/s Ratio Prot						0.01		c0.19		c0.23	0.25	
v/s Ratio Perm		0.03			c0.03	0.01	0.03					
v/c Ratio		0.28			0.29	0.03	0.09	0.64		0.75	0.36	
Uniform Delay, d1		21.0			21.0	8.9	13.3	16.0		16.2	3.2	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.6			1.0	0.0	0.2	3.1		6.6	0.2	
Delay (s)		21.6			22.0	8.9	13.5	19.1		22.9	3.5	
Level of Service		C			C	A	B	B		C	A	
Approach Delay (s)		21.6			15.2			18.7			12.7	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	51.8	Sum of lost time (s)	15.0
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	186	491	1042	72	323	306
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.95	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1540	2368	2431	1309	1540	1621
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1540	2368	2431	1309	1540	1621
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	202	534	1133	78	351	333
RTOR Reduction (vph)	0	436	0	11	0	0
Lane Group Flow (vph)	202	98	1133	67	351	333
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	4		2		1	6
Permitted Phases		4		2		
Actuated Green, G (s)	19.9	19.9	49.1	49.1	24.1	78.2
Effective Green, g (s)	19.9	19.9	49.1	49.1	24.1	78.2
Actuated g/C Ratio	0.18	0.18	0.45	0.45	0.22	0.72
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	283	435	1104	594	343	1172
v/s Ratio Prot	c0.13		c0.47		c0.23	0.21
v/s Ratio Perm		0.04		0.05		
v/c Ratio	0.71	0.23	1.03	0.11	1.02	0.28
Uniform Delay, d1	41.4	37.5	29.5	17.0	42.0	5.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.3	0.3	34.0	0.1	54.7	0.1
Delay (s)	49.7	37.8	63.5	17.0	96.7	5.3
Level of Service	D	D	E	B	F	A
Approach Delay (s)	41.1		60.5			52.2
Approach LOS	D		E			D

Intersection Summary			
HCM 2000 Control Delay	52.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	108.1	Sum of lost time (s)	15.0
Intersection Capacity Utilization	76.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	24	48	43	195	456	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frpb, ped/bikes	0.96		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		0.99	1.00	1.00	
Frt	0.91		1.00	1.00	0.99	
Flt Protected	0.98		0.95	1.00	1.00	
Satd. Flow (prot)	1547		1688	1531	3107	
Flt Permitted	0.98		0.44	1.00	1.00	
Satd. Flow (perm)	1547		787	1531	3107	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	27	53	48	217	507	51
RTOR Reduction (vph)	48	0	0	0	7	0
Lane Group Flow (vph)	32	0	48	217	551	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	10
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	3.8		24.6	24.6	24.6	
Effective Green, g (s)	3.8		24.6	24.6	24.6	
Actuated g/C Ratio	0.10		0.64	0.64	0.64	
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	153		504	980	1990	
v/s Ratio Prot	c0.02			0.14	c0.18	
v/s Ratio Perm			0.06			
v/c Ratio	0.21		0.10	0.22	0.28	
Uniform Delay, d1	15.9		2.6	2.9	3.0	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.7		0.1	0.1	0.1	
Delay (s)	16.6		2.7	3.0	3.1	
Level of Service	B		A	A	A	
Approach Delay (s)	16.6			3.0	3.1	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	4.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	38.4	Sum of lost time (s)	10.0
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	211	441	1409	17	109	1021
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.96	1.00		1.00	1.00
Flpb, ped/bikes	0.93	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1584	1466	3412		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1584	1466	3412		1711	3421
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	234	490	1566	19	121	1134
RTOR Reduction (vph)	0	142	1	0	0	0
Lane Group Flow (vph)	234	348	1584	0	121	1134
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	28.7	28.7	46.1		9.9	61.1
Effective Green, g (s)	28.7	28.7	46.1		9.9	61.1
Actuated g/C Ratio	0.29	0.29	0.46		0.10	0.61
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	454	420	1572		169	2090
v/s Ratio Prot			c0.46		c0.07	0.33
v/s Ratio Perm	0.15	c0.24				
v/c Ratio	0.52	0.83	1.01		0.72	0.54
Uniform Delay, d1	29.8	33.4	26.9		43.7	11.3
Progression Factor	1.00	1.00	1.66		1.04	1.04
Incremental Delay, d2	1.0	12.7	13.6		13.5	0.3
Delay (s)	30.8	46.0	58.4		59.0	12.0
Level of Service	C	D	E		E	B
Approach Delay (s)	41.1		58.4			16.6
Approach LOS	D		E			B

Intersection Summary			
HCM 2000 Control Delay	40.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
11: Terry A Francois Blvd./Terry A Francois Blvd & 16th

4/27/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	40	30	55	198	409	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.97	
Flt Protected	0.95	1.00		0.99	1.00	
Satd. Flow (prot)	1540	1351		3041	2974	
Flt Permitted	0.95	1.00		0.72	1.00	
Satd. Flow (perm)	1540	1351		2225	2974	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	47	35	65	233	481	112
RTOR Reduction (vph)	0	34	0	0	37	0
Lane Group Flow (vph)	47	1	0	298	556	0
Confl. Peds. (#/hr)	1	1	25			25
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	2.1	2.1		15.4	15.4	
Effective Green, g (s)	2.1	2.1		15.4	15.4	
Actuated g/C Ratio	0.04	0.04		0.29	0.29	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	60	53		645	862	
v/s Ratio Prot	c0.03				c0.19	
v/s Ratio Perm		0.00		0.13		
v/c Ratio	0.78	0.03		0.46	0.65	
Uniform Delay, d1	25.3	24.5		15.5	16.5	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	47.5	0.2		0.5	1.7	
Delay (s)	72.8	24.7		16.0	18.1	
Level of Service	E	C		B	B	
Approach Delay (s)	52.3			16.0	18.1	
Approach LOS	D			B	B	

Intersection Summary			
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	53.1	Sum of lost time (s)	15.0
Intersection Capacity Utilization	40.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
12: Illinois St & 16th

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	136	67	107	53	87	10	221	48	19	10	274	193
Peak Hour Factor	0.92	0.87	0.87	0.87	0.87	0.92	0.87	0.92	0.87	0.92	0.92	0.92
Hourly flow rate (vph)	148	77	123	61	100	11	254	52	22	11	298	210

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	148	200	61	111	328	309	210
Volume Left (vph)	148	0	61	0	254	11	0
Volume Right (vph)	0	123	0	11	22	0	210
Hadj (s)	0.53	-0.40	0.53	-0.03	0.15	0.05	-0.67
Departure Headway (s)	8.0	7.1	8.4	7.8	7.2	7.0	6.3
Degree Utilization, x	0.33	0.39	0.14	0.24	0.65	0.60	0.37
Capacity (veh/h)	426	471	390	418	484	499	552
Control Delay (s)	13.7	13.4	11.6	12.1	22.6	18.8	11.6
Approach Delay (s)	13.5		11.9		22.6	15.9	
Approach LOS	B		B		C	C	

Intersection Summary			
Delay	16.4		
Level of Service	C		
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	193	197	313	24	334	143	310	1090	40	73	943	216
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1512	1621	1337	1526	1621	1304	2987	3058		1540	2978	
Flt Permitted	0.37	1.00	1.00	0.56	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	581	1621	1337	901	1621	1304	2987	3058		1540	2978	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	212	216	344	26	367	157	341	1198	44	80	1036	237
RTOR Reduction (vph)	0	0	225	0	0	103	0	2	0	0	20	0
Lane Group Flow (vph)	212	216	119	26	367	54	341	1240	0	80	1253	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Effective Green, g (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Actuated g/C Ratio	0.34	0.34	0.34	0.34	0.34	0.34	0.14	0.38		0.12	0.36	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Grp Cap (vph)	200	559	461	310	559	449	418	1155		184	1066	
v/s Ratio Prot		0.13			0.23		0.11	c0.41		0.05	c0.42	
v/s Ratio Perm	c0.36		0.09	0.03		0.04						
v/c Ratio	1.06	0.39	0.26	0.08	0.66	0.12	0.82	1.07		0.43	1.18	
Uniform Delay, d1	32.8	24.8	23.5	22.1	27.7	22.4	41.7	31.1		40.9	32.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.59	0.83		1.01	1.01	
Incremental Delay, d2	80.4	2.0	1.3	0.5	5.9	0.5	1.7	34.9		6.3	87.7	
Delay (s)	113.1	26.8	24.9	22.6	33.7	22.9	26.2	60.6		47.6	120.0	
Level of Service	F	C	C	C	C	C	C	E		D	F	
Approach Delay (s)		49.7			30.1			53.2			115.7	
Approach LOS		D			C			D			F	

Intersection Summary			
HCM 2000 Control Delay	69.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	123.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	127	538	14	42	741	77	49	54	77	88	34	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.88	1.00	0.98		1.00	0.94	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.94	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1711	1801	1489	1711	1801	1340	1711	1604		1610	1477	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.33	1.00		0.67	1.00	
Satd. Flow (perm)	1711	1801	1489	1711	1801	1340	594	1604		1127	1477	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	138	585	15	46	805	84	53	59	84	96	37	248
RTOR Reduction (vph)	0	0	7	0	0	43	0	68	0	0	198	0
Lane Group Flow (vph)	138	585	8	46	805	41	53	75	0	96	87	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	8.0	38.5	38.5	4.6	35.1	35.1	13.6	13.6		13.6	13.6	
Effective Green, g (s)	8.0	38.5	38.5	4.6	35.1	35.1	13.6	13.6		13.6	13.6	
Actuated g/C Ratio	0.11	0.54	0.54	0.06	0.49	0.49	0.19	0.19		0.19	0.19	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	190	967	799	109	881	655	112	304		213	280	
v/s Ratio Prot	c0.08	c0.32		0.03	c0.45			0.05			0.06	
v/s Ratio Perm			0.01			0.03	c0.09			0.09		
v/c Ratio	0.73	0.60	0.01	0.42	0.91	0.06	0.47	0.25		0.45	0.31	
Uniform Delay, d1	30.8	11.4	7.7	32.3	16.9	9.6	25.9	24.7		25.7	25.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	12.9	2.8	0.0	2.6	13.7	0.0	3.1	0.4		1.5	0.6	
Delay (s)	43.7	14.2	7.8	34.9	30.6	9.7	29.0	25.1		27.3	25.7	
Level of Service	D	B	A	C	C	A	C	C		C	C	
Approach Delay (s)		19.6			28.9			26.2			26.1	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	71.7	Sum of lost time (s)	15.0
Intersection Capacity Utilization	93.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↱			↰↑	↱
Volume (vph)	137	388	234	66	860	92	138	173	129	162	329	187
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.98	1.00
Satd. Flow (prot)	1540	1540	1378	1540	1540	1315	1540	2882			3029	1356
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.30	1.00			0.68	1.00
Satd. Flow (perm)	1540	1540	1378	1540	1540	1315	485	2882			2090	1356
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	143	404	244	69	896	96	144	180	134	169	343	195
RTOR Reduction (vph)	0	0	82	0	0	25	0	100	0	0	0	147
Lane Group Flow (vph)	143	404	162	69	896	71	144	214	0	0	512	48
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	9.0	70.4	70.4	6.4	66.8	66.8	31.0	31.0			30.0	30.0
Effective Green, g (s)	9.0	70.4	70.4	6.4	66.8	66.8	31.0	31.0			30.0	30.0
Actuated g/C Ratio	0.07	0.58	0.58	0.05	0.55	0.55	0.26	0.26			0.25	0.25
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	114	897	803	81	851	727	124	739			519	336
v/s Ratio Prot	c0.09	c0.26		0.04	c0.58			0.07				
v/s Ratio Perm			0.12			0.05	c0.30				0.24	0.04
v/c Ratio	1.25	0.45	0.20	0.85	1.05	0.10	1.16	0.29			0.99	0.14
Uniform Delay, d1	55.9	14.3	11.9	56.7	27.0	12.8	44.9	36.1			45.2	35.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	167.6	1.6	0.6	53.8	45.7	0.1	130.6	0.2			35.7	0.2
Delay (s)	223.5	15.9	12.5	110.5	72.7	12.8	175.5	36.3			80.9	35.6
Level of Service	F	B	B	F	E	B	F	D			F	D
Approach Delay (s)		52.4			69.8			80.1			68.4	
Approach LOS		D			E			F			E	

Intersection Summary			
HCM 2000 Control Delay	66.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	120.8	Sum of lost time (s)	15.0
Intersection Capacity Utilization	100.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑	↱	↰	↑	↱	↰	↑↱	
Volume (vph)	72	537	76	58	594	533	75	329	48	173	140	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.90	1.00	1.00	0.96	1.00	0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1540	1076		1540	1296	997	1232	1102	1058	1232	1165	
Flt Permitted	0.09	1.00		0.09	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	147	1076		147	1296	997	1232	1102	1058	1232	1165	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	77	571	81	62	632	567	80	350	51	184	149	139
RTOR Reduction (vph)	0	4	0	0	0	78	0	0	39	0	31	0
Lane Group Flow (vph)	77	648	0	62	632	489	80	350	12	184	257	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	48.1	48.1		48.1	48.1	60.1	10.7	25.0	25.0	12.0	26.3	
Effective Green, g (s)	48.1	48.1		48.1	48.1	60.1	10.7	25.0	25.0	12.0	26.3	
Actuated g/C Ratio	0.44	0.44		0.44	0.44	0.55	0.10	0.23	0.23	0.11	0.24	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	114	474		114	571	595	120	252	242	135	281	
v/s Ratio Prot	0.02	c0.60		0.02	0.49	c0.09	0.06	c0.32		c0.15	0.22	
v/s Ratio Perm	0.27			0.22		0.40			0.01			
v/c Ratio	0.68	1.37		0.54	1.11	0.82	0.67	1.39	0.05	1.36	0.91	
Uniform Delay, d1	25.7	30.4		47.0	30.4	20.1	47.4	42.0	32.7	48.5	40.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	14.7	177.9		5.2	70.4	8.9	13.1	197.6	0.1	203.5	32.0	
Delay (s)	40.4	208.3		52.2	100.8	29.0	60.6	239.6	32.8	252.0	72.2	
Level of Service	D	F		D	F	C	E	F	C	F	E	
Approach Delay (s)		190.6			66.1			187.9			142.3	
Approach LOS		F			E			F			F	

Intersection Summary			
HCM 2000 Control Delay	129.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.39		
Actuated Cycle Length (s)	109.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	86.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	81	93	49	56	372	17	41	126	109	21	61	345
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor	1.00	0.95		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00			1.00	0.98		0.98	
Flpb, ped/bikes	0.99	1.00		0.98	1.00			1.00	1.00		1.00	
Frt	1.00	0.95		1.00	0.99			1.00	0.85		0.89	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)	1695	3198		1679	1786			1776	1496		1564	
Flt Permitted	0.30	1.00		0.65	1.00			0.72	1.00		0.98	
Satd. Flow (perm)	531	3198		1153	1786			1301	1496		1536	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	90	103	54	62	413	19	46	140	121	23	68	383
RTOR Reduction (vph)	0	36	0	0	2	0	0	0	86	0	194	0
Lane Group Flow (vph)	90	121	0	62	430	0	0	186	35	0	280	0
Confl. Peds. (#/hr)	13		16	16		13	16		19	19		16
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4		4	8		
Actuated Green, G (s)	21.3	21.3		21.3	21.3			19.1	19.1		19.1	
Effective Green, g (s)	21.3	21.3		21.3	21.3			19.1	19.1		19.1	
Actuated g/C Ratio	0.33	0.33		0.33	0.33			0.29	0.29		0.29	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)	173	1043		376	582			380	437		449	
v/s Ratio Prot		0.04			c0.24							
v/s Ratio Perm	0.17			0.05				0.14	0.02		c0.18	
v/c Ratio	0.52	0.12		0.16	0.74			0.49	0.08		0.62	
Uniform Delay, d1	17.9	15.4		15.7	19.5			19.1	16.7		20.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	2.8	0.0		0.2	4.9			1.0	0.1		2.7	
Delay (s)	20.7	15.5		15.9	24.4			20.1	16.8		22.7	
Level of Service	C	B		B	C			C	B		C	
Approach Delay (s)		17.4			23.3			18.8			22.7	
Approach LOS		B			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	65.3	Sum of lost time (s)	14.0
Intersection Capacity Utilization	82.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	205	138	106	99	614	45	106	1190	49	36	941	303
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.99		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1693	3147		1682	3375		1711	3397		1711	3269	
Flt Permitted	0.27	1.00		0.59	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	480	3147		1046	3375		1711	3397		1711	3269	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	218	147	113	105	653	48	113	1266	52	38	1001	322
RTOR Reduction (vph)	0	72	0	0	6	0	0	3	0	0	31	0
Lane Group Flow (vph)	218	188	0	105	695	0	113	1315	0	38	1292	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	36.7	36.7		36.7	36.7		9.9	37.9		9.9	37.9	
Effective Green, g (s)	36.7	36.7		36.7	36.7		9.9	37.9		9.9	37.9	
Actuated g/C Ratio	0.37	0.37		0.37	0.37		0.10	0.38		0.10	0.38	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Grp Cap (vph)	176	1154		383	1238		169	1287		169	1238	
v/s Ratio Prot		0.06			0.21		0.07	c0.39		0.02	c0.40	
v/s Ratio Perm	c0.45			0.10								
v/c Ratio	1.24	0.16		0.27	0.56		0.67	1.02		0.22	1.04	
Uniform Delay, d1	31.6	21.3		22.3	25.2		43.5	31.1		41.5	31.1	
Progression Factor	1.00	1.00		1.00	1.00		0.94	0.89		1.56	0.58	
Incremental Delay, d2	146.3	0.3		1.8	1.8		17.7	29.7		0.8	26.1	
Delay (s)	178.0	21.6		24.0	27.1		58.4	57.4		65.5	44.3	
Level of Service	F	C		C	C		E	E		E	D	
Approach Delay (s)		92.9			26.7			57.5			44.8	
Approach LOS		F			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	51.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	108.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	457	76	16	929	105	51	0	24	46	0	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.98			0.96		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00			0.97		0.95	1.00	
Satd. Flow (prot)	1711	3348		1711	3369			1666		1711	1531	
Flt Permitted	0.14	1.00		0.38	1.00			0.75		0.70	1.00	
Satd. Flow (perm)	255	3348		691	3369			1299		1268	1531	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	497	83	17	1010	114	55	0	26	50	0	187
RTOR Reduction (vph)	0	15	0	0	10	0	0	15	0	0	35	0
Lane Group Flow (vph)	92	565	0	17	1114	0	0	66	0	50	152	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	42.0	42.0		42.0	42.0			38.0		38.0	38.0	
Effective Green, g (s)	42.0	42.0		42.0	42.0			38.0		38.0	38.0	
Actuated g/C Ratio	0.47	0.47		0.47	0.47			0.42		0.42	0.42	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Grp Cap (vph)	119	1562		322	1572			548		535	646	
v/s Ratio Prot		0.17			0.33						c0.10	
v/s Ratio Perm	c0.36			0.02				0.05		0.04		
v/c Ratio	0.77	0.36		0.05	0.71			0.12		0.09	0.24	
Uniform Delay, d1	20.0	15.4		13.1	19.1			15.8		15.6	16.7	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	37.7	0.7		0.3	2.7			0.4		0.3	0.9	
Delay (s)	57.7	16.1		13.4	21.9			16.3		16.0	17.5	
Level of Service	E	B		B	C			B		B	B	
Approach Delay (s)		21.8			21.7			16.3			17.2	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	21.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	129	0	0	1123	99	539	248	502	0	0	606
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				3.5
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Flpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Frt		1.00			0.99		1.00	0.90				0.85
Flt Protected		0.99			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3383			5070		1711	3078				2694
Flt Permitted		0.75			1.00		0.95	1.00				1.00
Satd. Flow (perm)		2581			5070		1711	3078				2694
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	38	132	0	0	1146	101	550	253	512	0	0	618
RTOR Reduction (vph)	0	0	0	0	10	0	0	321	0	0	0	123
Lane Group Flow (vph)	0	170	0	0	1237	0	550	444	0	0	0	495
Confl. Peds. (#/hr)												20
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		59.5			32.5		41.0	41.0				23.5
Effective Green, g (s)		59.5			32.5		41.0	41.0				23.5
Actuated g/C Ratio		0.54			0.30		0.37	0.37				0.21
Clearance Time (s)		4.5			4.5		5.0	5.0				3.5
Lane Grp Cap (vph)		1567			1497		637	1147				575
v/s Ratio Prot		0.02			c0.24		c0.32	0.14				c0.18
v/s Ratio Perm		0.04										
v/c Ratio		0.11			0.83		0.86	0.39				0.86
Uniform Delay, d1		12.3			36.1		31.9	25.3				41.7
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			5.4		14.5	1.0				15.5
Delay (s)		12.5			41.5		46.4	26.3				57.1
Level of Service		B			D		D	C				E
Approach Delay (s)		12.5			41.5			34.7			57.1	
Approach LOS		B			D			C			E	

Intersection Summary			
HCM 2000 Control Delay	40.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	88.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	166	430	1511	757	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.93	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1575	1424	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1575	1424	3319	1801		
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	171	443	1558	780	0	0
RTOR Reduction (vph)	3	3	0	0	0	0
Lane Group Flow (vph)	319	289	1558	780	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	21.4	21.4	38.6	70.0		
Effective Green, g (s)	21.4	21.4	38.6	70.0		
Actuated g/C Ratio	0.31	0.31	0.55	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	481	435	1830	1801		
v/s Ratio Prot	0.20		c0.47	0.43		
v/s Ratio Perm		c0.20				
v/c Ratio	0.66	0.66	0.85	0.43		
Uniform Delay, d1	21.2	21.2	13.3	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	3.4	3.8	4.0	0.2		
Delay (s)	24.6	25.0	17.3	0.2		
Level of Service	C	C	B	A		
Approach Delay (s)	24.8			11.6	0.0	
Approach LOS	C			B	A	

Intersection Summary			
HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	224	168	188	9	312	39	209	954	29	110	910	272
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.94		1.00	0.98		1.00	1.00		1.00	0.97	
Flpb, ped/bikes	0.99	1.00		0.94	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.92		1.00	0.98		1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1529	2496		1448	1569		1540	3055		1540	2898	
Flt Permitted	0.19	1.00		0.53	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	309	2496		809	1569		1540	3055		1540	2898	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	233	175	196	9	325	41	218	994	30	115	948	283
RTOR Reduction (vph)	0	124	0	0	5	0	0	2	0	0	28	0
Lane Group Flow (vph)	233	247	0	9	361	0	218	1022	0	115	1203	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	36.5	36.5		24.5	24.5		11.0	37.4		9.8	36.2	
Effective Green, g (s)	36.5	36.5		24.5	24.5		11.0	37.4		9.8	36.2	
Actuated g/C Ratio	0.36	0.36		0.24	0.24		0.11	0.37		0.10	0.36	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	194	911		198	384		169	1142		150	1049	
v/s Ratio Prot	c0.08	0.10			0.23		c0.14	0.33		0.07	c0.42	
v/s Ratio Perm	c0.36			0.01								
v/c Ratio	1.20	0.27		0.05	0.94		1.29	0.90		0.77	1.15	
Uniform Delay, d1	30.0	22.4		28.8	37.0		44.5	29.5		44.0	31.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.93	0.91	
Incremental Delay, d2	129.3	0.2		0.1	31.2		167.4	10.9		19.8	77.0	
Delay (s)	159.3	22.5		28.9	68.2		211.9	40.4		60.7	106.0	
Level of Service	F	C		C	E		F	D		E	F	
Approach Delay (s)		75.3			67.3			70.5			102.1	
Approach LOS		E			E			E			F	

Intersection Summary			
HCM 2000 Control Delay	82.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	105.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

2040 Cumulative with Project – Basketball Game
Weekday PM Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	924	825	48	407	937	47	79	1490	477	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.98		1.00	0.98			1.00	0.68			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00			
Frt	1.00	0.99		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	3001		2987	3010			5475	942			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	3001		2987	3010			5475	942			
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	953	851	49	420	966	48	81	1536	492	0	0	0
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	206	0	0	0
Lane Group Flow (vph)	953	896	0	420	1014	0	0	1617	286	0	0	0
Confl. Peds. (#/hr)			400			400	400		400			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.2	37.2		13.2	33.7			39.2	39.2			
Effective Green, g (s)	18.2	37.2		13.2	33.7			39.2	39.2			
Actuated g/C Ratio	0.17	0.34		0.12	0.31			0.36	0.36			
Clearance Time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	741	1014		358	922			1951	335			
v/s Ratio Prot	c0.21	0.30		0.14	c0.34							
v/s Ratio Perm								0.30	c0.30			
v/c Ratio	1.29	0.88		1.17	1.10			0.83	0.85			
Uniform Delay, d1	45.9	34.4		48.4	38.1			32.3	32.7			
Progression Factor	1.37	1.51		1.42	0.99			0.96	1.17			
Incremental Delay, d2	132.8	4.7		95.4	55.8			3.0	18.2			
Delay (s)	195.8	56.7		164.4	93.6			34.2	56.5			
Level of Service	F	E		F	F			C	E			
Approach Delay (s)		128.2			114.3			39.4			0.0	
Approach LOS		F			F			D			A	

Intersection Summary			
HCM 2000 Control Delay	89.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	98.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	346	1643	36	30	962	24	8	250	107	47	657	592
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	0.64	1.00	0.87	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00	0.77	1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85	1.00	0.96	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1459	4143		1459	2863			1528	813	1123	2354	550
Flt Permitted	0.95	1.00		0.95	1.00			0.96	1.00	0.51	1.00	1.00
Satd. Flow (perm)	1459	4143		1459	2863			1467	813	607	2354	550
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	353	1677	37	31	982	24	8	255	109	48	670	604
RTOR Reduction (vph)	0	2	0	0	1	0	0	0	71	0	25	226
Lane Group Flow (vph)	353	1712	0	31	1005	0	0	263	38	48	856	167
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.4	43.0		8.9	35.9			38.2	38.2	39.2	39.2	39.2
Effective Green, g (s)	14.4	43.0		8.9	35.9			38.2	38.2	39.2	39.2	39.2
Actuated g/C Ratio	0.13	0.39		0.08	0.33			0.35	0.35	0.36	0.36	0.36
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	190	1619		118	934			509	282	216	838	196
v/s Ratio Prot	c0.24	0.41		0.02	c0.35						c0.36	
v/s Ratio Perm								0.18	0.05	0.08		0.30
v/c Ratio	1.86	1.06		0.26	1.08			0.52	0.13	0.22	1.02	0.85
Uniform Delay, d1	47.8	33.5		47.5	37.0			28.6	24.6	24.7	35.4	32.7
Progression Factor	0.59	1.13		0.89	0.88			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	394.4	32.6		0.1	36.4			0.9	0.2	0.5	36.6	28.3
Delay (s)	422.6	70.3		42.4	68.9			29.4	24.8	25.3	72.0	61.0
Level of Service	F	E		D	E			C	C	C	E	E
Approach Delay (s)		130.5			68.1			28.1			67.0	
Approach LOS		F			E			C			E	

Intersection Summary			
HCM 2000 Control Delay	91.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	123.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	2002	157	0	1562	100	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.91			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	4366			3079	1540	1357
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	4366			3079	1540	1357
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	2085	164	0	1627	104	24
RTOR Reduction (vph)	8	0	0	0	0	3
Lane Group Flow (vph)	2241	0	0	1627	104	21
Confl. Peds. (#/hr)		37	37		1	3
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	2464			1738	512	451
v/s Ratio Prot	0.51			c0.53	c0.07	
v/s Ratio Perm						0.02
v/c Ratio	0.91			0.94	0.20	0.05
Uniform Delay, d1	21.4			22.1	26.3	24.9
Progression Factor	1.00			0.76	1.00	1.00
Incremental Delay, d2	6.3			1.3	0.9	0.2
Delay (s)	27.8			18.1	27.2	25.1
Level of Service	C			B	C	C
Approach Delay (s)	27.8			18.1	26.8	
Approach LOS	C			B	C	

Intersection Summary			
HCM 2000 Control Delay	23.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	90.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

4/27/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	250	1050	150	100	570	810	340	362	1424	460
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.0			2.0	2.0			2.0	2.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.99	0.87
Flpb, ped/bikes		0.99			1.00	1.00			1.00	1.00
Frt		0.98			1.00	0.96			1.00	0.85
Flt Protected		0.99			0.99	1.00			0.95	1.00
Satd. Flow (prot)		6062			3026	2596			4318	1033
Flt Permitted		0.99			0.52	1.00			0.95	1.00
Satd. Flow (perm)		6062			1584	2596			4318	1033
Peak-hour factor, PHF	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93
Adj. Flow (vph)	272	1129	161	108	613	871	366	393	1531	495
RTOR Reduction (vph)	0	23	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	1539	0	0	721	1236	0	0	1974	445
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Perm
Protected Phases		6			4	4		7	7	
Permitted Phases	6			4						7
Actuated Green, G (s)		27.0			25.0	25.0			24.0	24.0
Effective Green, g (s)		29.0			28.0	28.0			27.0	27.0
Actuated g/C Ratio		0.32			0.31	0.31			0.30	0.30
Clearance Time (s)		4.0			5.0	5.0			5.0	5.0
Lane Grp Cap (vph)		1953			492	807			1295	309
v/s Ratio Prot						c0.48			c0.46	
v/s Ratio Perm		0.25			0.46					0.43
v/c Ratio		0.79			1.54dl	1.53			1.52	1.44
Uniform Delay, d1		27.7			31.0	31.0			31.5	31.5
Progression Factor		1.56			0.31	1.00			1.00	1.00
Incremental Delay, d2		2.0			210.5	245.3			239.9	215.6
Delay (s)		45.2			220.1	276.3			271.4	247.1
Level of Service		D			F	F			F	F
Approach Delay (s)		45.2			220.1	276.3			266.9	
Approach LOS		D			F	F			F	

Intersection Summary			
HCM 2000 Control Delay	204.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.30		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	137.2%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	105	303	1050	110	565	140	500	260	180	982
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.90		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.99		0.95		0.85		1.00	1.00
Flt Protected		0.95	1.00		1.00		1.00		0.95	1.00
Satd. Flow (prot)		2494	3622		2497		1228		1401	2690
Flt Permitted		0.95	1.00		1.00		1.00		0.15	0.61
Satd. Flow (perm)		2494	3622		2497		1228		218	1652
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	113	326	1129	118	608	151	538	280	194	1056
RTOR Reduction (vph)	0	0	12	0	15	0	226	0	0	0
Lane Group Flow (vph)	0	406	1268	0	879	0	177	0	379	1151
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	5	0	5	0	0	0	0	5
Parking (#/hr)			10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		22.5	22.5		23.0		23.0		42.0	42.0
Effective Green, g (s)		22.5	25.0		24.5		23.0		43.5	43.5
Actuated g/C Ratio		0.25	0.28		0.27		0.26		0.48	0.48
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		623	1006		679		313		322	988
v/s Ratio Prot		0.16	c0.35		c0.35				0.22	c0.21
v/s Ratio Perm							0.14		0.35	0.35
v/c Ratio		0.65	1.26		1.29		0.56		1.18	1.16
Uniform Delay, d1		30.2	32.5		32.8		29.1		33.1	23.2
Progression Factor		1.00	1.00		1.00		1.00		1.05	1.07
Incremental Delay, d2		5.2	125.5		143.1		7.2		82.9	75.4
Delay (s)		35.5	158.0		175.9		36.3		117.7	100.2
Level of Service		D	F		F		D		F	F
Approach Delay (s)			128.5		132.5					104.5
Approach LOS			F		F					F

Intersection Summary			
HCM 2000 Control Delay	121.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	99.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	56	224	209	28	30	77	39	1449	139	70	429	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.98		1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.92		1.00	0.99		1.00	0.99	
Flt Protected		0.99	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1601	1353		1458		1540	3007		1540	3049	
Flt Permitted		0.91	1.00		0.90		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1471	1353		1321		1540	3007		1540	3049	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	59	236	220	29	32	81	41	1525	146	74	452	26
RTOR Reduction (vph)	0	0	149	0	48	0	0	7	0	0	4	0
Lane Group Flow (vph)	0	295	71	0	94	0	41	1664	0	74	474	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		32.1	32.1		32.1		8.0	47.5		4.5	44.3	
Effective Green, g (s)		32.1	32.1		32.1		8.0	47.5		4.5	44.3	
Actuated g/C Ratio		0.32	0.32		0.32		0.08	0.48		0.04	0.44	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Grp Cap (vph)		472	434		424		123	1428		69	1350	
v/s Ratio Prot							0.03	c0.55		c0.05	0.16	
v/s Ratio Perm		c0.20	0.05		0.07							
v/c Ratio		0.62	0.16		0.22		0.33	1.17		1.07	0.35	
Uniform Delay, d1		28.8	24.3		24.8		43.5	26.2		47.8	18.4	
Progression Factor		1.00	1.00		1.00		1.23	0.64		1.00	1.00	
Incremental Delay, d2		6.1	0.8		1.2		6.7	81.8		129.7	0.7	
Delay (s)		35.0	25.1		26.0		60.3	98.6		177.4	19.1	
Level of Service		C	C		C		E	F		F	B	
Approach Delay (s)		30.8			26.0			97.7			40.3	
Approach LOS		C			C			F			D	

Intersection Summary			
HCM 2000 Control Delay	71.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.9
Intersection Capacity Utilization	104.5%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	139	20	8	38	48	18	259	24	326	332	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00	0.98	1.00	1.00		1.00	0.96	
Flpb, ped/bikes		0.99			1.00	1.00	0.84	1.00		1.00	1.00	
Frt		0.98			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.99			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2978			1605	1353	1292	1595		1540	1530	
Flt Permitted		0.88			0.91	1.00	0.52	1.00		0.95	1.00	
Satd. Flow (perm)		2654			1479	1353	711	1595		1540	1530	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	43	149	22	9	41	52	19	278	26	351	357	51
RTOR Reduction (vph)	0	12	0	0	0	29	0	5	0	0	6	0
Lane Group Flow (vph)	0	202	0	0	50	23	19	299	0	351	402	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		9.7			9.7	25.0	15.8	15.8		15.3	36.1	
Effective Green, g (s)		9.7			9.7	25.0	15.8	15.8		15.3	36.1	
Actuated g/C Ratio		0.17			0.17	0.45	0.28	0.28		0.27	0.65	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		461			257	727	201	451		422	989	
v/s Ratio Prot						0.01		c0.19		c0.23	0.26	
v/s Ratio Perm		c0.08			0.03	0.01	0.03					
v/c Ratio		0.44			0.19	0.03	0.09	0.66		0.83	0.41	
Uniform Delay, d1		20.6			19.7	8.6	14.7	17.7		19.0	4.7	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.7			0.4	0.0	0.2	3.6		13.1	0.3	
Delay (s)		21.3			20.1	8.6	14.9	21.3		32.1	5.0	
Level of Service		C			C	A	B	C		C	A	
Approach Delay (s)		21.3			14.2			20.9			17.5	
Approach LOS		C			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	55.8	Sum of lost time (s)	15.0
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	186	473	984	72	420	275
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.95	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1540	2368	2431	1304	1540	1621
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1540	2368	2431	1304	1540	1621
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	202	514	1070	78	457	299
RTOR Reduction (vph)	0	420	0	12	0	0
Lane Group Flow (vph)	202	94	1070	66	457	299
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	4		2		1	6
Permitted Phases		4		2		
Actuated Green, G (s)	19.7	19.7	44.1	44.1	29.1	78.2
Effective Green, g (s)	19.7	19.7	44.1	44.1	29.1	78.2
Actuated g/C Ratio	0.18	0.18	0.41	0.41	0.27	0.72
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	281	432	993	532	415	1174
v/s Ratio Prot	c0.13		c0.44		c0.30	0.18
v/s Ratio Perm		0.04		0.05		
v/c Ratio	0.72	0.22	1.08	0.12	1.10	0.25
Uniform Delay, d1	41.5	37.5	31.9	19.9	39.4	5.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.5	0.3	51.8	0.1	74.4	0.1
Delay (s)	50.0	37.8	83.7	20.0	113.8	5.1
Level of Service	D	D	F	B	F	A
Approach Delay (s)	41.2		79.4			70.8
Approach LOS	D		E			E

Intersection Summary			
HCM 2000 Control Delay	66.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	107.9	Sum of lost time (s)	15.0
Intersection Capacity Utilization	80.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
9: Terry A Francois Blvd/Terry A Francois Blvd. & South St.
4/27/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	24	48	87	213	456	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frpb, ped/bikes	0.96		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		0.99	1.00	1.00	
Frt	0.91		1.00	1.00	0.99	
Flt Protected	0.98		0.95	1.00	1.00	
Satd. Flow (prot)	1547		1688	1531	3107	
Flt Permitted	0.98		0.44	1.00	1.00	
Satd. Flow (perm)	1547		787	1531	3107	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	27	53	97	237	507	51
RTOR Reduction (vph)	48	0	0	0	7	0
Lane Group Flow (vph)	32	0	97	237	551	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	10
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	3.8		24.6	24.6	24.6	
Effective Green, g (s)	3.8		24.6	24.6	24.6	
Actuated g/C Ratio	0.10		0.64	0.64	0.64	
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	153		504	980	1990	
v/s Ratio Prot	c0.02			0.15	c0.18	
v/s Ratio Perm			0.12			
v/c Ratio	0.21		0.19	0.24	0.28	
Uniform Delay, d1	15.9		2.8	2.9	3.0	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.7		0.2	0.1	0.1	
Delay (s)	16.6		3.0	3.1	3.1	
Level of Service	B		A	A	A	
Approach Delay (s)	16.6			3.0	3.1	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	4.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	38.4	Sum of lost time (s)	10.0
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: Third St. & South St.
4/27/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	211	322	1442	52	74	1022
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.96	1.00		1.00	1.00
Flpb, ped/bikes	0.93	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1584	1466	3394		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1584	1466	3394		1711	3421
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	234	358	1602	58	82	1136
RTOR Reduction (vph)	0	141	3	0	0	0
Lane Group Flow (vph)	234	217	1657	0	82	1136
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	28.7	28.7	48.1		7.9	61.1
Effective Green, g (s)	28.7	28.7	48.1		7.9	61.1
Actuated g/C Ratio	0.29	0.29	0.48		0.08	0.61
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	454	420	1632		135	2090
v/s Ratio Prot			c0.49		0.05	c0.33
v/s Ratio Perm	0.15	c0.15				
v/c Ratio	0.52	0.52	1.02		0.61	0.54
Uniform Delay, d1	29.8	29.8	25.9		44.5	11.3
Progression Factor	1.00	1.00	1.63		1.04	1.04
Incremental Delay, d2	1.0	1.1	15.6		7.5	0.3
Delay (s)	30.8	30.9	57.9		54.1	12.1
Level of Service	C	C	E		D	B
Approach Delay (s)	30.9		57.9			14.9
Approach LOS	C		E			B

Intersection Summary			
HCM 2000 Control Delay	38.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	86.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	40	32	57	260	409	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.97	
Flt Protected	0.95	1.00		0.99	1.00	
Satd. Flow (prot)	1540	1351		3047	2974	
Flt Permitted	0.95	1.00		0.74	1.00	
Satd. Flow (perm)	1540	1351		2271	2974	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	47	38	67	306	481	112
RTOR Reduction (vph)	0	36	0	0	37	0
Lane Group Flow (vph)	47	2	0	373	556	0
Confl. Peds. (#/hr)	1	1	25			25
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	2.1	2.1		15.4	15.4	
Effective Green, g (s)	2.1	2.1		15.4	15.4	
Actuated g/C Ratio	0.04	0.04		0.29	0.29	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	60	53		658	862	
v/s Ratio Prot	c0.03				c0.19	
v/s Ratio Perm		0.00		0.16		
v/c Ratio	0.78	0.03		0.57	0.65	
Uniform Delay, d1	25.3	24.5		16.0	16.5	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	47.5	0.2		1.1	1.7	
Delay (s)	72.8	24.7		17.1	18.1	
Level of Service	E	C		B	B	
Approach Delay (s)	51.3			17.1	18.1	
Approach LOS	D			B	B	

Intersection Summary			
HCM 2000 Control Delay	20.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	53.1	Sum of lost time (s)	15.0
Intersection Capacity Utilization	42.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	50	67	107	53	87	10	221	44	19	10	164	122
Peak Hour Factor	0.92	0.87	0.87	0.87	0.87	0.92	0.87	0.92	0.87	0.92	0.92	0.92
Hourly flow rate (vph)	54	77	123	61	100	11	254	48	22	11	178	133

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	54	200	61	111	324	189	133
Volume Left (vph)	54	0	61	0	254	11	0
Volume Right (vph)	0	123	0	11	22	0	133
Hadj (s)	0.53	-0.40	0.53	-0.03	0.15	0.06	-0.67
Departure Headway (s)	7.3	6.4	7.4	6.9	6.4	6.5	5.7
Degree Utilization, x	0.11	0.35	0.13	0.21	0.58	0.34	0.21
Capacity (veh/h)	457	527	440	477	533	526	588
Control Delay (s)	10.0	11.6	10.3	10.5	17.9	11.5	9.0
Approach Delay (s)	11.2		10.4		17.9	10.5	
Approach LOS	B		B		C	B	

Intersection Summary			
Delay	12.9		
Level of Service	B		
Intersection Capacity Utilization	55.0%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	249	131	313	24	263	143	315	1102	19	73	943	217
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1507	1621	1337	1524	1621	1304	2987	3069		1540	2978	
Flt Permitted	0.46	1.00	1.00	0.66	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	736	1621	1337	1061	1621	1304	2987	3069		1540	2978	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	274	144	344	26	289	157	346	1211	21	80	1036	238
RTOR Reduction (vph)	0	0	225	0	0	103	0	1	0	0	20	0
Lane Group Flow (vph)	274	144	119	26	289	54	346	1231	0	80	1254	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Effective Green, g (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Actuated g/C Ratio	0.34	0.34	0.34	0.34	0.34	0.34	0.14	0.38		0.12	0.36	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Grp Cap (vph)	253	559	461	366	559	449	418	1160		184	1066	
v/s Ratio Prot		0.09			0.18		0.12	c0.40		0.05	c0.42	
v/s Ratio Perm	c0.37		0.09	0.02		0.04						
v/c Ratio	1.08	0.26	0.26	0.07	0.52	0.12	0.83	1.06		0.43	1.18	
Uniform Delay, d1	32.8	23.5	23.5	22.0	26.1	22.4	41.8	31.1		40.9	32.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.59	0.81		1.01	1.00	
Incremental Delay, d2	80.5	1.1	1.3	0.4	3.4	0.5	5.1	33.3		6.3	88.1	
Delay (s)	113.2	24.7	24.9	22.4	29.5	22.9	29.8	58.7		47.5	120.3	
Level of Service	F	C	C	C	C	C	C	E		D	F	
Approach Delay (s)		56.6			26.9			52.3			116.0	
Approach LOS		E			C			D			F	

Intersection Summary			
HCM 2000 Control Delay	70.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	123.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	140	528	14	42	674	79	49	54	77	88	34	228
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.87	1.00	0.98		1.00	0.94	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.94	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1711	1801	1489	1711	1801	1338	1711	1606		1609	1478	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.37	1.00		0.67	1.00	
Satd. Flow (perm)	1711	1801	1489	1711	1801	1338	667	1606		1128	1478	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	574	15	46	733	86	53	59	84	96	37	248
RTOR Reduction (vph)	0	0	7	0	0	45	0	66	0	0	195	0
Lane Group Flow (vph)	152	574	8	46	733	41	53	77	0	96	90	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	8.0	37.4	37.4	4.6	34.0	34.0	15.6	15.6		15.6	15.6	
Effective Green, g (s)	8.0	37.4	37.4	4.6	34.0	34.0	15.6	15.6		15.6	15.6	
Actuated g/C Ratio	0.11	0.52	0.52	0.06	0.47	0.47	0.21	0.21		0.21	0.21	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	188	927	767	108	843	626	143	345		242	317	
v/s Ratio Prot	c0.09	c0.32		0.03	c0.41			0.05			0.06	
v/s Ratio Perm			0.01			0.03	0.08			c0.09		
v/c Ratio	0.81	0.62	0.01	0.43	0.87	0.07	0.37	0.22		0.40	0.28	
Uniform Delay, d1	31.6	12.5	8.6	32.7	17.3	10.6	24.3	23.5		24.5	23.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	21.9	3.1	0.0	2.7	9.5	0.0	1.6	0.3		1.1	0.5	
Delay (s)	53.5	15.6	8.6	35.4	26.8	10.6	25.9	23.8		25.5	24.3	
Level of Service	D	B	A	D	C	B	C	C		C	C	
Approach Delay (s)		23.3			25.7			24.4			24.6	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	24.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	72.6	Sum of lost time (s)	15.0
Intersection Capacity Utilization	92.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	142	382	238	67	789	94	138	245	138	162	336	187
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.98	1.00
Satd. Flow (prot)	1540	1540	1378	1540	1540	1321	1540	2912			3030	1357
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.32	1.00			0.64	1.00
Satd. Flow (perm)	1540	1540	1378	1540	1540	1321	523	2912			1976	1357
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	148	398	248	70	822	98	144	255	144	169	350	195
RTOR Reduction (vph)	0	0	105	0	0	27	0	67	0	0	0	140
Lane Group Flow (vph)	148	398	143	70	822	71	144	332	0	0	519	55
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	9.0	65.5	65.5	6.3	61.8	61.8	34.6	34.6			33.6	33.6
Effective Green, g (s)	9.0	65.5	65.5	6.3	61.8	61.8	34.6	34.6			33.6	33.6
Actuated g/C Ratio	0.08	0.55	0.55	0.05	0.52	0.52	0.29	0.29			0.28	0.28
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	116	844	755	81	797	683	151	843			556	381
v/s Ratio Prot	c0.10	c0.26		0.05	c0.53			0.11				
v/s Ratio Perm			0.10			0.05	c0.28				0.26	0.04
v/c Ratio	1.28	0.47	0.19	0.86	1.03	0.10	0.95	0.39			0.93	0.14
Uniform Delay, d1	55.2	16.4	13.6	56.1	28.8	14.7	41.6	34.0			41.8	32.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	175.0	1.9	0.6	56.9	40.2	0.1	59.0	0.3			22.9	0.2
Delay (s)	230.2	18.3	14.1	113.0	69.0	14.8	100.6	34.3			64.7	32.3
Level of Service	F	B	B	F	E	B	F	C			E	C
Approach Delay (s)		56.5			66.7			51.9			55.8	
Approach LOS		E			E			D			E	

Intersection Summary			
HCM 2000 Control Delay	58.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	119.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	100.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	72	571	76	58	581	475	75	329	48	142	140	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.90	1.00	1.00	0.96	1.00	0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1540	1077		1540	1296	992	1232	1102	1058	1232	1165	
Flt Permitted	0.09	1.00		0.09	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	140	1077		140	1296	992	1232	1102	1058	1232	1165	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	77	607	81	62	618	505	80	350	51	151	149	139
RTOR Reduction (vph)	0	4	0	0	0	78	0	0	39	0	31	0
Lane Group Flow (vph)	77	684	0	62	618	427	80	350	12	151	257	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	50.1	50.1		50.1	50.1	60.1	9.0	25.0	25.0	10.0	26.0	
Effective Green, g (s)	50.1	50.1		50.1	50.1	60.1	9.0	25.0	25.0	10.0	26.0	
Actuated g/C Ratio	0.46	0.46		0.46	0.46	0.55	0.08	0.23	0.23	0.09	0.24	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	114	495		114	595	592	101	252	242	113	277	
v/s Ratio Prot	0.02	c0.63		0.02	c0.48	0.07	0.06	c0.32		c0.12	0.22	
v/s Ratio Perm	0.28			0.23		0.36			0.01			
v/c Ratio	0.68	1.38		0.54	1.04	0.72	0.79	1.39	0.05	1.34	0.93	
Uniform Delay, d1	25.3	29.4		47.7	29.4	18.2	49.1	42.0	32.7	49.5	40.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	14.7	183.8		5.2	47.3	4.3	33.3	197.6	0.1	199.4	34.9	
Delay (s)	40.0	213.3		52.9	76.7	22.5	82.4	239.6	32.8	248.9	75.5	
Level of Service	D	F		D	E	C	F	F	C	F	E	
Approach Delay (s)		195.8			52.4			191.5			135.1	
Approach LOS		F			D			F			F	

Intersection Summary			
HCM 2000 Control Delay	126.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.39		
Actuated Cycle Length (s)	109.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	86.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	77	155	49	56	372	17	41	126	109	21	61	235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	0.95		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00			0.99			0.98	
Flpb, ped/bikes	0.99	1.00		0.98	1.00			1.00			1.00	
Frt	1.00	0.96		1.00	0.99			0.95			0.90	
Flt Protected	0.95	1.00		0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1695	3265		1682	1786			1675			1581	
Flt Permitted	0.29	1.00		0.61	1.00			0.89			0.97	
Satd. Flow (perm)	521	3265		1081	1786			1505			1534	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	86	172	54	62	413	19	46	140	121	23	68	261
RTOR Reduction (vph)	0	35	0	0	2	0	0	30	0	0	131	0
Lane Group Flow (vph)	86	191	0	62	430	0	0	277	0	0	221	0
Confl. Peds. (#/hr)	13		16	16		13	16		19	19		16
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	21.5	21.5		21.5	21.5			20.2			20.2	
Effective Green, g (s)	21.5	21.5		21.5	21.5			20.2			20.2	
Actuated g/C Ratio	0.32	0.32		0.32	0.32			0.30			0.30	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	168	1055		349	577			457			465	
v/s Ratio Prot		0.06			c0.24							
v/s Ratio Perm	0.16			0.06				c0.18			0.14	
v/c Ratio	0.51	0.18		0.18	0.75			0.61			0.48	
Uniform Delay, d1	18.2	16.2		16.2	20.1			19.8			18.8	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	2.6	0.1		0.2	5.2			2.3			0.8	
Delay (s)	20.9	16.3		16.4	25.3			22.0			19.6	
Level of Service	C	B		B	C			C			B	
Approach Delay (s)		17.5			24.1			22.0			19.6	
Approach LOS		B			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	21.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	66.5	Sum of lost time (s)	14.0
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	205	177	106	96	507	45	108	1187	67	36	941	303
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	0.99		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1688	3184		1684	3366		1711	3389		1711	3269	
Flt Permitted	0.34	1.00		0.56	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	602	3184		985	3366		1711	3389		1711	3269	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	218	188	113	102	539	48	115	1263	71	38	1001	322
RTOR Reduction (vph)	0	72	0	0	6	0	0	4	0	0	31	0
Lane Group Flow (vph)	218	229	0	102	581	0	115	1330	0	38	1292	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	36.7	36.7		36.7	36.7		9.9	37.9		9.9	37.9	
Effective Green, g (s)	36.7	36.7		36.7	36.7		9.9	37.9		9.9	37.9	
Actuated g/C Ratio	0.37	0.37		0.37	0.37		0.10	0.38		0.10	0.38	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Grp Cap (vph)	220	1168		361	1235		169	1284		169	1238	
v/s Ratio Prot		0.07			0.17		0.07	c0.39		0.02	c0.40	
v/s Ratio Perm	c0.36			0.10								
v/c Ratio	0.99	0.20		0.28	0.47		0.68	1.04		0.22	1.04	
Uniform Delay, d1	31.5	21.6		22.4	24.2		43.5	31.1		41.5	31.1	
Progression Factor	1.00	1.00		1.00	1.00		0.94	0.90		1.56	0.58	
Incremental Delay, d2	58.4	0.4		2.0	1.3		18.5	33.8		0.8	26.1	
Delay (s)	89.9	22.0		24.3	25.5		59.4	61.7		65.5	44.2	
Level of Service	F	C		C	C		E	E		E	D	
Approach Delay (s)		50.5			25.3			61.5			44.8	
Approach LOS		D			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	48.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	117.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	496	76	16	824	105	51	0	24	46	0	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.98			0.96		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00			0.97		0.95	1.00	
Satd. Flow (prot)	1711	3353		1711	3363			1666		1711	1531	
Flt Permitted	0.16	1.00		0.35	1.00			0.76		0.70	1.00	
Satd. Flow (perm)	284	3353		628	3363			1313		1268	1531	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	539	83	17	896	114	55	0	26	50	0	187
RTOR Reduction (vph)	0	16	0	0	13	0	0	14	0	0	55	0
Lane Group Flow (vph)	92	606	0	17	997	0	0	67	0	50	132	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	31.6	31.6		31.6	31.6			35.4		35.4	35.4	
Effective Green, g (s)	31.6	31.6		31.6	31.6			35.4		35.4	35.4	
Actuated g/C Ratio	0.41	0.41		0.41	0.41			0.46		0.46	0.46	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	116	1376		257	1380			603		582	703	
v/s Ratio Prot		0.18			0.30						c0.09	
v/s Ratio Perm	c0.32			0.03				0.05		0.04		
v/c Ratio	0.79	0.44		0.07	0.72			0.11		0.09	0.19	
Uniform Delay, d1	19.8	16.3		13.8	19.0			11.8		11.7	12.3	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	30.0	0.2		0.1	1.9			0.4		0.1	0.1	
Delay (s)	49.8	16.6		13.9	20.9			12.2		11.8	12.4	
Level of Service	D	B		B	C			B		B	B	
Approach Delay (s)		20.8			20.8			12.2			12.3	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	129	0	0	1016	111	539	336	541	0	0	606
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				3.5
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Flpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Frt		1.00			0.99		1.00	0.91				0.85
Flt Protected		0.99			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3376			5056		1711	3105				2694
Flt Permitted		0.74			1.00		0.95	1.00				1.00
Satd. Flow (perm)		2515			5056		1711	3105				2694
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	48	132	0	0	1037	113	550	343	552	0	0	618
RTOR Reduction (vph)	0	0	0	0	15	0	0	325	0	0	0	115
Lane Group Flow (vph)	0	180	0	0	1135	0	550	570	0	0	0	503
Confl. Peds. (#/hr)												20
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		48.5			27.5		32.0	32.0				17.5
Effective Green, g (s)		48.5			27.5		32.0	32.0				17.5
Actuated g/C Ratio		0.54			0.31		0.36	0.36				0.19
Clearance Time (s)		4.5			4.5		5.0	5.0				3.5
Lane Grp Cap (vph)		1522			1544		608	1104				523
v/s Ratio Prot		0.02			c0.22		c0.32	0.18				c0.19
v/s Ratio Perm		0.04										
v/c Ratio		0.12			0.73		0.90	0.52				0.96
Uniform Delay, d1		10.2			28.0		27.6	22.9				35.9
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.2			3.1		19.4	1.7				30.9
Delay (s)		10.4			31.1		46.9	24.6				66.8
Level of Service		B			C		D	C				E
Approach Delay (s)		10.4			31.1			33.1			66.8	
Approach LOS		B			C			C			E	

Intersection Summary			
HCM 2000 Control Delay	37.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	86.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.

4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	176	430	1404	757	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.93	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1581	1424	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1581	1424	3319	1801		
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	181	443	1447	780	0	0
RTOR Reduction (vph)	4	4	0	0	0	0
Lane Group Flow (vph)	323	293	1447	780	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	21.5	21.5	38.5	70.0		
Effective Green, g (s)	21.5	21.5	38.5	70.0		
Actuated g/C Ratio	0.31	0.31	0.55	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	485	437	1825	1801		
v/s Ratio Prot	0.20		c0.44	0.43		
v/s Ratio Perm		c0.21				
v/c Ratio	0.67	0.67	0.79	0.43		
Uniform Delay, d1	21.1	21.2	12.6	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	3.4	4.0	2.5	0.2		
Delay (s)	24.6	25.2	15.0	0.2		
Level of Service	C	C	B	A		
Approach Delay (s)	24.8			9.8	0.0	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	13.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	227	168	188	9	312	39	209	968	29	110	908	271
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.94		1.00	0.98		1.00	1.00		1.00	0.97	
Flpb, ped/bikes	0.99	1.00		0.94	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.92		1.00	0.98		1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1529	2496		1448	1569		1540	3056		1540	2899	
Flt Permitted	0.19	1.00		0.53	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	309	2496		809	1569		1540	3056		1540	2899	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	236	175	196	9	325	41	218	1008	30	115	946	282
RTOR Reduction (vph)	0	124	0	0	5	0	0	2	0	0	28	0
Lane Group Flow (vph)	236	247	0	9	361	0	218	1036	0	115	1200	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	36.5	36.5		24.5	24.5		10.0	37.5		9.7	37.2	
Effective Green, g (s)	36.5	36.5		24.5	24.5		10.0	37.5		9.7	37.2	
Actuated g/C Ratio	0.36	0.36		0.24	0.24		0.10	0.38		0.10	0.37	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	194	911		198	384		154	1146		149	1078	
v/s Ratio Prot	c0.08	0.10			0.23		c0.14	0.34		0.07	c0.41	
v/s Ratio Perm	c0.36			0.01								
v/c Ratio	1.22	0.27		0.05	0.94		1.42	0.90		0.77	1.11	
Uniform Delay, d1	30.0	22.4		28.8	37.0		45.0	29.6		44.1	31.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.92	0.90	
Incremental Delay, d2	135.0	0.2		0.1	31.2		220.7	11.7		20.7	63.6	
Delay (s)	165.0	22.5		28.9	68.2		265.7	41.2		61.5	91.7	
Level of Service	F	C		C	E		F	D		E	F	
Approach Delay (s)		77.9			67.3			80.2			89.2	
Approach LOS		E			E			F			F	

Intersection Summary			
HCM 2000 Control Delay	81.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.24		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	105.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

2040 Cumulative with Project – Basketball Game Saturday Evening

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	662	674	232	651	618	102	74	691	268	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.97		1.00	0.98			1.00	0.90			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	0.96		1.00	0.98			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	2882		2987	2966			5503	1237			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	2882		2987	2966			5503	1237			
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	736	749	258	723	687	113	82	768	298	0	0	0
RTOR Reduction (vph)	0	31	0	0	11	0	0	0	219	0	0	0
Lane Group Flow (vph)	736	976	0	723	789	0	0	850	79	0	0	0
Confl. Peds. (#/hr)			100			100	100		100			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	21.5	38.7		23.3	40.5			29.1	29.1			
Effective Green, g (s)	21.5	38.7		23.3	40.5			29.1	29.1			
Actuated g/C Ratio	0.20	0.35		0.21	0.37			0.26	0.26			
Clearance Time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	875	1013		632	1092			1455	327			
v/s Ratio Prot	0.16	c0.34		c0.24	0.27							
v/s Ratio Perm								0.15	0.06			
v/c Ratio	0.84	0.96		1.14	0.72			0.58	0.24			
Uniform Delay, d1	42.6	35.0		43.4	29.9			35.2	31.8			
Progression Factor	0.80	0.68		0.75	0.51			1.37	5.58			
Incremental Delay, d2	3.3	11.7		77.7	1.6			0.5	0.3			
Delay (s)	37.3	35.4		110.3	17.0			48.7	177.6			
Level of Service	D	D		F	B			D	F			
Approach Delay (s)		36.2			61.3			82.2			0.0	
Approach LOS		D			E			F			A	

Intersection Summary			
HCM 2000 Control Delay	56.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.9
Intersection Capacity Utilization	99.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	348	1439	114	64	572	56	16	178	42	87	817	199
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.97		1.00	0.94			1.00	0.64	1.00	0.99	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00	0.74	1.00	1.00
Frt	1.00	0.99		1.00	0.99			1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	4253		1296	2415			1599	858	1141	2902	581
Flt Permitted	0.95	1.00		0.95	1.00			0.74	1.00	0.59	1.00	1.00
Satd. Flow (perm)	1540	4253		1296	2415			1189	858	703	2902	581
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	370	1531	121	68	609	60	17	189	45	93	869	212
RTOR Reduction (vph)	0	7	0	0	6	0	0	0	30	0	1	115
Lane Group Flow (vph)	370	1645	0	68	663	0	0	206	15	93	889	76
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	17.4	41.5		11.4	33.9			37.2	37.2	38.2	38.2	38.2
Effective Green, g (s)	17.4	41.5		11.4	33.9			37.2	37.2	38.2	38.2	38.2
Actuated g/C Ratio	0.16	0.38		0.10	0.31			0.34	0.34	0.35	0.35	0.35
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	243	1604		134	744			402	290	244	1007	201
v/s Ratio Prot	c0.24	c0.39		0.05	c0.27						c0.31	
v/s Ratio Perm								0.17	0.02	0.13		0.13
v/c Ratio	1.52	1.03		0.51	0.89			0.51	0.05	0.38	0.88	0.38
Uniform Delay, d1	46.3	34.2		46.6	36.3			29.1	24.5	27.0	33.8	27.0
Progression Factor	0.90	1.11		0.76	0.74			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	251.2	26.8		2.1	9.7			1.1	0.1	1.0	9.2	1.2
Delay (s)	293.0	64.9		37.6	36.7			30.2	24.6	28.0	43.0	28.2
Level of Service	F	E		D	D			C	C	C	D	C
Approach Delay (s)		106.6			36.7			29.2			39.4	
Approach LOS		F			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	70.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	137.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1748	91	0	787	35	153
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.91			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	4388			3079	1540	1357
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	4388			3079	1540	1357
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	1921	100	0	865	38	168
RTOR Reduction (vph)	3	0	0	0	0	8
Lane Group Flow (vph)	2018	0	0	865	38	160
Confl. Peds. (#/hr)		10	10			3
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	80.4			80.4	18.3	18.3
Effective Green, g (s)	80.4			80.4	18.3	18.3
Actuated g/C Ratio	0.73			0.73	0.17	0.17
Clearance Time (s)	4.9			4.9	6.4	6.4
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	3207			2250	256	225
v/s Ratio Prot	c0.46			0.28	0.02	
v/s Ratio Perm						c0.12
v/c Ratio	0.63			0.38	0.15	0.71
Uniform Delay, d1	7.4			5.5	39.2	43.3
Progression Factor	1.00			0.22	1.00	1.00
Incremental Delay, d2	0.9			0.1	0.3	9.8
Delay (s)	8.3			1.3	39.5	53.2
Level of Service	A			A	D	D
Approach Delay (s)	8.3			1.3	50.6	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	9.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

4/27/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	246	1136	135	65	529	548	292	504	1371	455
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5			3.0	3.0			3.0	3.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.95			1.00	1.00
Flpb, ped/bikes		0.99			1.00	1.00			1.00	1.00
Frt		0.99			1.00	0.95			1.00	0.85
Flt Protected		0.99			0.99	1.00			0.95	1.00
Satd. Flow (prot)		6059			3025	2544			4324	1185
Flt Permitted		0.99			0.59	1.00			0.95	1.00
Satd. Flow (perm)		6059			1800	2544			4324	1185
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	254	1171	139	67	545	565	301	520	1413	469
RTOR Reduction (vph)	0	19	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	1545	0	0	612	865	0	0	1980	422
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Prot
Protected Phases		6			4	4		7	7	7
Permitted Phases	6			4						
Actuated Green, G (s)		21.5			23.0	23.0			28.0	28.0
Effective Green, g (s)		23.5			26.0	26.0			31.0	31.0
Actuated g/C Ratio		0.26			0.29	0.29			0.34	0.34
Clearance Time (s)		5.5			6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1582			520	734			1489	408
v/s Ratio Prot						c0.34			c0.46	0.36
v/s Ratio Perm		0.25			0.34					
v/c Ratio		0.98			1.18	1.18			1.33	1.03
Uniform Delay, d1		33.0			32.0	32.0			29.5	29.5
Progression Factor		1.55			1.00	1.00			1.00	1.00
Incremental Delay, d2		12.3			98.3	94.3			153.1	53.7
Delay (s)		63.4			130.3	126.3			182.6	83.2
Level of Service		E			F	F			F	F
Approach Delay (s)		63.4			130.3	126.3			165.1	
Approach LOS		E			F	F			F	

Intersection Summary			
HCM 2000 Control Delay	125.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.22		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	126.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

4/27/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	335	189	510	120	259	41	292	236	77	985
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.98		0.90		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.97		0.95		0.85		1.00	1.00
Flt Protected		0.95	1.00		1.00		1.00		0.95	1.00
Satd. Flow (prot)		2186	3343		2346		1161		1327	2558
Flt Permitted		0.95	1.00		1.00		1.00		0.28	0.95
Satd. Flow (perm)		2186	3343		2346		1161		384	2444
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	414	233	630	148	320	51	360	291	95	1216
RTOR Reduction (vph)	0	0	35	0	44	0	179	0	0	0
Lane Group Flow (vph)	0	565	825	0	460	0	48	0	376	1226
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	8	0	5	0	0	0	0	5
Parking (#/hr)		10	10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		18.5	18.5		16.0		16.0		31.0	31.0
Effective Green, g (s)		18.5	21.0		17.5		16.0		32.5	32.5
Actuated g/C Ratio		0.25	0.28		0.23		0.21		0.43	0.43
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		539	936		547		247		323	1078
v/s Ratio Prot		c0.26	0.25		0.20				0.19	c0.19
v/s Ratio Perm							0.04		c0.31	0.30
v/c Ratio		1.58dl	0.88		0.84		0.20		1.16	1.14
Uniform Delay, d1		28.2	25.8		27.4		24.2		24.3	21.2
Progression Factor		1.00	1.00		1.00		1.00		1.00	1.00
Incremental Delay, d2		52.0	11.8		14.4		1.8		102.4	73.4
Delay (s)		80.3	37.6		41.8		26.0		126.7	94.7
Level of Service		F	D		D		C		F	F
Approach Delay (s)			54.5		36.9					102.2
Approach LOS			D		D					F

Intersection Summary			
HCM 2000 Control Delay	71.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	993	197	12	12	16	18	524	84	164	339	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.99		1.00	0.97		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.95		1.00	0.98		1.00	0.99	
Flt Protected		1.00	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1615	1352		1490		1540	2926		1540	3055	
Flt Permitted		0.98	1.00		0.54		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1593	1352		820		1540	2926		1540	3055	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	52	1024	203	12	12	16	19	540	87	169	349	15
RTOR Reduction (vph)	0	0	65	0	7	0	0	11	0	0	2	0
Lane Group Flow (vph)	0	1076	138	0	33	0	19	616	0	169	362	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		70.1	70.1		70.1		2.5	23.5		13.6	34.9	
Effective Green, g (s)		70.1	70.1		70.1		2.5	23.5		13.6	34.9	
Actuated g/C Ratio		0.57	0.57		0.57		0.02	0.19		0.11	0.28	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Vehicle Extension (s)		3.0	3.0		3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		907	769		466		31	558		170	866	
v/s Ratio Prot							0.01	c0.21		c0.11	0.12	
v/s Ratio Perm		c0.68	0.10		0.04							
v/c Ratio		1.19	0.18		0.07		0.61	1.10		0.99	0.42	
Uniform Delay, d1		26.5	12.7		11.9		59.8	49.8		54.7	35.8	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		95.0	0.1		0.1		22.6	70.1		66.9	0.3	
Delay (s)		121.5	12.8		12.0		82.4	119.9		121.6	36.2	
Level of Service		F	B		B		F	F		F	D	
Approach Delay (s)		104.3			12.0			118.8			63.3	
Approach LOS		F			B			F			E	

Intersection Summary			
HCM 2000 Control Delay	97.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	123.1	Sum of lost time (s)	15.9
Intersection Capacity Utilization	106.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	836	14	5	14	26	13	89	4	400	271	34
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00	0.97	1.00	1.00		1.00	0.96	
Flpb, ped/bikes		1.00			1.00	1.00	0.77	1.00		1.00	1.00	
Frt		1.00			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		1.00			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2592			1430	1191	1062	1436		1377	1364	
Flt Permitted		0.95			0.84	1.00	0.55	1.00		0.95	1.00	
Satd. Flow (perm)		2469			1213	1191	616	1436		1377	1364	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	17	961	16	6	16	30	15	102	5	460	311	39
RTOR Reduction (vph)	0	1	0	0	0	10	0	3	0	0	6	0
Lane Group Flow (vph)	0	993	0	0	22	20	15	104	0	460	344	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Parking (#/hr)		2										
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		30.3			30.3	49.5	9.0	9.0		19.2	33.2	
Effective Green, g (s)		30.3			30.3	49.5	9.0	9.0		19.2	33.2	
Actuated g/C Ratio		0.41			0.41	0.67	0.12	0.12		0.26	0.45	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	2.0	3.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		1017			500	883	75	175		359	616	
v/s Ratio Prot						0.01		0.07		c0.33	c0.25	
v/s Ratio Perm		c0.40			0.02	0.01	0.02					
v/c Ratio		0.98			0.04	0.02	0.20	0.60		1.28	0.56	
Uniform Delay, d1		21.2			12.9	4.0	29.0	30.5		27.1	14.8	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		22.4			0.0	0.0	1.3	5.4		146.4	1.1	
Delay (s)		43.6			13.0	4.0	30.3	35.9		173.5	15.9	
Level of Service		D			B	A	C	D		F	B	
Approach Delay (s)		43.6			7.8			35.2			105.4	
Approach LOS		D			A			D			F	

Intersection Summary			
HCM 2000 Control Delay	67.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	73.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	75.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	109	203	249	62	966	168
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.89	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1540	2366	2431	1232	1540	1621
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1540	2366	2431	1232	1540	1621
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	125	233	286	71	1110	193
RTOR Reduction (vph)	0	202	0	46	0	0
Lane Group Flow (vph)	125	31	286	25	1110	193
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	Perm	Prot	NA
Protected Phases	4		2		1	6
Permitted Phases		4		2		
Actuated Green, G (s)	13.4	13.4	15.8	15.8	57.1	77.9
Effective Green, g (s)	13.4	13.4	15.8	15.8	57.1	77.9
Actuated g/C Ratio	0.13	0.13	0.16	0.16	0.56	0.77
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	203	312	379	192	868	1246
v/s Ratio Prot	c0.08		c0.12		c0.72	0.12
v/s Ratio Perm		0.01		0.02		
v/c Ratio	0.62	0.10	0.75	0.13	1.28	0.15
Uniform Delay, d1	41.5	38.6	40.9	36.8	22.1	3.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.5	0.1	8.3	0.3	134.3	0.1
Delay (s)	47.0	38.8	49.2	37.2	156.4	3.1
Level of Service	D	D	D	D	F	A
Approach Delay (s)	41.6		46.8			133.7
Approach LOS	D		D			F

Intersection Summary			
HCM 2000 Control Delay	102.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	101.3	Sum of lost time (s)	15.0
Intersection Capacity Utilization	87.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
9: Terry A Francois Blvd/Terry A Francois Blvd. & South St.

4/27/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	13	31	227	166	147	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frpb, ped/bikes	0.94		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		0.98	1.00	1.00	
Frt	0.90		1.00	1.00	1.00	
Flt Protected	0.99		0.95	1.00	1.00	
Satd. Flow (prot)	1515		1670	1531	3150	
Flt Permitted	0.99		0.64	1.00	1.00	
Satd. Flow (perm)	1515		1123	1531	3150	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	15	37	270	198	175	4
RTOR Reduction (vph)	35	0	0	0	1	0
Lane Group Flow (vph)	17	0	270	198	178	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	2.3		27.8	27.8	27.8	
Effective Green, g (s)	2.3		27.8	27.8	27.8	
Actuated g/C Ratio	0.06		0.69	0.69	0.69	
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	86		778	1061	2183	
v/s Ratio Prot	c0.01			0.13	0.06	
v/s Ratio Perm			c0.24			
v/c Ratio	0.20		0.35	0.19	0.08	
Uniform Delay, d1	18.0		2.5	2.2	2.0	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	1.1		0.3	0.1	0.0	
Delay (s)	19.2		2.8	2.3	2.0	
Level of Service	B		A	A	A	
Approach Delay (s)	19.2			2.5	2.0	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	3.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	40.1	Sum of lost time (s)	10.0
Intersection Capacity Utilization	53.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: Third St. & South St.

4/27/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	11	53	542	54	310	474
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.94	0.99		1.00	1.00
Flpb, ped/bikes	0.95	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1628	1437	3339		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1628	1437	3339		1711	3421
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	12	57	583	58	333	510
RTOR Reduction (vph)	0	53	6	0	0	0
Lane Group Flow (vph)	12	4	635	0	333	510
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	4.1	4.1	30.3		15.2	50.6
Effective Green, g (s)	4.1	4.1	30.3		15.2	50.6
Actuated g/C Ratio	0.06	0.06	0.47		0.23	0.78
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	102	90	1558		400	2667
v/s Ratio Prot			c0.19		c0.19	0.15
v/s Ratio Perm	c0.01	0.00				
v/c Ratio	0.12	0.04	0.41		0.83	0.19
Uniform Delay, d1	28.7	28.6	11.4		23.6	1.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.5	0.2	0.8		13.8	0.2
Delay (s)	29.2	28.7	12.2		37.4	2.0
Level of Service	C	C	B		D	A
Approach Delay (s)	28.8		12.2			16.0
Approach LOS	C		B			B

Intersection Summary			
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	64.9	Sum of lost time (s)	15.3
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
11: Terry A Francois Blvd./Terry A Francois Blvd & 16th

4/27/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	40	17	16	353	162	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1540	1353		2879	2840	
Flt Permitted	0.95	1.00		0.94	1.00	
Satd. Flow (perm)	1540	1353		2698	2840	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	47	20	19	415	191	19
RTOR Reduction (vph)	0	19	0	0	14	0
Lane Group Flow (vph)	47	1	0	434	196	0
Confl. Peds. (#/hr)	1	1	25			25
Parking (#/hr)				5	5	
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	2.6	2.6		13.5	13.5	
Effective Green, g (s)	2.6	2.6		13.5	13.5	
Actuated g/C Ratio	0.05	0.05		0.26	0.26	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	77	67		703	740	
v/s Ratio Prot	c0.03				0.07	
v/s Ratio Perm		0.00		c0.16		
v/c Ratio	0.61	0.01		0.62	0.26	
Uniform Delay, d1	24.1	23.4		16.9	15.2	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.5	0.1		1.6	0.2	
Delay (s)	37.6	23.5		18.5	15.4	
Level of Service	D	C		B	B	
Approach Delay (s)	33.4			18.5	15.4	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	51.8	Sum of lost time (s)	15.0
Intersection Capacity Utilization	35.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
12: Illinois St & 16th

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	129	32	32	4	18	10	48	222	15	10	53	38
Peak Hour Factor	0.92	0.79	0.79	0.79	0.79	0.92	0.79	0.92	0.79	0.92	0.92	0.92
Hourly flow rate (vph)	140	41	41	5	23	11	61	241	19	11	58	41

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	140	81	5	34	321	68	41
Volume Left (vph)	140	0	5	0	61	11	0
Volume Right (vph)	0	41	0	11	19	0	41
Hadj (s)	0.53	-0.32	0.53	-0.19	0.04	0.11	-0.67
Departure Headway (s)	6.3	5.4	6.6	5.8	5.4	5.7	5.0
Degree Utilization, x	0.24	0.12	0.01	0.05	0.48	0.11	0.06
Capacity (veh/h)	542	625	503	564	648	592	682
Control Delay (s)	10.1	8.0	8.4	8.0	13.3	8.2	7.1
Approach Delay (s)	9.3		8.0		13.3	7.8	
Approach LOS	A		A		B	A	

Intersection Summary			
Delay	10.9		
Level of Service	B		
Intersection Capacity Utilization	42.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	172	159	116	8	74	18	79	400	17	14	384	82
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.96	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1267	1365	1129	1288	1365	1109	2515	2573		1296	2513	
Flt Permitted	0.70	1.00	1.00	0.64	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	938	1365	1129	873	1365	1109	2515	2573		1296	2513	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	193	179	130	9	83	20	89	449	19	16	431	92
RTOR Reduction (vph)	0	0	91	0	0	14	0	3	0	0	17	0
Lane Group Flow (vph)	193	179	39	9	83	6	89	465	0	16	506	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	19.4	19.4	19.4	19.4	19.4	19.4	6.2	27.0		1.9	22.7	
Effective Green, g (s)	19.4	19.4	19.4	19.4	19.4	19.4	6.2	27.0		1.9	22.7	
Actuated g/C Ratio	0.30	0.30	0.30	0.30	0.30	0.30	0.10	0.42		0.03	0.35	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	284	413	342	264	413	336	243	1085		38	891	
v/s Ratio Prot		0.13			0.06		0.04	c0.18		0.01	c0.20	
v/s Ratio Perm	c0.21		0.03	0.01		0.01						
v/c Ratio	0.68	0.43	0.12	0.03	0.20	0.02	0.37	0.43		0.42	0.57	
Uniform Delay, d1	19.6	17.9	16.1	15.7	16.5	15.6	27.1	13.1		30.5	16.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.3	0.7	0.2	0.1	0.2	0.0	0.9	0.3		7.4	0.8	
Delay (s)	25.9	18.6	16.3	15.8	16.8	15.6	28.0	13.3		37.9	17.5	
Level of Service	C	B	B	B	B	B	C	B		D	B	
Approach Delay (s)		20.8			16.5			15.7			18.1	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	64.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	162	387	2	14	186	37	4	11	12	48	11	96
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.85	1.00	1.00		1.00	0.94	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.92		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1238	1621	1572		1487	1382	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.69	1.00		0.74	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1238	1169	1572		1162	1382	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	169	403	2	15	194	39	4	11	12	50	11	100
RTOR Reduction (vph)	0	0	1	0	0	27	0	9	0	0	75	0
Lane Group Flow (vph)	169	403	1	15	194	12	4	14	0	50	36	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	21.5	45.6	45.6	2.7	26.8	26.8	21.6	21.6		21.6	21.6	
Effective Green, g (s)	21.5	45.6	45.6	2.7	26.8	26.8	21.6	21.6		21.6	21.6	
Actuated g/C Ratio	0.25	0.54	0.54	0.03	0.32	0.32	0.25	0.25		0.25	0.25	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	410	916	778	51	538	390	297	399		295	351	
v/s Ratio Prot	c0.10	c0.24		0.01	0.11			0.01			0.03	
v/s Ratio Perm			0.00			0.01	0.00			c0.04		
v/c Ratio	0.41	0.44	0.00	0.29	0.36	0.03	0.01	0.04		0.17	0.10	
Uniform Delay, d1	26.4	11.9	9.1	40.2	22.4	20.1	23.7	23.8		24.7	24.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	1.5	0.0	3.2	0.4	0.0	0.0	0.0		0.3	0.1	
Delay (s)	27.1	13.4	9.1	43.4	22.8	20.1	23.7	23.8		24.9	24.4	
Level of Service	C	B	A	D	C	C	C	C		C	C	
Approach Delay (s)		17.5			23.7			23.8			24.5	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	20.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	84.9	Sum of lost time (s)	15.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	405	60	16	254	19	31	494	118	30	85	50
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.99	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1046	1540	2990			3039	1072
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.67	1.00			0.75	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1046	1085	2990			2301	1072
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	30	455	67	18	285	21	35	555	133	34	96	56
RTOR Reduction (vph)	0	0	29	0	0	11	0	20	0	0	0	38
Lane Group Flow (vph)	30	455	38	18	285	10	35	668	0	0	130	18
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	2.1	37.9	37.9	2.1	36.9	36.9	27.0	27.0			26.0	26.0
Effective Green, g (s)	2.1	37.9	37.9	2.1	36.9	36.9	27.0	27.0			26.0	26.0
Actuated g/C Ratio	0.03	0.47	0.47	0.03	0.46	0.46	0.34	0.34			0.32	0.32
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	31	575	652	40	560	482	366	1009			747	348
v/s Ratio Prot	c0.02	c0.37		0.01	0.23			c0.22				
v/s Ratio Perm			0.03			0.01	0.03				0.06	0.02
v/c Ratio	0.97	0.79	0.06	0.45	0.51	0.02	0.10	0.66			0.17	0.05
Uniform Delay, d1	38.9	17.7	11.4	38.4	15.2	11.7	18.1	22.6			19.3	18.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	146.8	7.3	0.0	7.9	0.7	0.0	0.1	1.6			0.1	0.1
Delay (s)	185.7	25.1	11.4	46.2	15.9	11.7	18.3	24.3			19.4	18.6
Level of Service	F	C	B	D	B	B	B	C			B	B
Approach Delay (s)		32.1			17.3			24.0			19.2	
Approach LOS		C			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	24.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	365	65	14	242	78	38	120	13	111	41	73
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.91	1.00	1.00	0.95	1.00	0.95	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1321	930		1335	1126	870	1070	957	911	1070	963	
Flt Permitted	0.41	1.00		0.29	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	567	930		409	1126	870	1070	957	911	1070	963	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	36	429	76	16	285	92	45	141	15	131	48	86
RTOR Reduction (vph)	0	5	0	0	0	34	0	0	13	0	68	0
Lane Group Flow (vph)	36	500	0	16	285	58	45	141	2	131	66	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	54.1	54.1		53.3	53.3	67.3	17.6	17.5	17.5	14.0	13.9	
Effective Green, g (s)	54.1	54.1		53.3	53.3	67.3	17.6	17.5	17.5	14.0	13.9	
Actuated g/C Ratio	0.51	0.51		0.50	0.50	0.63	0.16	0.16	0.16	0.13	0.13	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	302	469		216	560	587	175	156	148	139	124	
v/s Ratio Prot	0.00	c0.54		0.00	c0.25	0.01	0.04	c0.15		c0.12	0.07	
v/s Ratio Perm	0.06			0.04		0.05			0.00			
v/c Ratio	0.12	1.07		0.07	0.51	0.10	0.26	0.90	0.02	0.94	0.53	
Uniform Delay, d1	14.3	26.5		23.6	18.1	7.9	39.0	44.0	37.6	46.2	43.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	60.0		0.1	0.7	0.1	0.8	44.8	0.0	58.7	4.4	
Delay (s)	14.5	86.5		23.7	18.8	8.0	39.8	88.7	37.6	104.8	47.9	
Level of Service	B	F		C	B	A	D	F	D	F	D	
Approach Delay (s)		81.7			16.5			74.0			76.1	
Approach LOS		F			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	61.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	107.1	Sum of lost time (s)	20.0
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd. 4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	229	320	34	32	124	60	29	26	42	10	29	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	0.95		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			0.99			0.98	
Flpb, ped/bikes	0.98	1.00		0.99	1.00			1.00			1.00	
Frt	1.00	0.99		1.00	0.95			0.94			0.92	
Flt Protected	0.95	1.00		0.95	1.00			0.99			1.00	
Satd. Flow (prot)	1685	3107		1690	1690			1648			1370	
Flt Permitted	0.60	1.00		0.48	1.00			0.88			0.97	
Satd. Flow (perm)	1061	3107		855	1690			1480			1332	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	286	400	42	40	155	75	36	32	52	12	36	80
RTOR Reduction (vph)	0	8	0	0	18	0	0	40	0	0	63	0
Lane Group Flow (vph)	286	434	0	40	212	0	0	80	0	0	65	0
Confl. Peds. (#/hr)	13		16	16		13	16		19	19		16
Parking (#/hr)		10	10								10	10
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	25.8	25.8		25.8	25.8			13.5			13.5	
Effective Green, g (s)	25.8	25.8		25.8	25.8			13.5			13.5	
Actuated g/C Ratio	0.40	0.40		0.40	0.40			0.21			0.21	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	422	1237		340	672			308			277	
v/s Ratio Prot		0.14			0.13							
v/s Ratio Perm	c0.27			0.05				c0.05			0.05	
v/c Ratio	0.68	0.35		0.12	0.32			0.26			0.23	
Uniform Delay, d1	16.1	13.6		12.3	13.4			21.5			21.3	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	4.3	0.2		0.2	0.3			0.5			0.4	
Delay (s)	20.4	13.8		12.5	13.7			21.9			21.8	
Level of Service	C	B		B	B			C			C	
Approach Delay (s)		16.4			13.5			21.9			21.8	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	64.8	Sum of lost time (s)	14.0
Intersection Capacity Utilization	58.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St. 4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	79	512	44	40	156	25	42	392	47	27	405	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1669	3371		1697	3327		1260	2474		1260	2449	
Flt Permitted	0.62	1.00		0.28	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1092	3371		501	3327		1260	2474		1260	2449	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	91	589	51	46	179	29	48	451	54	31	466	87
RTOR Reduction (vph)	0	6	0	0	13	0	0	9	0	0	15	0
Lane Group Flow (vph)	91	634	0	46	195	0	48	496	0	31	538	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	30.1	30.1		30.1	30.1		9.3	40.4		8.2	39.3	
Effective Green, g (s)	30.1	30.1		30.1	30.1		9.3	40.4		8.2	39.3	
Actuated g/C Ratio	0.32	0.32		0.32	0.32		0.10	0.43		0.09	0.42	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	348	1077		160	1063		124	1061		109	1021	
v/s Ratio Prot		c0.19			0.06		0.04	c0.20		0.02	c0.22	
v/s Ratio Perm	0.08			0.09								
v/c Ratio	0.26	0.59		0.29	0.18		0.39	0.47		0.28	0.53	
Uniform Delay, d1	23.8	26.9		24.0	23.2		39.8	19.2		40.3	20.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.8		1.0	0.1		2.0	1.5		1.4	0.5	
Delay (s)	24.2	27.7		25.0	23.3		41.8	20.7		41.7	21.0	
Level of Service	C	C		C	C		D	C		D	C	
Approach Delay (s)		27.3			23.6			22.5			22.1	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	94.2	Sum of lost time (s)	15.5
Intersection Capacity Utilization	104.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	658	22	8	211	53	27	0	2	7	5	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.97			0.99		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3405		1711	3318			1705		1711	1561	
Flt Permitted	0.58	1.00		0.37	1.00			0.72		0.74	1.00	
Satd. Flow (perm)	1037	3405		668	3318			1292		1327	1561	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	715	24	9	229	58	29	0	2	8	5	39
RTOR Reduction (vph)	0	4	0	0	32	0	0	24	0	0	30	0
Lane Group Flow (vph)	30	735	0	9	255	0	0	7	0	8	14	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	15.0	15.0		15.0	15.0			7.9		7.9	7.9	
Effective Green, g (s)	15.0	15.0		15.0	15.0			7.9		7.9	7.9	
Actuated g/C Ratio	0.46	0.46		0.46	0.46			0.24		0.24	0.24	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	472	1552		304	1512			310		318	374	
v/s Ratio Prot		c0.22			0.08						c0.01	
v/s Ratio Perm	0.03			0.01				0.01		0.01		
v/c Ratio	0.06	0.47		0.03	0.17			0.02		0.03	0.04	
Uniform Delay, d1	5.0	6.2		4.9	5.3			9.6		9.6	9.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.2		0.0	0.1			0.0		0.0	0.0	
Delay (s)	5.1	6.4		5.0	5.3			9.6		9.6	9.6	
Level of Service	A	A		A	A			A		A	A	
Approach Delay (s)		6.4			5.3			9.6			9.6	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	32.9	Sum of lost time (s)	10.0
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	133	0	0	312	43	219	626	585	0	0	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frt		1.00			0.98		1.00	0.93				0.85
Flt Protected		0.99			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3385			5038		1711	3173				2694
Flt Permitted		0.83			1.00		0.95	1.00				1.00
Satd. Flow (perm)		2833			5038		1711	3173				2694
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	46	166	0	0	390	54	274	782	731	0	0	172
RTOR Reduction (vph)	0	0	0	0	25	0	0	222	0	0	0	163
Lane Group Flow (vph)	0	212	0	0	419	0	274	1291	0	0	0	9
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		35.5			26.5		31.0	31.0				4.0
Effective Green, g (s)		35.5			26.5		31.0	31.0				4.0
Actuated g/C Ratio		0.47			0.35		0.41	0.41				0.05
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1352			1756		697	1294				141
v/s Ratio Prot		c0.01			c0.08		0.16	c0.41				0.00
v/s Ratio Perm		0.06										
v/c Ratio		0.16			0.24		0.39	1.00				0.06
Uniform Delay, d1		11.6			17.6		15.9	22.5				34.2
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.2			0.3		1.7	24.5				0.9
Delay (s)		11.9			17.9		17.5	46.9				35.1
Level of Service		B			B		B	D				D
Approach Delay (s)		11.9			17.9			42.4			35.1	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	35.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	64.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.

4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	170	128	338	330	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	1.00	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.99	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1690	1428	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1690	1428	3319	1801		
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	207	156	412	402	0	0
RTOR Reduction (vph)	3	53	0	0	0	0
Lane Group Flow (vph)	220	87	412	402	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	37.3	37.3	12.7	60.0		
Effective Green, g (s)	37.3	37.3	12.7	60.0		
Actuated g/C Ratio	0.62	0.62	0.21	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	1050	887	702	1801		
v/s Ratio Prot	0.13		c0.12	c0.22		
v/s Ratio Perm		0.06				
v/c Ratio	0.21	0.10	0.59	0.22		
Uniform Delay, d1	4.9	4.6	21.3	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.1	0.0	1.3	0.1		
Delay (s)	5.0	4.6	22.5	0.1		
Level of Service	A	A	C	A		
Approach Delay (s)	4.9			11.4	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	30.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	82	41	109	3	38	0	101	340	0	39	336	114
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.93		1.00	1.00		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	0.97	1.00		0.94	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	1.00		1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1179	1898		1145	1279		1215	2431		1215	2288	
Flt Permitted	0.44	1.00		0.65	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	544	1898		778	1279		1215	2431		1215	2288	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	92	46	122	3	43	0	113	382	0	44	378	128
RTOR Reduction (vph)	0	85	0	0	0	0	0	0	0	0	26	0
Lane Group Flow (vph)	92	83	0	3	43	0	113	382	0	44	480	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	22.2	22.2		8.0	8.0		10.3	24.7		10.0	24.4	
Effective Green, g (s)	22.2	22.2		8.0	8.0		10.3	24.7		10.0	24.4	
Actuated g/C Ratio	0.30	0.30		0.11	0.11		0.14	0.34		0.14	0.33	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	242	575		85	139		170	820		165	762	
v/s Ratio Prot	c0.05	0.04			0.03		c0.09	0.16		0.04	c0.21	
v/s Ratio Perm	c0.07			0.00								
v/c Ratio	0.38	0.14		0.04	0.31		0.66	0.47		0.27	0.63	
Uniform Delay, d1	19.5	18.6		29.1	30.1		29.8	19.1		28.3	20.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	0.1		0.2	1.3		9.4	0.4		0.9	1.6	
Delay (s)	20.5	18.7		29.3	31.3		39.2	19.5		29.2	22.2	
Level of Service	C	B		C	C		D	B		C	C	
Approach Delay (s)		19.3			31.2			24.0			22.8	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	73.2	Sum of lost time (s)	21.6
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

EXISTING 2015 PLUS PROJECT – BASKETBALL GAME
NO TSP – WEEKDAY PM PEAK

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	889	733	12	174	907	36	53	1073	291	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.68			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	1.00		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	3057		2987	3023			5481	942			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	3057		2987	3023			5481	942			
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	916	756	12	179	935	37	55	1106	300	0	0	0
RTOR Reduction (vph)	0	1	0	0	0	0	0	0	201	0	0	0
Lane Group Flow (vph)	916	767	0	179	972	0	0	1161	99	0	0	0
Confl. Peds. (#/hr)			400			400	400		400			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.2	40.1		13.2	36.6			36.3	36.3			
Effective Green, g (s)	18.2	40.1		13.2	36.6			36.3	36.3			
Actuated g/C Ratio	0.17	0.36		0.12	0.33			0.33	0.33			
Clearance Time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	741	1114		358	1005			1808	310			
v/s Ratio Prot	c0.20	0.25		0.06	c0.32							
v/s Ratio Perm								0.21	0.11			
v/c Ratio	1.24	0.69		0.50	0.97			0.64	0.32			
Uniform Delay, d1	45.9	29.6		45.3	36.1			31.3	27.6			
Progression Factor	1.38	1.60		1.53	1.02			0.90	2.83			
Incremental Delay, d2	111.8	1.6		0.4	9.8			0.7	0.6			
Delay (s)	175.4	49.1		69.5	46.5			29.0	78.7			
Level of Service	F	D		E	D			C	E			
Approach Delay (s)		117.8			50.1			39.2			0.0	
Approach LOS		F			D			D			A	

Intersection Summary			
HCM 2000 Control Delay	72.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	151	1521	25	24	917	19	5	69	79	34	326	304
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	0.64	1.00	0.87	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00	0.68	1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85	1.00	0.96	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1296	3693		1296	2553			1587	858	1044	2462	581
Flt Permitted	0.95	1.00		0.95	1.00			0.97	1.00	0.71	1.00	1.00
Satd. Flow (perm)	1296	3693		1296	2553			1541	858	778	2462	581
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	154	1552	26	24	936	19	5	70	81	35	333	310
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	53	0	28	127
Lane Group Flow (vph)	154	1577	0	24	954	0	0	75	28	35	417	71
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.4	45.9		6.0	35.9			38.2	38.2	39.2	39.2	39.2
Effective Green, g (s)	14.4	45.9		6.0	35.9			38.2	38.2	39.2	39.2	39.2
Actuated g/C Ratio	0.13	0.42		0.05	0.33			0.35	0.35	0.36	0.36	0.36
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	169	1540		70	833			535	297	277	877	207
v/s Ratio Prot	0.12	c0.43		0.02	c0.37						c0.17	
v/s Ratio Perm								0.05	0.03	0.04		0.12
v/c Ratio	0.91	1.02		0.34	1.14			0.14	0.09	0.13	0.48	0.34
Uniform Delay, d1	47.2	32.0		50.1	37.0			24.6	24.2	23.9	27.4	25.9
Progression Factor	0.58	1.24		0.88	0.90			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.1	14.2		1.0	70.4			0.1	0.1	0.2	0.4	1.0
Delay (s)	34.6	53.9		45.1	103.7			24.8	24.4	24.1	27.8	26.9
Level of Service	C	D		D	F			C	C	C	C	C
Approach Delay (s)		52.2			102.3			24.6			27.4	
Approach LOS		D			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	60.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	119.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1689	138	0	1226	86	8
Ideal Flow (vphpl)	1850	1850	1850	1850	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2957			2998	1540	1357
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	2957			2998	1540	1357
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1759	144	0	1277	90	8
RTOR Reduction (vph)	6	0	0	0	0	5
Lane Group Flow (vph)	1897	0	0	1277	90	3
Confl. Peds. (#/hr)		37	37		1	3
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	1669			1692	512	451
v/s Ratio Prot	c0.64			0.43	c0.06	
v/s Ratio Perm						0.00
v/c Ratio	1.14			0.75	0.18	0.01
Uniform Delay, d1	23.9			18.2	26.0	24.5
Progression Factor	1.00			0.54	1.00	1.00
Incremental Delay, d2	69.5			0.9	0.7	0.0
Delay (s)	93.5			10.8	26.8	24.6
Level of Service	F			B	C	C
Approach Delay (s)	93.5			10.8	26.6	
Approach LOS	F			B	C	

Intersection Summary			
HCM 2000 Control Delay	59.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	98.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

4/27/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	272	1171	161	52	302	537	219	231	799	265
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		2.0			2.0	2.0			2.0	2.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.99	0.87
Flpb, ped/bikes		0.99			1.00	1.00			1.00	1.00
Frt		0.98			1.00	0.96			1.00	0.85
Flt Protected		0.99			0.99	1.00			0.95	1.00
Satd. Flow (prot)		5749			2857	2464			4090	978
Flt Permitted		0.99			0.66	1.00			0.95	1.00
Satd. Flow (perm)		5749			1899	2464			4090	978
Peak-hour factor, PHF	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93
Adj. Flow (vph)	296	1259	173	56	325	577	235	251	859	285
RTOR Reduction (vph)	0	22	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	1706	0	0	381	809	0	0	1139	256
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Perm
Protected Phases		6			4	4		7	7	
Permitted Phases	6			4						7
Actuated Green, G (s)		27.0			25.0	25.0			24.0	24.0
Effective Green, g (s)		29.0			28.0	28.0			27.0	27.0
Actuated g/C Ratio		0.32			0.31	0.31			0.30	0.30
Clearance Time (s)		4.0			5.0	5.0			5.0	5.0
Lane Grp Cap (vph)		1852			590	766			1227	293
v/s Ratio Prot						c0.33			c0.28	
v/s Ratio Perm		0.30			0.20					0.26
v/c Ratio		0.92			0.65	1.06			0.93	0.87
Uniform Delay, d1		29.4			26.7	31.0			30.6	29.9
Progression Factor		1.48			0.06	1.00			1.00	1.00
Incremental Delay, d2		6.6			0.5	48.5			13.4	28.4
Delay (s)		50.1			2.1	79.5			44.0	58.2
Level of Service		D			A	E			D	E
Approach Delay (s)		50.1			2.1	79.5			46.6	
Approach LOS		D			A	E			D	

Intersection Summary			
HCM 2000 Control Delay	50.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	111.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

4/27/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	16	506	568	45	338	362	24	255	129	656
Ideal Flow (vphpl)	1000	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.84		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.99		0.92		0.85		1.00	1.00
Flt Protected		0.95	0.99		1.00		1.00		0.95	0.99
Satd. Flow (prot)		1313	1912		2130		1163		1327	2543
Flt Permitted		0.95	0.99		1.00		1.00		0.15	0.66
Satd. Flow (perm)		1313	1912		2130		1163		207	1680
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	17	544	611	48	363	389	26	274	139	705
RTOR Reduction (vph)	0	0	7	0	0	0	17	0	0	0
Lane Group Flow (vph)	0	479	734	0	755	0	6	0	316	802
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	5	0	5	0	0	0	0	5
Parking (#/hr)			10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		22.5	22.5		23.0		23.0		42.0	42.0
Effective Green, g (s)		22.5	25.0		24.5		23.0		43.5	43.5
Actuated g/C Ratio		0.25	0.28		0.27		0.26		0.48	0.48
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		328	531		579		297		305	970
v/s Ratio Prot		0.36	c0.38		c0.35				c0.19	0.15
v/s Ratio Perm							0.01		0.31	0.25
v/c Ratio		1.46	1.38		1.42dr		0.02		1.04	0.83
Uniform Delay, d1		33.8	32.5		32.8		25.1		31.1	20.0
Progression Factor		1.00	1.00		1.00		1.00		1.08	1.12
Incremental Delay, d2		223.3	183.3		149.0		0.1		35.1	2.1
Delay (s)		257.1	215.8		181.8		25.2		68.6	24.4
Level of Service		F	F		F		C		E	C
Approach Delay (s)			232.0		177.1					36.9
Approach LOS			F		F					D

Intersection Summary			
HCM 2000 Control Delay	148.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	102.7%	ICU Level of Service	G
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	153	80	19	10	67	20	946	52	25	183	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.98		1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.91		1.00	0.99		1.00	0.99	
Flt Protected		0.99	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1611	1353		1426		1272	2508		1540	3037	
Flt Permitted		0.97	1.00		0.93		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1571	1353		1341		1272	2508		1540	3037	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	18	161	84	20	11	71	21	996	55	26	193	16
RTOR Reduction (vph)	0	0	57	0	48	0	0	4	0	0	6	0
Lane Group Flow (vph)	0	179	27	0	54	0	21	1047	0	26	203	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		32.1	32.1		32.1		13.8	38.5		13.5	38.5	
Effective Green, g (s)		32.1	32.1		32.1		13.8	38.5		13.5	38.5	
Actuated g/C Ratio		0.32	0.32		0.32		0.14	0.38		0.14	0.38	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Grp Cap (vph)		504	434		430		175	965		207	1169	
v/s Ratio Prot							0.02	c0.42		0.02	c0.07	
v/s Ratio Perm		c0.11	0.02		0.04							
v/c Ratio		0.36	0.06		0.13		0.12	1.09		0.13	0.17	
Uniform Delay, d1		26.0	23.5		24.0		37.8	30.8		38.1	20.3	
Progression Factor		1.00	1.00		1.00		1.22	0.26		1.00	1.00	
Incremental Delay, d2		2.0	0.3		0.6		1.1	51.7		1.2	0.3	
Delay (s)		28.0	23.8		24.6		47.0	59.5		39.3	20.6	
Level of Service		C	C		C		D	E		D	C	
Approach Delay (s)		26.6			24.6			59.3			22.7	
Approach LOS		C			C			E			C	

Intersection Summary			
HCM 2000 Control Delay	46.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.9
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	130	10	3	12	30	7	84	6	115	131	19
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00	0.99	1.00	1.00		1.00	0.97	
Flpb, ped/bikes		1.00			1.00	1.00	0.83	1.00		1.00	1.00	
Frt		0.99			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.99			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2702			1436	1217	1150	1432		1377	1383	
Flt Permitted		0.92			0.91	1.00	0.82	1.00		0.95	1.00	
Satd. Flow (perm)		2494			1318	1217	988	1432		1377	1383	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	20	140	11	3	13	32	8	90	6	124	141	20
RTOR Reduction (vph)	0	7	0	0	0	16	0	4	0	0	7	0
Lane Group Flow (vph)	0	164	0	0	16	16	8	92	0	124	154	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		6.9			6.9	20.9	4.9	4.9		14.0	23.9	
Effective Green, g (s)		6.9			6.9	20.9	4.9	4.9		14.0	23.9	
Actuated g/C Ratio		0.17			0.17	0.51	0.12	0.12		0.34	0.59	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		421			222	772	118	171		472	810	
v/s Ratio Prot						0.01		c0.06		c0.09	0.11	
v/s Ratio Perm		c0.07			0.01	0.01	0.01					
v/c Ratio		0.39			0.07	0.02	0.07	0.54		0.26	0.19	
Uniform Delay, d1		15.1			14.3	4.9	15.9	16.9		9.7	3.9	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.6			0.1	0.0	0.2	3.2		0.3	0.1	
Delay (s)		15.7			14.4	4.9	16.2	20.1		10.0	4.1	
Level of Service		B			B	A	B	C		A	A	
Approach Delay (s)		15.7			8.1			19.8			6.6	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	40.8	Sum of lost time (s)	15.0
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.

4/27/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	34	242	784	29	195	235
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1742	1535	847	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1742	1535	847	1134	1194
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	263	852	32	212	255
RTOR Reduction (vph)	0	238	0	6	0	0
Lane Group Flow (vph)	37	25	852	26	212	255
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	8.8	8.8	47.0	42.0	20.0	72.0
Effective Green, g (s)	8.8	8.8	47.0	42.0	20.0	72.0
Actuated g/C Ratio	0.10	0.10	0.52	0.46	0.22	0.79
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	109	168	794	438	249	946
v/s Ratio Prot	c0.03		c0.55	0.01	c0.19	0.21
v/s Ratio Perm		0.01		0.02		
v/c Ratio	0.34	0.15	1.07	0.06	0.85	0.27
Uniform Delay, d1	38.3	37.6	21.9	13.5	34.0	2.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.9	0.4	53.4	0.1	23.3	0.2
Delay (s)	40.1	38.0	75.3	13.5	57.3	2.6
Level of Service	D	D	E	B	E	A
Approach Delay (s)	38.3		73.0			27.5
Approach LOS	D		E			C

Intersection Summary			
HCM 2000 Control Delay	53.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
9: Terry A Francois Blvd/Terry A Francois Blvd. & South St.

4/27/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	19	43	60	192	209	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frpb, ped/bikes	0.96		1.00	1.00	0.99	
Flpb, ped/bikes	1.00		0.98	1.00	1.00	
Frt	0.91		1.00	1.00	0.98	
Flt Protected	0.99		0.95	1.00	1.00	
Satd. Flow (prot)	1539		1678	1531	3061	
Flt Permitted	0.99		0.58	1.00	1.00	
Satd. Flow (perm)	1539		1026	1531	3061	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	21	48	67	213	232	46
RTOR Reduction (vph)	43	0	0	0	16	0
Lane Group Flow (vph)	26	0	67	213	262	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	10
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	3.6		23.3	23.3	23.3	
Effective Green, g (s)	3.6		23.3	23.3	23.3	
Actuated g/C Ratio	0.10		0.63	0.63	0.63	
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	150		647	966	1932	
v/s Ratio Prot	c0.02			c0.14	0.09	
v/s Ratio Perm			0.07			
v/c Ratio	0.17		0.10	0.22	0.14	
Uniform Delay, d1	15.3		2.7	2.9	2.7	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.5		0.1	0.1	0.0	
Delay (s)	15.8		2.8	3.0	2.8	
Level of Service	B		A	A	A	
Approach Delay (s)	15.8			3.0	2.8	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	4.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	36.9	Sum of lost time (s)	10.0
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: Third St. & South St.

4/27/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	189	153	894	53	45	488
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.96	1.00		1.00	1.00
Flpb, ped/bikes	0.93	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1584	1466	3378		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1584	1466	3378		1711	3421
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	210	170	993	59	50	542
RTOR Reduction (vph)	0	121	4	0	0	0
Lane Group Flow (vph)	210	49	1048	0	50	542
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	28.7	28.7	48.1		7.9	61.1
Effective Green, g (s)	28.7	28.7	48.1		7.9	61.1
Actuated g/C Ratio	0.29	0.29	0.48		0.08	0.61
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	454	420	1624		135	2090
v/s Ratio Prot			c0.31		c0.03	0.16
v/s Ratio Perm	c0.13	0.03				
v/c Ratio	0.46	0.12	0.65		0.37	0.26
Uniform Delay, d1	29.3	26.3	19.5		43.7	9.0
Progression Factor	1.00	1.00	1.78		1.06	1.34
Incremental Delay, d2	0.7	0.1	1.2		1.7	0.1
Delay (s)	30.1	26.4	35.9		48.0	12.1
Level of Service	C	C	D		D	B
Approach Delay (s)	28.4		35.9			15.1
Approach LOS	C		D			B

Intersection Summary			
HCM 2000 Control Delay	28.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	10	12	22	242	192	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.96	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1540	1346		3063	2948	
Flt Permitted	0.95	1.00		0.90	1.00	
Satd. Flow (perm)	1540	1346		2773	2948	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	12	14	26	285	226	71
RTOR Reduction (vph)	0	14	0	0	55	0
Lane Group Flow (vph)	12	0	0	311	242	0
Confl. Peds. (#/hr)	1	1	25			25
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	1.3	1.3		10.3	10.3	
Effective Green, g (s)	1.3	1.3		10.3	10.3	
Actuated g/C Ratio	0.03	0.03		0.22	0.22	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	42	37		606	644	
v/s Ratio Prot	c0.01				0.08	
v/s Ratio Perm		0.00		c0.11		
v/c Ratio	0.29	0.01		0.51	0.38	
Uniform Delay, d1	22.4	22.3		16.2	15.7	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.7	0.1		0.7	0.4	
Delay (s)	26.2	22.4		16.9	16.0	
Level of Service	C	C		B	B	
Approach Delay (s)	24.1			16.9	16.0	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.18		
Actuated Cycle Length (s)	47.1	Sum of lost time (s)	15.0
Intersection Capacity Utilization	37.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	52	8	67	49	28	5	130	47	9	5	167	124
Peak Hour Factor	0.92	0.87	0.87	0.87	0.87	0.92	0.87	0.92	0.87	0.92	0.92	0.92
Hourly flow rate (vph)	57	9	77	56	32	5	149	51	10	5	182	135

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	57	86	56	38	211	187	135
Volume Left (vph)	57	0	56	0	149	5	0
Volume Right (vph)	0	77	0	5	10	0	135
Hadj (s)	0.53	-0.59	0.53	-0.07	0.15	0.05	-0.67
Departure Headway (s)	6.6	5.4	6.6	6.0	5.7	5.5	4.8
Degree Utilization, x	0.10	0.13	0.10	0.06	0.33	0.29	0.18
Capacity (veh/h)	508	610	500	548	607	628	719
Control Delay (s)	9.1	8.0	9.2	8.2	11.5	9.5	7.6
Approach Delay (s)	8.5		8.8		11.5	8.7	
Approach LOS	A		A		B	A	

Intersection Summary			
Delay	9.5		
Level of Service	A		
Intersection Capacity Utilization	44.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	191	91	266	3	232	47	269	709	18	18	472	187
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1267	1365	1126	1283	1365	1099	2515	2580		1296	2464	
Flt Permitted	0.51	1.00	1.00	0.69	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	678	1365	1126	935	1365	1099	2515	2580		1296	2464	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	210	100	292	3	255	52	296	779	20	20	519	205
RTOR Reduction (vph)	0	0	191	0	0	34	0	2	0	0	42	0
Lane Group Flow (vph)	210	100	101	3	255	18	296	797	0	20	682	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Effective Green, g (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Actuated g/C Ratio	0.34	0.34	0.34	0.34	0.34	0.34	0.14	0.38		0.12	0.36	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Grp Cap (vph)	233	470	388	322	470	379	352	975		155	882	
v/s Ratio Prot		0.07			0.19		0.12	c0.31		0.02	c0.28	
v/s Ratio Perm	c0.31		0.09	0.00		0.02						
v/c Ratio	0.90	0.21	0.26	0.01	0.54	0.05	0.84	0.82		0.13	0.77	
Uniform Delay, d1	31.1	23.2	23.6	21.5	26.4	21.8	41.9	28.0		39.3	28.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.64	0.76		1.15	1.19	
Incremental Delay, d2	38.0	1.0	1.6	0.1	4.4	0.2	8.4	2.8		1.7	6.3	
Delay (s)	69.1	24.2	25.2	21.6	30.8	22.0	35.3	24.1		47.0	40.4	
Level of Service	E	C	C	C	C	C	D	C		D	D	
Approach Delay (s)		40.4			29.3			27.1			40.6	
Approach LOS		D			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	33.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	116.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	103	474	8	6	650	33	33	25	34	41	3	105
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.85	1.00	0.98		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1411	1621	1706	1238	1621	1527		1491	1355	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.68	1.00		0.72	1.00	
Satd. Flow (perm)	1621	1706	1411	1621	1706	1238	1163	1527		1123	1355	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	112	515	9	7	707	36	36	27	37	45	3	114
RTOR Reduction (vph)	0	0	4	0	0	20	0	28	0	0	85	0
Lane Group Flow (vph)	112	515	5	7	707	16	36	36	0	45	32	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	10.9	47.6	47.6	2.7	39.4	39.4	21.9	21.9		21.9	21.9	
Effective Green, g (s)	10.9	47.6	47.6	2.7	39.4	39.4	21.9	21.9		21.9	21.9	
Actuated g/C Ratio	0.12	0.55	0.55	0.03	0.45	0.45	0.25	0.25		0.25	0.25	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	202	931	770	50	770	559	292	383		282	340	
v/s Ratio Prot	c0.07	c0.30		0.00	c0.41			0.02			0.02	
v/s Ratio Perm			0.00			0.01	0.03			c0.04		
v/c Ratio	0.55	0.55	0.01	0.14	0.92	0.03	0.12	0.09		0.16	0.09	
Uniform Delay, d1	35.9	12.9	9.0	41.1	22.4	13.3	25.2	25.0		25.5	25.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.3	2.4	0.0	1.3	15.7	0.0	0.2	0.1		0.3	0.1	
Delay (s)	39.1	15.2	9.0	42.4	38.1	13.3	25.4	25.2		25.7	25.2	
Level of Service	D	B	A	D	D	B	C	C		C	C	
Approach Delay (s)		19.4			37.0			25.3			25.3	
Approach LOS		B			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	28.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	87.2	Sum of lost time (s)	15.0
Intersection Capacity Utilization	86.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	123	402	18	22	685	81	49	211	70	112	62	146
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.97	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1050	1540	2964			2983	1072
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.64	1.00			0.65	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1050	1032	2964			1992	1072
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	128	419	19	23	714	84	51	220	73	117	65	152
RTOR Reduction (vph)	0	0	6	0	0	22	0	39	0	0	0	129
Lane Group Flow (vph)	128	419	13	23	714	62	51	254	0	0	182	23
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	7.0	57.2	57.2	2.3	51.5	51.5	14.1	14.1			13.1	13.1
Effective Green, g (s)	7.0	57.2	57.2	2.3	51.5	51.5	14.1	14.1			13.1	13.1
Actuated g/C Ratio	0.08	0.66	0.66	0.03	0.59	0.59	0.16	0.16			0.15	0.15
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	98	802	910	40	722	624	168	482			301	162
v/s Ratio Prot	c0.11	0.34		0.01	c0.59			0.09				
v/s Ratio Perm			0.01			0.06	0.05				c0.09	0.02
v/c Ratio	1.31	0.52	0.01	0.57	0.99	0.10	0.30	0.53			1.04dl	0.14
Uniform Delay, d1	39.8	7.6	5.0	41.7	17.3	7.6	31.9	33.2			34.3	31.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	193.5	2.4	0.0	18.4	30.4	0.1	1.0	1.0			3.4	0.4
Delay (s)	233.3	10.0	5.1	60.1	47.6	7.6	32.9	34.2			37.7	32.3
Level of Service	F	B	A	E	D	A	C	C			D	C
Approach Delay (s)		60.4			43.9			34.1			35.3	
Approach LOS		E			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	45.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	86.6	Sum of lost time (s)	15.0
Intersection Capacity Utilization	95.8%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	422	70	33	479	368	61	249	30	91	138	43
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.90	1.00	1.00	0.96	1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1337	931		1336	1126	858	1070	957	918	1070	1068	
Flt Permitted	0.18	1.00		0.27	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	250	931		386	1126	858	1070	957	918	1070	1068	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	50	449	74	35	510	391	65	265	32	97	147	46
RTOR Reduction (vph)	0	5	0	0	0	123	0	0	25	0	11	0
Lane Group Flow (vph)	50	518	0	35	510	268	65	265	7	97	182	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	55.4	55.4		54.6	54.6	62.6	9.9	24.0	24.0	8.0	22.1	
Effective Green, g (s)	55.4	55.4		54.6	54.6	62.6	9.9	24.0	24.0	8.0	22.1	
Actuated g/C Ratio	0.50	0.50		0.50	0.50	0.57	0.09	0.22	0.22	0.07	0.20	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	157	469		212	559	528	96	209	200	77	214	
v/s Ratio Prot	0.01	c0.56		0.00	c0.45	0.04	0.06	c0.28		c0.09	0.17	
v/s Ratio Perm	0.15			0.08		0.28			0.01			
v/c Ratio	0.32	1.10		0.17	0.91	0.51	0.68	1.27	0.03	1.26	0.85	
Uniform Delay, d1	18.6	27.2		25.8	25.4	14.3	48.4	42.9	33.8	50.9	42.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.2	72.8		0.4	19.3	0.8	17.3	152.7	0.1	187.5	25.6	
Delay (s)	19.7	100.0		26.2	44.7	15.0	65.7	195.6	33.9	238.4	67.9	
Level of Service	B	F		C	D	B	E	F	C	F	E	
Approach Delay (s)		93.0			31.6			158.0			124.9	
Approach LOS		F			C			F			F	

Intersection Summary			
HCM 2000 Control Delay	81.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	109.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	77.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	66	139	39	45	162	2	31	116	78	11	51	218
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		0.99		1.00	1.00			1.00	0.98		0.98	
Flpb, ped/bikes		1.00		0.99	1.00			1.00	1.00		1.00	
Frt		0.98		1.00	1.00			1.00	0.85		0.89	
Flt Protected		0.99		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)		1721		1691	1797			1779	1499		1577	
Flt Permitted		0.86		0.56	1.00			0.87	1.00		0.99	
Satd. Flow (perm)		1501		1004	1797			1556	1499		1556	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	73	154	43	50	180	2	34	129	87	12	57	242
RTOR Reduction (vph)	0	8	0	0	1	0	0	0	65	0	176	0
Lane Group Flow (vph)	0	262	0	50	181	0	0	163	22	0	135	0
Confl. Peds. (#/hr)	13		16	16		13	16		19	19		16
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4		4	8		
Actuated Green, G (s)		15.9		15.9	15.9			13.4	13.4		13.4	
Effective Green, g (s)		15.9		15.9	15.9			13.4	13.4		13.4	
Actuated g/C Ratio		0.29		0.29	0.29			0.25	0.25		0.25	
Clearance Time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		441		295	528			385	371		385	
v/s Ratio Prot					0.10							
v/s Ratio Perm		c0.17		0.05				c0.10	0.01		0.09	
v/c Ratio		0.59		0.17	0.34			0.42	0.06		0.35	
Uniform Delay, d1		16.3		14.2	15.0			17.1	15.5		16.8	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		2.2		0.3	0.4			0.8	0.1		0.6	
Delay (s)		18.5		14.5	15.4			17.9	15.6		17.3	
Level of Service		B		B	B			B	B		B	
Approach Delay (s)		18.5			15.2			17.1			17.3	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	54.1	Sum of lost time (s)	14.0
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	146	174	51	66	322	23	42	826	53	16	426	299
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1677	3278		1681	3377		1260	2491		1260	2331	
Flt Permitted	0.49	1.00		0.60	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	872	3278		1067	3377		1260	2491		1260	2331	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	155	185	54	70	343	24	45	879	56	17	453	318
RTOR Reduction (vph)	0	27	0	0	5	0	0	5	0	0	127	0
Lane Group Flow (vph)	155	212	0	70	362	0	45	930	0	17	644	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	34.7	34.7		34.7	34.7		11.9	34.9		14.9	37.9	
Effective Green, g (s)	34.7	34.7		34.7	34.7		11.9	34.9		14.9	37.9	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.12	0.35		0.15	0.38	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Grp Cap (vph)	302	1137		370	1171		149	869		187	883	
v/s Ratio Prot		0.06			0.11		0.04	c0.37		0.01	c0.28	
v/s Ratio Perm	c0.18			0.07								
v/c Ratio	0.51	0.19		0.19	0.31		0.30	1.07		0.09	0.73	
Uniform Delay, d1	25.9	22.8		22.8	23.9		40.3	32.5		36.7	26.6	
Progression Factor	1.00	1.00		1.00	1.00		0.91	0.81		1.55	0.62	
Incremental Delay, d2	6.1	0.4		1.1	0.7		4.0	48.0		0.7	3.8	
Delay (s)	32.1	23.2		24.0	24.6		40.7	74.3		57.6	20.3	
Level of Service	C	C		C	C		D	E		E	C	
Approach Delay (s)		26.7			24.5			72.7			21.1	
Approach LOS		C			C			E			C	

Intersection Summary			
HCM 2000 Control Delay	42.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	110.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

19: Minnesota St./4th St. & Mariposa St.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	325	38	4	716	2	38	0	12	13	0	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00			0.97		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3368		1711	3420			1678		1711	1531	
Flt Permitted	0.27	1.00		0.52	1.00			0.84		0.72	1.00	
Satd. Flow (perm)	491	3368		935	3420			1467		1300	1531	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	353	41	4	778	2	41	0	13	14	0	14
RTOR Reduction (vph)	0	15	0	0	0	0	0	20	0	0	8	0
Lane Group Flow (vph)	7	379	0	4	780	0	0	34	0	14	6	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	24.0	24.0		24.0	24.0			26.0		26.0	26.0	
Effective Green, g (s)	24.0	24.0		24.0	24.0			26.0		26.0	26.0	
Actuated g/C Ratio	0.40	0.40		0.40	0.40			0.43		0.43	0.43	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Grp Cap (vph)	196	1347		374	1368			635		563	663	
v/s Ratio Prot		0.11			c0.23						0.00	
v/s Ratio Perm	0.01			0.00				c0.02		0.01		
v/c Ratio	0.04	0.28		0.01	0.57			0.05		0.02	0.01	
Uniform Delay, d1	11.0	12.2		10.8	14.0			9.9		9.7	9.7	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.5		0.1	1.7			0.2		0.1	0.0	
Delay (s)	11.3	12.7		10.9	15.7			10.0		9.8	9.7	
Level of Service	B	B		B	B			B		A	A	
Approach Delay (s)		12.7			15.7			10.0			9.8	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	37.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

20: I-280 NB Off-Ramp & Mariposa St.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	86	0	0	825	18	382	205	287	0	0	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				3.5
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Flpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Frt		1.00			1.00		1.00	0.91				0.85
Flt Protected		0.99			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3399			5116		1711	3122				2694
Flt Permitted		0.88			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3020			5116		1711	3122				2694
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	13	88	0	0	842	18	390	209	293	0	0	130
RTOR Reduction (vph)	0	0	0	0	2	0	0	152	0	0	0	121
Lane Group Flow (vph)	0	101	0	0	858	0	390	350	0	0	0	9
Confl. Peds. (#/hr)												20
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		47.5			36.5		53.0	53.0				7.5
Effective Green, g (s)		47.5			36.5		53.0	53.0				7.5
Actuated g/C Ratio		0.43			0.33		0.48	0.48				0.07
Clearance Time (s)		4.5			4.5		5.0	5.0				3.5
Lane Grp Cap (vph)		1329			1697		824	1504				183
v/s Ratio Prot		c0.01			c0.17		c0.23	0.11				0.00
v/s Ratio Perm		0.03										
v/c Ratio		0.08			0.51		0.47	0.23				0.05
Uniform Delay, d1		18.4			29.5		19.1	16.6				47.9
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			1.1		1.9	0.4				0.5
Delay (s)		18.5			30.6		21.1	17.0				48.4
Level of Service		B			C		C	B				D
Approach Delay (s)		18.5			30.6			18.8			48.4	
Approach LOS		B			C			B			D	

Intersection Summary			
HCM 2000 Control Delay	25.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.

4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	99	566	785	549	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.89	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1507	1426	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1507	1426	3319	1801		
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	102	584	809	566	0	0
RTOR Reduction (vph)	31	31	0	0	0	0
Lane Group Flow (vph)	322	302	809	566	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	37.4	37.4	22.6	70.0		
Effective Green, g (s)	37.4	37.4	22.6	70.0		
Actuated g/C Ratio	0.53	0.53	0.32	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	805	761	1071	1801		
v/s Ratio Prot	c0.21		c0.24	0.31		
v/s Ratio Perm		0.21				
v/c Ratio	0.40	0.40	0.76	0.31		
Uniform Delay, d1	9.7	9.6	21.2	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.3	0.3	3.1	0.1		
Delay (s)	10.0	10.0	24.3	0.1		
Level of Service	A	A	C	A		
Approach Delay (s)	10.0			14.3	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	203	135	181	7	204	13	176	589	16	17	570	169
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.93		1.00	0.99		1.00	1.00		1.00	0.97	
Flpb, ped/bikes	0.98	1.00		0.94	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.99		1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1188	1945		1139	1257		1215	2414		1215	2289	
Flt Permitted	0.36	1.00		0.55	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	454	1945		662	1257		1215	2414		1215	2289	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	211	141	189	7	212	14	183	614	17	18	594	176
RTOR Reduction (vph)	0	127	0	0	2	0	0	2	0	0	28	0
Lane Group Flow (vph)	211	203	0	7	224	0	183	629	0	18	742	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	32.9	32.9		21.9	21.9		17.3	46.8		4.0	33.5	
Effective Green, g (s)	32.9	32.9		21.9	21.9		17.3	46.8		4.0	33.5	
Actuated g/C Ratio	0.33	0.33		0.22	0.22		0.17	0.47		0.04	0.34	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	191	639		144	275		210	1129		48	766	
v/s Ratio Prot	c0.06	0.10			0.18		c0.15	0.26		0.01	c0.32	
v/s Ratio Perm	c0.30			0.01								
v/c Ratio	1.10	0.32		0.05	0.81		0.87	0.56		0.38	0.97	
Uniform Delay, d1	34.2	25.1		30.8	37.1		40.3	19.1		46.8	32.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.03	0.81	
Incremental Delay, d2	95.9	0.3		0.1	16.6		30.2	2.0		3.9	22.6	
Delay (s)	130.1	25.4		31.0	53.7		70.5	21.1		52.3	49.0	
Level of Service	F	C		C	D		E	C		D	D	
Approach Delay (s)		66.3			53.0			32.2			49.1	
Approach LOS		E			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	47.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	99.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

EXISTING 2015 PLUS PROJECT – BASKETBALL GAME
NO TSP – WEEKDAY EVENING

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	808	695	17	445	920	53	44	891	269	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00	0.68			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	1.00		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	3046		2987	2999			5481	941			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	3046		2987	2999			5481	941			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	878	755	18	484	1000	58	48	968	292	0	0	0
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	203	0	0	0
Lane Group Flow (vph)	878	772	0	484	1057	0	0	1016	89	0	0	0
Confl. Peds. (#/hr)			400			400	400		400			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.2	38.7		19.0	39.5			33.4	33.4			
Effective Green, g (s)	18.2	38.7		19.0	39.5			33.4	33.4			
Actuated g/C Ratio	0.17	0.35		0.17	0.36			0.30	0.30			
Clearance Time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	741	1071		515	1076			1664	285			
v/s Ratio Prot	c0.20	0.25		0.16	c0.35							
v/s Ratio Perm								0.19	0.09			
v/c Ratio	1.18	0.72		0.94	0.98			0.61	0.31			
Uniform Delay, d1	45.9	31.0		44.9	34.9			32.7	29.5			
Progression Factor	0.97	0.97		0.78	0.59			1.47	5.45			
Incremental Delay, d2	90.5	2.2		19.6	18.7			0.6	0.6			
Delay (s)	134.9	32.1		54.4	39.4			48.6	161.1			
Level of Service	F	C		D	D			D	F			
Approach Delay (s)		86.8			44.1			73.8			0.0	
Approach LOS		F			D			E			A	

Intersection Summary			
HCM 2000 Control Delay	68.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.9
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	187	1389	24	31	902	31	26	87	80	51	721	458
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00	0.64	1.00	0.94	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.97	1.00	0.70	1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85	1.00	0.98	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1296	3692		1296	2527			1562	858	1077	2708	581
Flt Permitted	0.95	1.00		0.95	1.00			0.55	1.00	0.68	1.00	1.00
Satd. Flow (perm)	1296	3692		1296	2527			864	858	768	2708	581
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	205	1526	26	34	991	34	29	96	88	56	792	503
RTOR Reduction (vph)	0	2	0	0	2	0	0	0	57	0	10	160
Lane Group Flow (vph)	205	1550	0	34	1023	0	0	125	31	56	893	232
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	11.4	48.5		3.4	38.9			38.2	38.2	39.2	39.2	39.2
Effective Green, g (s)	11.4	48.5		3.4	38.9			38.2	38.2	39.2	39.2	39.2
Actuated g/C Ratio	0.10	0.44		0.03	0.35			0.35	0.35	0.36	0.36	0.36
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	134	1627		40	893			300	297	273	965	207
v/s Ratio Prot	c0.16	0.42		0.03	c0.40						0.33	
v/s Ratio Perm								0.14	0.04	0.07		c0.40
v/c Ratio	1.53	0.95		0.85	1.15			0.42	0.10	0.21	0.93	1.12
Uniform Delay, d1	49.3	29.6		53.0	35.5			27.4	24.3	24.6	34.0	35.4
Progression Factor	0.70	1.12		0.65	0.57			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	241.9	1.9		38.7	70.3			0.9	0.2	0.4	14.2	98.3
Delay (s)	276.6	35.0		73.2	90.7			28.3	24.5	25.0	48.2	133.7
Level of Service	F	C		E	F			C	C	C	D	F
Approach Delay (s)		63.1			90.1			26.7			72.1	
Approach LOS		E			F			C			E	

Intersection Summary			
HCM 2000 Control Delay	70.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	118.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1581	199	2	1384	74	19
Ideal Flow (vphpl)	1850	1850	1850	1850	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.98			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2937			2998	1540	1357
Flt Permitted	1.00			0.93	0.95	1.00
Satd. Flow (perm)	2937			2789	1540	1357
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1664	209	2	1457	78	20
RTOR Reduction (vph)	9	0	0	0	0	11
Lane Group Flow (vph)	1864	0	0	1459	78	9
Confl. Peds. (#/hr)		37	37		1	3
Confl. Bikes (#/hr)		1				
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	1658			1574	512	451
v/s Ratio Prot	c0.63				c0.05	
v/s Ratio Perm				0.52		0.01
v/c Ratio	1.12			0.93	0.15	0.02
Uniform Delay, d1	23.9			21.9	25.8	24.7
Progression Factor	1.00			0.80	1.00	1.00
Incremental Delay, d2	64.5			1.3	0.6	0.1
Delay (s)	88.5			18.9	26.4	24.7
Level of Service	F			B	C	C
Approach Delay (s)	88.5			18.9	26.1	
Approach LOS	F			B	C	

Intersection Summary			
HCM 2000 Control Delay	57.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	97.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

4/27/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	122	1129	155	29	278	527	260	466	1298	258
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		3.5			3.0	3.0			3.0	3.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			1.00	1.00
Flpb, ped/bikes		1.00			1.00	1.00			1.00	1.00
Frt		0.98			1.00	0.95			1.00	0.85
Flt Protected		1.00			1.00	1.00			0.95	1.00
Satd. Flow (prot)		5773			2869	2440			4103	1122
Flt Permitted		1.00			0.75	1.00			0.95	1.00
Satd. Flow (perm)		5773			2150	2440			4103	1122
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	139	1283	176	33	316	599	295	530	1475	293
RTOR Reduction (vph)	0	29	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	1569	0	0	349	893	0	0	2034	264
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Prot
Protected Phases		6			4	4		7	7	7
Permitted Phases	6			4						
Actuated Green, G (s)		20.5			22.0	22.0			15.0	15.0
Effective Green, g (s)		22.5			25.0	25.0			18.0	18.0
Actuated g/C Ratio		0.30			0.33	0.33			0.24	0.24
Clearance Time (s)		5.5			6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1731			716	813			984	269
v/s Ratio Prot						c0.37			c0.50	0.24
v/s Ratio Perm		0.27			0.16					
v/c Ratio		0.91			0.49	1.10			2.07	0.98
Uniform Delay, d1		25.2			19.9	25.0			28.5	28.3
Progression Factor		1.00			1.00	1.00			1.00	1.00
Incremental Delay, d2		7.2			0.5	62.1			483.7	49.5
Delay (s)		32.4			20.4	87.1			512.2	77.8
Level of Service		C			C	F			F	E
Approach Delay (s)		32.4			20.4	87.1			462.3	
Approach LOS		C			C	F			F	

Intersection Summary			
HCM 2000 Control Delay	233.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.36		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	108.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

4/27/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	29	509	654	48	278	283	30	212	105	798
Ideal Flow (vphpl)	1000	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)	2.0	4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor	1.00	0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes	1.00	1.00	0.99		0.85		0.98		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00		1.00		1.00	1.00
Frt	1.00	1.00	0.99		0.92		0.85		1.00	1.00
Flt Protected	0.95	0.95	1.00		1.00		1.00		0.95	1.00
Satd. Flow (prot)	810	1313	1910		2182		1161		1327	2557
Flt Permitted	0.95	0.95	1.00		1.00		1.00		0.20	0.95
Satd. Flow (perm)	810	1313	1910		2182		1161		279	2444
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	31	536	688	51	293	298	32	223	111	840
RTOR Reduction (vph)	0	0	9	0	1	0	23	0	0	0
Lane Group Flow (vph)	31	482	784	0	593	0	6	0	323	851
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	8	0	5	0	0	0	0	5
Parking (#/hr)			10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)	18.5	18.5	18.5		16.0		16.0		31.0	31.0
Effective Green, g (s)	21.0	18.5	21.0		17.5		16.0		32.5	32.5
Actuated g/C Ratio	0.27	0.24	0.27		0.23		0.21		0.42	0.42
Clearance Time (s)	4.5	4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)	220	315	520		495		241		287	1049
v/s Ratio Prot	0.04	0.37	c0.41		c0.27				c0.18	0.13
v/s Ratio Perm							0.01		0.29	0.21
v/c Ratio	0.14	1.53	1.51		1.28dr		0.03		1.13	0.81
Uniform Delay, d1	21.2	29.2	28.0		29.8		24.3		26.8	19.6
Progression Factor	1.00	1.00	1.00		1.00		1.00		1.00	1.00
Incremental Delay, d2	1.3	254.1	238.5		107.5		0.2		91.3	6.8
Delay (s)	22.5	283.3	266.5		137.3		24.5		118.1	26.4
Level of Service	C	F	F		F		C		F	C
Approach Delay (s)			266.9		132.0					51.6
Approach LOS			F		F					D

Intersection Summary			
HCM 2000 Control Delay	158.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	90.5%	ICU Level of Service	E
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	920	210	12	2	26	20	859	81	107	325	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.98		1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.91		1.00	0.99		1.00	0.98	
Flt Protected		1.00	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1617	1352		1428		1272	2480		1540	3020	
Flt Permitted		0.99	1.00		0.48		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1603	1352		696		1272	2480		1540	3020	
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	38	1136	259	15	2	32	25	1060	100	132	401	47
RTOR Reduction (vph)	0	0	71	0	18	0	0	6	0	0	6	0
Lane Group Flow (vph)	0	1174	188	0	31	0	25	1154	0	132	442	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		55.1	55.1		55.1		6.1	35.5		16.3	46.0	
Effective Green, g (s)		55.1	55.1		55.1		6.1	35.5		16.3	46.0	
Actuated g/C Ratio		0.45	0.45		0.45		0.05	0.29		0.13	0.37	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		719	606		312		63	716		204	1131	
v/s Ratio Prot							0.02	c0.47		c0.09	0.15	
v/s Ratio Perm		c0.73	0.14		0.05							
v/c Ratio		1.63	0.31		0.10		0.40	1.61		0.65	0.39	
Uniform Delay, d1		33.8	21.7		19.5		56.6	43.6		50.5	28.1	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		291.1	0.3		0.1		4.1	281.9		6.9	0.2	
Delay (s)		324.9	22.0		19.7		60.6	325.6		57.4	28.4	
Level of Service		F	C		B		E	F		E	C	
Approach Delay (s)		270.2			19.7			320.0			35.0	
Approach LOS		F			B			F			C	

Intersection Summary			
HCM 2000 Control Delay	242.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.47		
Actuated Cycle Length (s)	122.8	Sum of lost time (s)	15.9
Intersection Capacity Utilization	112.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	749	8	4	23	33	13	54	4	408	252	63
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00	0.97	1.00	1.00		1.00	0.94	
Flpb, ped/bikes		1.00			1.00	1.00	0.83	1.00		1.00	1.00	
Frt		1.00			1.00	0.85	1.00	0.99		1.00	0.97	
Flt Protected		1.00			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2597			1439	1192	1139	1430		1377	1323	
Flt Permitted		0.95			0.92	1.00	0.58	1.00		0.95	1.00	
Satd. Flow (perm)		2476			1327	1192	695	1430		1377	1323	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	9	780	8	4	24	34	14	56	4	425	262	66
RTOR Reduction (vph)	0	1	0	0	0	14	0	3	0	0	14	0
Lane Group Flow (vph)	0	796	0	0	28	20	14	57	0	425	314	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Parking (#/hr)		2										
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		22.8			22.8	31.9	6.9	6.9		9.1	21.0	
Effective Green, g (s)		22.8			22.8	31.9	6.9	6.9		9.1	21.0	
Actuated g/C Ratio		0.42			0.42	0.59	0.13	0.13		0.17	0.39	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		1049			562	817	89	183		232	516	
v/s Ratio Prot						0.00		0.04		c0.31	c0.24	
v/s Ratio Perm		c0.32			0.02	0.01	0.02					
v/c Ratio		0.76			0.05	0.02	0.16	0.31		1.83	0.61	
Uniform Delay, d1		13.2			9.1	4.5	20.9	21.3		22.3	13.1	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.2			0.0	0.0	0.8	1.0		390.7	2.0	
Delay (s)		16.4			9.2	4.5	21.7	22.2		413.1	15.1	
Level of Service		B			A	A	C	C		F	B	
Approach Delay (s)		16.4			6.6			22.1			239.7	
Approach LOS		B			A			C			F	

Intersection Summary			
HCM 2000 Control Delay	116.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	53.8	Sum of lost time (s)	15.0
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.

4/27/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	53	264	528	19	1022	329
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1743	1535	846	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1743	1535	846	1134	1194
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	57	284	568	20	1099	354
RTOR Reduction (vph)	0	253	0	5	0	0
Lane Group Flow (vph)	57	31	568	15	1099	354
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	10.2	10.2	47.1	42.1	20.0	72.1
Effective Green, g (s)	10.2	10.2	47.1	42.1	20.0	72.1
Actuated g/C Ratio	0.11	0.11	0.51	0.46	0.22	0.78
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	125	192	783	431	245	932
v/s Ratio Prot	c0.05		c0.37	0.01	c0.97	0.30
v/s Ratio Perm		0.02		0.01		
v/c Ratio	0.46	0.16	0.73	0.03	4.49	0.38
Uniform Delay, d1	38.5	37.2	17.6	13.9	36.1	3.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.6	0.4	3.4	0.0	1578.0	0.3
Delay (s)	41.1	37.6	20.9	13.9	1614.1	3.4
Level of Service	D	D	C	B	F	A
Approach Delay (s)	38.2		20.7			1221.7
Approach LOS	D		C			F

Intersection Summary			
HCM 2000 Control Delay	755.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.77		
Actuated Cycle Length (s)	92.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	130.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
9: Terry A Francois Blvd/Terry A Francois Blvd. & South St.
4/27/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	20	24	270	123	126	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frpb, ped/bikes	0.96		1.00	1.00	0.99	
Flpb, ped/bikes	1.00		0.98	1.00	1.00	
Frt	0.93		1.00	1.00	0.98	
Flt Protected	0.98		0.95	1.00	1.00	
Satd. Flow (prot)	1562		1668	1531	3076	
Flt Permitted	0.98		0.64	1.00	1.00	
Satd. Flow (perm)	1562		1129	1531	3076	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	24	28	318	145	148	24
RTOR Reduction (vph)	26	0	0	0	7	0
Lane Group Flow (vph)	26	0	318	145	165	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	10
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	2.4		29.5	29.5	29.5	
Effective Green, g (s)	2.4		29.5	29.5	29.5	
Actuated g/C Ratio	0.06		0.70	0.70	0.70	
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	89		794	1077	2165	
v/s Ratio Prot	c0.02			0.09	0.05	
v/s Ratio Perm			c0.28			
v/c Ratio	0.29		0.40	0.13	0.08	
Uniform Delay, d1	18.9		2.6	2.0	1.9	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	1.8		0.3	0.1	0.0	
Delay (s)	20.7		2.9	2.1	2.0	
Level of Service	C		A	A	A	
Approach Delay (s)	20.7			2.6	2.0	
Approach LOS	C			A	A	

Intersection Summary			
HCM 2000 Control Delay	3.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	41.9	Sum of lost time (s)	10.0
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: Third St. & South St.
4/27/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	132	189	872	109	349	405
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.95	0.99		1.00	1.00
Flpb, ped/bikes	0.91	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1558	1457	3332		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1558	1457	3332		1711	3421
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	148	212	980	122	392	455
RTOR Reduction (vph)	0	161	8	0	0	0
Lane Group Flow (vph)	148	51	1094	0	392	455
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	28.7	28.7	52.1		23.9	81.1
Effective Green, g (s)	28.7	28.7	52.1		23.9	81.1
Actuated g/C Ratio	0.24	0.24	0.43		0.20	0.68
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	372	348	1446		340	2312
v/s Ratio Prot			c0.33		c0.23	0.13
v/s Ratio Perm	c0.09	0.03				
v/c Ratio	0.40	0.15	0.76		1.15	0.20
Uniform Delay, d1	38.4	36.0	28.6		48.0	7.3
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.7	0.2	3.7		97.1	0.0
Delay (s)	39.1	36.2	32.3		145.2	7.3
Level of Service	D	D	C		F	A
Approach Delay (s)	37.4		32.3			71.1
Approach LOS	D		C			E

Intersection Summary			
HCM 2000 Control Delay	47.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	94.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
11: Terry A Francois Blvd./Terry A Francois Blvd & 16th

4/27/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	10	7	12	383	120	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.97		1.00	0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.97	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1518	1341		2881	2969	
Flt Permitted	0.95	1.00		0.94	1.00	
Satd. Flow (perm)	1518	1341		2723	2969	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	12	8	14	451	141	35
RTOR Reduction (vph)	0	8	0	0	25	0
Lane Group Flow (vph)	12	0	0	465	151	0
Confl. Peds. (#/hr)	1	1	25			25
Parking (#/hr)				5		
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	0.6	0.6		13.8	13.8	
Effective Green, g (s)	0.6	0.6		13.8	13.8	
Actuated g/C Ratio	0.01	0.01		0.28	0.28	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	18	16		753	821	
v/s Ratio Prot	c0.01				0.05	
v/s Ratio Perm		0.00		c0.17		
v/c Ratio	0.67	0.01		0.62	0.18	
Uniform Delay, d1	24.6	24.4		15.7	13.8	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	66.1	0.1		1.5	0.1	
Delay (s)	90.6	24.5		17.3	13.9	
Level of Service	F	C		B	B	
Approach Delay (s)	64.2			17.3	13.9	
Approach LOS	E			B	B	

Intersection Summary			
HCM 2000 Control Delay	17.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	49.9	Sum of lost time (s)	15.0
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
12: Illinois St & 16th

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	162	3	61	23	16	5	86	268	7	5	113	92
Peak Hour Factor	0.92	0.81	0.81	0.81	0.81	0.92	0.81	0.92	0.81	0.92	0.92	0.92
Hourly flow rate (vph)	176	4	75	28	20	5	106	291	9	5	123	100

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	176	79	28	25	406	128	100
Volume Left (vph)	176	0	28	0	106	5	0
Volume Right (vph)	0	75	0	5	9	0	100
Hadj (s)	0.53	-0.63	0.53	-0.12	0.07	0.06	-0.67
Departure Headway (s)	6.9	5.7	7.3	6.7	5.8	6.1	5.4
Degree Utilization, x	0.34	0.13	0.06	0.05	0.66	0.22	0.15
Capacity (veh/h)	489	583	438	478	598	558	629
Control Delay (s)	12.2	8.4	9.6	8.8	19.3	9.6	8.1
Approach Delay (s)	11.0		9.2		19.3	8.9	
Approach LOS	B		A		C	A	

Intersection Summary			
Delay	14.0		
Level of Service	B		
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	272	192	219	2	159	33	210	676	24	10	337	189
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.97	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1262	1365	1126	1285	1365	1099	2515	2575		1296	2429	
Flt Permitted	0.61	1.00	1.00	0.55	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	805	1365	1126	750	1365	1099	2515	2575		1296	2429	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	313	221	252	2	183	38	241	777	28	11	387	217
RTOR Reduction (vph)	0	0	165	0	0	25	0	2	0	0	77	0
Lane Group Flow (vph)	313	221	87	2	183	13	241	803	0	11	527	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Effective Green, g (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Actuated g/C Ratio	0.34	0.34	0.34	0.34	0.34	0.34	0.14	0.38		0.12	0.36	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Grp Cap (vph)	277	470	388	258	470	379	352	973		155	869	
v/s Ratio Prot		0.16			0.13		0.10	c0.31		0.01	c0.22	
v/s Ratio Perm	c0.39		0.08	0.00		0.01						
v/c Ratio	1.13	0.47	0.22	0.01	0.39	0.03	0.68	0.82		0.07	0.61	
Uniform Delay, d1	32.8	25.6	23.2	21.5	24.8	21.7	40.9	28.1		39.1	26.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.86	0.80		1.00	1.00	
Incremental Delay, d2	93.7	3.4	1.3	0.1	2.4	0.2	5.5	4.3		0.9	3.1	
Delay (s)	126.5	29.0	24.6	21.6	27.2	21.9	40.8	26.8		39.9	29.5	
Level of Service	F	C	C	C	C	C	D	C		D	C	
Approach Delay (s)		66.4			26.2			30.1			29.6	
Approach LOS		E			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	40.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	116.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	160	623	9	19	496	43	23	14	13	46	10	114
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.84	1.00	1.00		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.91	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1224	1621	1582		1476	1373	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.65	1.00		0.74	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1224	1114	1582		1145	1373	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	186	724	10	22	577	50	27	16	15	53	12	133
RTOR Reduction (vph)	0	0	5	0	0	32	0	10	0	0	90	0
Lane Group Flow (vph)	186	724	5	22	577	18	27	21	0	53	55	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	15.0	42.0	42.0	6.0	33.0	33.0	30.0	30.0		30.0	30.0	
Effective Green, g (s)	15.0	42.0	42.0	6.0	33.0	33.0	30.0	30.0		30.0	30.0	
Actuated g/C Ratio	0.16	0.45	0.45	0.06	0.35	0.35	0.32	0.32		0.32	0.32	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	261	770	654	104	605	434	359	510		369	442	
v/s Ratio Prot	c0.11	c0.42		0.01	0.34			0.01			0.04	
v/s Ratio Perm			0.00			0.01	0.02			c0.05		
v/c Ratio	0.71	0.94	0.01	0.21	0.95	0.04	0.08	0.04		0.14	0.12	
Uniform Delay, d1	37.0	24.3	14.0	41.3	29.3	19.6	21.9	21.6		22.4	22.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.9	20.8	0.0	1.0	25.4	0.0	0.1	0.0		0.2	0.1	
Delay (s)	45.8	45.1	14.0	42.3	54.7	19.7	22.0	21.7		22.6	22.4	
Level of Service	D	D	B	D	D	B	C	C		C	C	
Approach Delay (s)		44.9			51.5			21.8			22.4	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	44.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	93.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	84.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	607	41	66	517	51	31	542	91	94	181	106
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.98	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1044	1540	3013			3027	1072
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.53	1.00			0.54	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1044	851	3013			1651	1072
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	660	45	72	562	55	34	589	99	102	197	115
RTOR Reduction (vph)	0	0	21	0	0	28	0	13	0	0	0	83
Lane Group Flow (vph)	87	660	24	72	562	27	34	675	0	0	299	32
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	9.0	58.2	58.2	5.0	53.2	53.2	30.9	30.9			29.9	29.9
Effective Green, g (s)	9.0	58.2	58.2	5.0	53.2	53.2	30.9	30.9			29.9	29.9
Actuated g/C Ratio	0.08	0.54	0.54	0.05	0.50	0.50	0.29	0.29			0.28	0.28
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	102	660	748	71	603	518	245	869			460	299
v/s Ratio Prot	c0.07	c0.54		0.05	0.46			c0.22				
v/s Ratio Perm			0.02			0.03	0.04				0.18	0.03
v/c Ratio	0.85	1.00	0.03	1.01	0.93	0.05	0.14	0.78			1.19dl	0.11
Uniform Delay, d1	48.4	24.4	11.4	51.0	25.3	13.9	28.2	34.9			34.0	28.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	45.9	35.0	0.0	110.8	21.4	0.0	0.3	4.4			3.3	0.2
Delay (s)	94.3	59.5	11.4	161.8	46.6	14.0	28.5	39.4			37.3	28.8
Level of Service	F	E	B	F	D	B	C	D			D	C
Approach Delay (s)		60.6			56.1			38.8			34.9	
Approach LOS		E			E			D			C	

Intersection Summary			
HCM 2000 Control Delay	49.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	107.1	Sum of lost time (s)	15.0
Intersection Capacity Utilization	94.4%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	541	77	38	364	252	69	230	17	170	109	36
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.91	1.00	1.00	0.96	1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1337	934		1337	1126	866	1070	957	918	1070	1064	
Flt Permitted	0.25	1.00		0.09	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	350	934		122	1126	866	1070	957	918	1070	1064	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	588	84	41	396	274	75	250	18	185	118	39
RTOR Reduction (vph)	0	4	0	0	0	119	0	0	14	0	12	0
Lane Group Flow (vph)	25	668	0	41	396	155	75	250	4	185	145	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	49.1	49.1		49.1	49.1	61.1	16.9	24.1	24.1	12.0	19.2	
Effective Green, g (s)	49.1	49.1		49.1	49.1	61.1	16.9	24.1	24.1	12.0	19.2	
Actuated g/C Ratio	0.45	0.45		0.45	0.45	0.57	0.16	0.22	0.22	0.11	0.18	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	185	424		88	511	529	167	213	204	118	188	
v/s Ratio Prot	0.00	c0.71		0.01	c0.35	0.03	0.07	c0.26		c0.17	0.14	
v/s Ratio Perm	0.06			0.20		0.15			0.00			
v/c Ratio	0.14	1.57		0.47	0.77	0.29	0.45	1.17	0.02	1.57	0.77	
Uniform Delay, d1	18.8	29.5		46.7	24.8	12.2	41.4	42.0	32.8	48.0	42.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	269.7		3.9	7.2	0.3	1.9	116.5	0.0	292.3	17.1	
Delay (s)	19.1	299.2		50.6	32.1	12.6	43.3	158.5	32.8	340.4	59.5	
Level of Service	B	F		D	C	B	D	F	C	F	E	
Approach Delay (s)		289.2			25.6			126.7			211.4	
Approach LOS		F			C			F			F	

Intersection Summary			
HCM 2000 Control Delay	160.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.46		
Actuated Cycle Length (s)	108.1	Sum of lost time (s)	20.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	280	358	59	47	105	6	39	74	53	8	29	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		1.00		1.00	1.00			1.00	0.97		0.97	
Flpb, ped/bikes		0.99		0.99	1.00			1.00	1.00		1.00	
Frt		0.99		1.00	0.99			1.00	0.85		0.89	
Flt Protected		0.98		0.95	1.00			0.98	1.00		1.00	
Satd. Flow (prot)		1461		1698	1780			1762	1489		1327	
Flt Permitted		0.81		0.39	1.00			0.76	1.00		0.99	
Satd. Flow (perm)		1214		689	1780			1362	1489		1310	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	308	393	65	52	115	7	43	81	58	9	32	153
RTOR Reduction (vph)	0	3	0	0	2	0	0	0	47	0	123	0
Lane Group Flow (vph)	0	763	0	52	120	0	0	124	11	0	71	0
Confl. Peds. (#/hr)	13		16	16		13	16		19	19		16
Parking (#/hr)		10	10								10	10
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4		4	8		
Actuated Green, G (s)		52.3		52.3	52.3			18.7	18.7		18.7	
Effective Green, g (s)		52.3		52.3	52.3			18.7	18.7		18.7	
Actuated g/C Ratio		0.55		0.55	0.55			0.20	0.20		0.20	
Clearance Time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		666		378	977			267	292		257	
v/s Ratio Prot					0.07							
v/s Ratio Perm		c0.63		0.08				c0.09	0.01		0.05	
v/c Ratio		1.15		0.14	0.12			0.46	0.04		0.28	
Uniform Delay, d1		21.5		10.5	10.4			33.8	31.0		32.5	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		82.6		0.2	0.1			1.3	0.1		0.6	
Delay (s)		104.1		10.6	10.4			35.1	31.0		33.1	
Level of Service		F		B	B			D	C		C	
Approach Delay (s)		104.1			10.5			33.8			33.1	
Approach LOS		F			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	71.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	95.2	Sum of lost time (s)	14.0
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	308	627	48	21	250	11	35	592	47	25	362	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.99		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1672	3376		1700	3393		1260	2485		1260	2373	
Flt Permitted	0.55	1.00		0.19	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	969	3376		337	3393		1260	2485		1260	2373	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	342	697	53	23	278	12	39	658	52	28	402	190
RTOR Reduction (vph)	0	6	0	0	3	0	0	6	0	0	56	0
Lane Group Flow (vph)	342	744	0	23	287	0	39	704	0	28	536	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	29.7	29.7		29.7	29.7		16.9	39.9		14.9	37.9	
Effective Green, g (s)	29.7	29.7		29.7	29.7		16.9	39.9		14.9	37.9	
Actuated g/C Ratio	0.30	0.30		0.30	0.30		0.17	0.40		0.15	0.38	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Grp Cap (vph)	287	1002		100	1007		212	991		187	899	
v/s Ratio Prot		0.22			0.08		0.03	c0.28		0.02	c0.23	
v/s Ratio Perm	c0.35			0.07								
v/c Ratio	1.19	0.74		0.23	0.29		0.18	0.71		0.15	0.60	
Uniform Delay, d1	35.1	31.7		26.5	27.0		35.6	25.2		37.0	24.9	
Progression Factor	1.00	1.00		1.00	1.00		0.84	0.73		1.49	0.63	
Incremental Delay, d2	115.4	5.0		5.3	0.7		1.2	2.8		1.4	2.4	
Delay (s)	150.5	36.7		31.8	27.7		31.2	21.2		56.6	18.1	
Level of Service	F	D		C	C		C	C		E	B	
Approach Delay (s)		72.3			28.0			21.7			19.9	
Approach LOS		E			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	41.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	102.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑↱		↰	↑↑↱			✥		↰	↱	
Volume (vph)	20	873	55	6	480	9	36	0	5	17	1	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00			0.98		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3391		1711	3412			1698		1711	1541	
Flt Permitted	0.44	1.00		0.19	1.00			0.81		0.73	1.00	
Satd. Flow (perm)	785	3391		345	3412			1441		1312	1541	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	949	60	7	522	10	39	0	5	18	1	24
RTOR Reduction (vph)	0	8	0	0	2	0	0	22	0	0	15	0
Lane Group Flow (vph)	22	1001	0	7	530	0	0	22	0	18	10	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	27.0	27.0		27.0	27.0			23.0		23.0	23.0	
Effective Green, g (s)	27.0	27.0		27.0	27.0			23.0		23.0	23.0	
Actuated g/C Ratio	0.45	0.45		0.45	0.45			0.38		0.38	0.38	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Grp Cap (vph)	353	1525		155	1535			552		502	590	
v/s Ratio Prot		c0.30			0.16						0.01	
v/s Ratio Perm	0.03			0.02				c0.02		0.01		
v/c Ratio	0.06	0.66		0.05	0.35			0.04		0.04	0.02	
Uniform Delay, d1	9.3	12.9		9.3	10.7			11.6		11.6	11.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.3	2.2		0.5	0.6			0.1		0.1	0.1	
Delay (s)	9.7	15.1		9.8	11.4			11.7		11.7	11.5	
Level of Service	A	B		A	B			B		B	B	
Approach Delay (s)		15.0			11.3			11.7			11.6	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	43.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑			↑↑↑↱		↰	↑↱				↱↱
Volume (vph)	20	92	0	0	567	32	308	666	758	0	0	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frt		1.00			0.99		1.00	0.92				0.85
Flt Protected		0.99			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3391			5091		1711	3148				2694
Flt Permitted		0.86			1.00		0.95	1.00				1.00
Satd. Flow (perm)		2928			5091		1711	3148				2694
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	23	107	0	0	659	37	358	774	881	0	0	86
RTOR Reduction (vph)	0	0	0	0	8	0	0	242	0	0	0	80
Lane Group Flow (vph)	0	130	0	0	688	0	358	1413	0	0	0	6
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		40.5			29.5		35.0	35.0				6.0
Effective Green, g (s)		40.5			29.5		35.0	35.0				6.0
Actuated g/C Ratio		0.48			0.35		0.41	0.41				0.07
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1427			1766		704	1296				190
v/s Ratio Prot		c0.01			c0.14		0.21	c0.45				0.00
v/s Ratio Perm		0.04										
v/c Ratio		0.09			0.39		0.51	1.09				0.03
Uniform Delay, d1		12.2			21.0		18.6	25.0				36.8
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			0.6		2.6	53.3				0.3
Delay (s)		12.3			21.6		21.2	78.3				37.1
Level of Service		B			C		C	E				D
Approach Delay (s)		12.3			21.6			68.1			37.1	
Approach LOS		B			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	53.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.

4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	112	444	487	461	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.91	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1537	1427	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1537	1427	3319	1801		
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	133	529	580	549	0	0
RTOR Reduction (vph)	52	52	0	0	0	0
Lane Group Flow (vph)	287	271	580	549	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	34.2	34.2	15.8	60.0		
Effective Green, g (s)	34.2	34.2	15.8	60.0		
Actuated g/C Ratio	0.57	0.57	0.26	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	876	813	874	1801		
v/s Ratio Prot	0.19		c0.17	c0.30		
v/s Ratio Perm		0.19				
v/c Ratio	0.33	0.33	0.66	0.30		
Uniform Delay, d1	6.8	6.8	19.7	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.2	0.2	1.9	0.1		
Delay (s)	7.0	7.1	21.6	0.1		
Level of Service	A	A	C	A		
Approach Delay (s)	7.1			11.2	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	41.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	215	121	165	6	127	10	122	459	13	17	339	144
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.93		1.00	0.99		1.00	1.00		1.00	0.97	
Flpb, ped/bikes	0.97	1.00		0.94	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.99		1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1175	1943		1137	1253		1215	2414		1215	2246	
Flt Permitted	0.43	1.00		0.56	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	538	1943		670	1253		1215	2414		1215	2246	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	239	134	183	7	141	11	136	510	14	19	377	160
RTOR Reduction (vph)	0	119	0	0	3	0	0	2	0	0	47	0
Lane Group Flow (vph)	239	198	0	7	149	0	136	522	0	19	490	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	34.9	34.9		17.1	17.1		16.4	43.4		5.4	32.4	
Effective Green, g (s)	34.9	34.9		17.1	17.1		16.4	43.4		5.4	32.4	
Actuated g/C Ratio	0.35	0.35		0.17	0.17		0.16	0.43		0.05	0.32	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	267	678		114	214		199	1047		65	727	
v/s Ratio Prot	c0.11	0.10			0.12		c0.11	0.22		0.02	c0.22	
v/s Ratio Perm	c0.20			0.01								
v/c Ratio	0.90	0.29		0.06	0.69		0.68	0.50		0.29	0.67	
Uniform Delay, d1	29.0	23.6		34.7	39.0		39.4	20.4		45.5	29.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.07	1.00	
Incremental Delay, d2	29.3	0.2		0.2	9.4		9.3	1.7		1.8	3.6	
Delay (s)	58.2	23.8		35.0	48.4		48.7	22.1		50.4	32.7	
Level of Service	E	C		C	D		D	C		D	C	
Approach Delay (s)		38.6			47.8			27.6			33.3	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	34.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	91.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

EXISTING 2015 PLUS PROJECT – BASKETBALL GAME
NO TSP – WEEKDAY LATE EVENING

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	478	420	8	108	764	52	37	599	446	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.90			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00			
Frt	1.00	1.00		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	3064		2987	3027			5531	1238			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	3064		2987	3027			5531	1238			
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	576	506	10	130	920	63	45	722	537	0	0	0
RTOR Reduction (vph)	0	1	0	0	4	0	0	0	263	0	0	0
Lane Group Flow (vph)	576	515	0	130	979	0	0	767	274	0	0	0
Confl. Peds. (#/hr)			100			100	100		100			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.2	48.9		10.1	40.8			32.1	32.1			
Effective Green, g (s)	18.2	48.9		10.1	40.8			32.1	32.1			
Actuated g/C Ratio	0.17	0.44		0.09	0.37			0.29	0.29			
Clearance Time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	741	1362		274	1122			1614	361			
v/s Ratio Prot	c0.13	0.17		0.04	c0.32							
v/s Ratio Perm								0.14	c0.22			
v/c Ratio	0.78	0.38		0.47	0.87			0.48	0.76			
Uniform Delay, d1	44.0	20.4		47.4	32.2			32.0	35.4			
Progression Factor	0.54	0.27		0.96	0.43			1.00	1.00			
Incremental Delay, d2	4.5	0.7		0.4	2.5			0.2	8.8			
Delay (s)	28.4	6.3		46.1	16.2			32.2	44.2			
Level of Service	C	A		D	B			C	D			
Approach Delay (s)		17.9			19.7			37.2			0.0	
Approach LOS		B			B			D			A	

Intersection Summary			
HCM 2000 Control Delay	25.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.9
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	78	837	21	40	725	36	12	30	30	39	211	171
Ideal Flow (vphpl)	1400	1400	1400	1400	1400	1400	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.97			1.00	0.63	1.00	0.89	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.91	1.00	0.67	1.00	1.00
Frt	1.00	1.00		1.00	0.99			1.00	0.85	1.00	0.97	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1134	3218		1134	2186			1455	854	1027	2548	580
Flt Permitted	0.95	1.00		0.95	1.00			0.83	1.00	0.72	1.00	1.00
Satd. Flow (perm)	1134	3218		1134	2186			1230	854	783	2548	580
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	93	996	25	48	863	43	14	36	36	46	251	204
RTOR Reduction (vph)	0	2	0	0	2	0	0	0	30	0	25	115
Lane Group Flow (vph)	93	1019	0	48	904	0	0	50	6	46	291	24
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.5	60.2		11.9	56.0			18.0	18.0	19.0	19.0	19.0
Effective Green, g (s)	14.5	60.2		11.9	56.0			18.0	18.0	19.0	19.0	19.0
Actuated g/C Ratio	0.13	0.55		0.11	0.51			0.16	0.16	0.17	0.17	0.17
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	149	1761		122	1112			201	139	135	440	100
v/s Ratio Prot	0.08	c0.32		0.04	c0.41						c0.11	
v/s Ratio Perm								0.04	0.01	0.06		0.04
v/c Ratio	0.62	0.58		0.39	0.81			0.25	0.04	0.34	0.66	0.24
Uniform Delay, d1	45.2	16.5		45.7	22.6			40.1	38.7	40.0	42.5	39.3
Progression Factor	0.86	1.09		0.59	0.32			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.1	0.9		1.0	2.4			0.7	0.1	1.5	3.7	1.2
Delay (s)	43.9	18.9		28.2	9.7			40.8	38.9	41.5	46.2	40.5
Level of Service	D	B		C	A			D	D	D	D	D
Approach Delay (s)		21.0			10.6			40.0			44.2	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	22.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	112.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.
4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	925	62	0	908	28	11
Ideal Flow (vphpl)	1100	1100	1000	1000	1000	1000
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	1764			1621	810	714
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	1764			1621	810	714
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	1101	74	0	1081	33	13
RTOR Reduction (vph)	2	0	0	0	0	12
Lane Group Flow (vph)	1173	0	0	1081	33	1
Confl. Peds. (#/hr)		10	10			3
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	91.2			91.2	7.5	7.5
Effective Green, g (s)	91.2			91.2	7.5	7.5
Actuated g/C Ratio	0.83			0.83	0.07	0.07
Clearance Time (s)	4.9			4.9	6.4	6.4
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1462			1343	55	48
v/s Ratio Prot	0.67			c0.67	c0.04	
v/s Ratio Perm						0.00
v/c Ratio	0.80			0.80	0.60	0.02
Uniform Delay, d1	4.8			4.8	49.8	47.8
Progression Factor	1.00			1.50	1.00	1.00
Incremental Delay, d2	4.7			2.5	16.4	0.2
Delay (s)	9.6			9.7	66.2	48.0
Level of Service	A			A	E	D
Approach Delay (s)	9.6			9.7	61.0	
Approach LOS	A			A	E	

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.
4/27/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	143	771	99	35	123	323	194	105	240	92
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		3.5			3.0	3.0			3.0	3.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.99	1.00
Flpb, ped/bikes		0.99			0.99	1.00			1.00	1.00
Frt		0.99			1.00	0.94			1.00	0.85
Flt Protected		0.99			0.99	1.00			0.95	1.00
Satd. Flow (prot)		5762			2834	2410			4083	1122
Flt Permitted		0.99			0.77	1.00			0.95	1.00
Satd. Flow (perm)		5762			2209	2410			4083	1122
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	168	907	116	41	145	380	228	124	282	108
RTOR Reduction (vph)	0	24	0	0	0	20	0	0	0	0
Lane Group Flow (vph)	0	1167	0	0	186	588	0	0	417	97
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Prot
Protected Phases		6			4	4		7	7	7
Permitted Phases	6			4						
Actuated Green, G (s)		23.5			21.2	21.2			12.8	12.8
Effective Green, g (s)		25.5			24.2	24.2			15.8	15.8
Actuated g/C Ratio		0.34			0.32	0.32			0.21	0.21
Clearance Time (s)		5.5			6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1959			712	777			860	236
v/s Ratio Prot						c0.24			c0.10	0.09
v/s Ratio Perm		0.20			0.08					
v/c Ratio		0.60			0.26	0.76			0.48	0.41
Uniform Delay, d1		20.5			18.8	22.8			26.0	25.6
Progression Factor		1.00			0.49	1.00			1.00	1.00
Incremental Delay, d2		0.5			0.1	4.2			0.4	1.2
Delay (s)		21.0			9.3	27.0			26.5	26.7
Level of Service		C			A	C			C	C
Approach Delay (s)		21.0			9.3	27.0			26.5	
Approach LOS		C			A	C			C	

Intersection Summary			
HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	27	944	210	22	131	112	14	170	20	381
Ideal Flow (vphpl)	1000	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	1.00		0.87		1.00		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.99		0.93		0.85		1.00	1.00
Flt Protected		0.95	0.97		1.00		1.00		0.95	1.00
Satd. Flow (prot)		1214	1875		2248		1188		1327	2554
Flt Permitted		0.95	0.97		1.00		1.00		0.52	0.95
Satd. Flow (perm)		1214	1875		2248		1188		720	2437
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	28	994	221	23	138	118	15	179	21	401
RTOR Reduction (vph)	0	0	5	0	1	0	10	0	0	0
Lane Group Flow (vph)	0	684	577	0	257	0	3	0	184	417
Confl. Peds. (#/hr)	25			60		200				
Bus Blockages (#/hr)	0	0	8	0	5	0	0	0	0	5
Parking (#/hr)		10	10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		18.5	18.5		16.0		16.0		31.0	31.0
Effective Green, g (s)		18.5	21.0		17.5		16.0		32.5	32.5
Actuated g/C Ratio		0.25	0.28		0.23		0.21		0.43	0.43
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		299	525		524		253		413	1075
v/s Ratio Prot		c0.56	0.31		c0.11				c0.07	0.06
v/s Ratio Perm							0.00		0.12	0.10
v/c Ratio		2.29	1.94dl		0.49		0.01		0.45	0.39
Uniform Delay, d1		28.2	27.0		24.9		23.3		17.3	14.5
Progression Factor		1.00	1.00		1.00		1.00		1.05	1.03
Incremental Delay, d2		589.9	69.1		3.3		0.1		2.7	0.8
Delay (s)		618.2	96.1		28.2		23.3		20.8	15.8
Level of Service		F	F		C		C		C	B
Approach Delay (s)			378.2		27.9					17.3
Approach LOS			F		C					B

Intersection Summary			
HCM 2000 Control Delay	232.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	87.9%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	140	10	67	73	854	314	5	454	4	1	75	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.96		1.00	1.00		1.00	0.99	
Flt Protected		0.96	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1548	1354		2933		1272	2537		1540	3043	
Flt Permitted		0.09	1.00		0.92		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		150	1354		2698		1272	2537		1540	3043	
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	171	12	82	89	1041	383	6	554	5	1	91	6
RTOR Reduction (vph)	0	0	37	0	33	0	0	1	0	0	4	0
Lane Group Flow (vph)	0	183	45	0	1480	0	6	558	0	1	93	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		47.4	47.4		47.4		0.9	22.3		0.9	22.6	
Effective Green, g (s)		47.4	47.4		47.4		0.9	22.3		0.9	22.6	
Actuated g/C Ratio		0.55	0.55		0.55		0.01	0.26		0.01	0.26	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Vehicle Extension (s)		3.0	3.0		3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		82	741		1478		13	654		16	795	
v/s Ratio Prot							0.00	c0.22		0.00	c0.03	
v/s Ratio Perm		c1.22	0.03		0.55							
v/c Ratio		2.23	0.06		1.00		0.46	0.85		0.06	0.12	
Uniform Delay, d1		19.6	9.1		19.6		42.6	30.5		42.4	24.3	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		591.5	0.0		23.7		9.1	10.5		0.6	0.1	
Delay (s)		611.1	9.2		43.3		51.7	41.1		43.0	24.4	
Level of Service		F	A		D		D	D		D	C	
Approach Delay (s)		424.8			43.3			41.2			24.6	
Approach LOS		F			D			D			C	

Intersection Summary			
HCM 2000 Control Delay	83.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.77		
Actuated Cycle Length (s)	86.5	Sum of lost time (s)	15.9
Intersection Capacity Utilization	83.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

7: Fourth St. & Channel St.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	77	3	1	854	9	2	20	61	78	47	8
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00	0.95	1.00	0.95		1.00	0.94	
Flpb, ped/bikes		1.00			1.00	1.00	0.67	1.00		1.00	1.00	
Frt		0.99			1.00	0.85	1.00	0.89		1.00	0.98	
Flt Protected		1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2579			1450	1173	924	1219		1377	1339	
Flt Permitted		0.88			1.00	1.00	0.71	1.00		0.95	1.00	
Satd. Flow (perm)		2270			1450	1173	692	1219		1377	1339	
Peak-hour factor, PHF	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Adj. Flow (vph)	6	97	4	1	1081	11	3	25	77	99	59	10
RTOR Reduction (vph)	0	2	0	0	0	3	0	70	0	0	8	0
Lane Group Flow (vph)	0	105	0	0	1082	8	3	32	0	99	61	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Parking (#/hr)		2										
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		44.2			44.2	49.7	6.8	6.8		5.5	17.3	
Effective Green, g (s)		44.2			44.2	49.7	6.8	6.8		5.5	17.3	
Actuated g/C Ratio		0.62			0.62	0.70	0.10	0.10		0.08	0.24	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	2.0	3.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		1403			896	897	65	115		105	323	
v/s Ratio Prot						0.00		c0.03		c0.07	0.05	
v/s Ratio Perm		0.05			0.75	0.01	0.00					
v/c Ratio		0.08			1.21	0.01	0.05	0.28		0.94	0.19	
Uniform Delay, d1		5.5			13.6	3.3	29.4	30.1		32.8	21.5	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.0			103.9	0.0	0.3	1.3		68.7	0.3	
Delay (s)		5.5			117.6	3.3	29.7	31.4		101.6	21.8	
Level of Service		A			F	A	C	C		F	C	
Approach Delay (s)		5.5			116.4			31.4			68.8	
Approach LOS		A			F			C			E	

Intersection Summary			
HCM 2000 Control Delay	96.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	71.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	82.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

8: Seventh St. & Mission Bay St.

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	6	898	605	11	97	86
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1746	1535	841	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1746	1535	841	1134	1194
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	7	1069	720	13	115	102
RTOR Reduction (vph)	0	417	0	3	0	0
Lane Group Flow (vph)	7	652	720	10	115	102
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	47.0	47.0	47.0	42.0	16.6	68.6
Effective Green, g (s)	47.0	47.0	47.0	42.0	16.6	68.6
Actuated g/C Ratio	0.37	0.37	0.37	0.33	0.13	0.55
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	424	653	574	314	149	652
v/s Ratio Prot	0.01		c0.47	0.00	c0.10	0.09
v/s Ratio Perm		c0.37		0.01		
v/c Ratio	0.02	1.00	1.25	0.03	0.77	0.16
Uniform Delay, d1	24.7	39.3	39.3	28.1	52.7	14.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	34.6	128.3	0.0	21.5	0.1
Delay (s)	24.8	73.9	167.6	28.2	74.2	14.3
Level of Service	C	E	F	C	E	B
Approach Delay (s)	73.6		165.1			46.0
Approach LOS	E		F			D

Intersection Summary			
HCM 2000 Control Delay	103.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	125.6	Sum of lost time (s)	20.0
Intersection Capacity Utilization	85.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
9: Terry A Francois Blvd/Terry A Francois Blvd. & South St.
4/27/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	207	323	152	61	70	135
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frpb, ped/bikes	0.96		1.00	1.00	0.95	
Flpb, ped/bikes	1.00		0.97	1.00	1.00	
Frt	0.92		1.00	1.00	0.90	
Flt Protected	0.98		0.95	1.00	1.00	
Satd. Flow (prot)	1554		1652	1531	2697	
Flt Permitted	0.98		0.57	1.00	1.00	
Satd. Flow (perm)	1554		984	1531	2697	
Peak-hour factor, PHF	0.67	0.67	0.67	0.67	0.67	0.67
Adj. Flow (vph)	309	482	227	91	104	201
RTOR Reduction (vph)	72	0	0	0	137	0
Lane Group Flow (vph)	719	0	227	91	168	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	37.7		22.3	22.3	22.3	
Effective Green, g (s)	37.7		22.3	22.3	22.3	
Actuated g/C Ratio	0.54		0.32	0.32	0.32	
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	836		313	487	859	
v/s Ratio Prot	c0.46			0.06	0.06	
v/s Ratio Perm			c0.23			
v/c Ratio	0.86		0.73	0.19	0.20	
Uniform Delay, d1	13.9		21.1	17.3	17.3	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	9.0		8.1	0.2	0.1	
Delay (s)	22.9		29.2	17.5	17.4	
Level of Service	C		C	B	B	
Approach Delay (s)	22.9			25.9	17.4	
Approach LOS	C			C	B	

Intersection Summary			
HCM 2000 Control Delay	22.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: Third St. & South St.
4/27/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	0	0	0	0	0	327
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)						4.9
Lane Util. Factor						0.95
Frpb, ped/bikes						1.00
Flpb, ped/bikes						1.00
Frt						1.00
Flt Protected						1.00
Satd. Flow (prot)						3421
Flt Permitted						1.00
Satd. Flow (perm)						3421
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	0	0	0	0	0	376
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	0	376
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm			Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)						49.9
Effective Green, g (s)						49.9
Actuated g/C Ratio						1.00
Clearance Time (s)						4.9
Vehicle Extension (s)						3.0
Lane Grp Cap (vph)						3421
v/s Ratio Prot						c0.11
v/s Ratio Perm						
v/c Ratio						0.11
Uniform Delay, d1						0.0
Progression Factor						1.00
Incremental Delay, d2						0.1
Delay (s)						0.1
Level of Service						A
Approach Delay (s)	0.0		0.0			0.1
Approach LOS	A		A			A

Intersection Summary			
HCM 2000 Control Delay	0.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.16		
Actuated Cycle Length (s)	49.9	Sum of lost time (s)	15.3
Intersection Capacity Utilization	40.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	10	5	0	203	393	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.97		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	1.00	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1518	1341		2887	2887	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	1518	1341		2887	2887	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	12	6	0	239	462	0
RTOR Reduction (vph)	0	6	0	0	0	0
Lane Group Flow (vph)	12	0	0	239	462	0
Confl. Peds. (#/hr)	1	1	25			25
Parking (#/hr)				5	5	
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	0.6	0.6		12.9	12.9	
Effective Green, g (s)	0.6	0.6		12.9	12.9	
Actuated g/C Ratio	0.01	0.01		0.26	0.26	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	18	16		760	760	
v/s Ratio Prot	c0.01			0.08	c0.16	
v/s Ratio Perm		0.00				
v/c Ratio	0.67	0.00		0.31	0.61	
Uniform Delay, d1	24.1	23.9		14.5	15.8	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	66.1	0.1		0.2	1.4	
Delay (s)	90.2	24.0		14.7	17.2	
Level of Service	F	C		B	B	
Approach Delay (s)	68.1			14.7	17.2	
Approach LOS	E			B	B	

Intersection Summary			
HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	49.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	26.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	0	0	0	0	0	29	0	0	0	320	339
Peak Hour Factor	0.92	0.83	0.83	0.83	0.83	0.92	0.83	0.92	0.83	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0	35	0	0	0	348	368

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	0	0	0	0	35	348	368
Volume Left (vph)	0	0	0	0	35	0	0
Volume Right (vph)	0	0	0	0	0	0	368
Hadj (s)	0.00	0.00	0.00	0.00	0.23	0.03	-0.67
Departure Headway (s)	5.9	5.9	5.9	5.9	5.3	4.6	3.9
Degree Utilization, x	0.00	0.00	0.00	0.00	0.05	0.44	0.40
Capacity (veh/h)	562	562	562	562	670	779	923
Control Delay (s)	7.7	7.7	7.7	7.7	8.5	9.9	8.2
Approach Delay (s)	0.0		0.0		8.5	9.0	
Approach LOS	A		A		A	A	

Intersection Summary			
Delay	9.0		
Level of Service	A		
Intersection Capacity Utilization	42.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	130	0	368	0	121	0	0	0	200	127
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)			5.5		5.5		5.0				5.2	
Lane Util. Factor			1.00		1.00		0.97				0.95	
Frpb, ped/bikes			0.97		1.00		1.00				0.99	
Flpb, ped/bikes			1.00		1.00		1.00				1.00	
Frt			0.85		1.00		1.00				0.94	
Flt Protected			1.00		1.00		0.95				1.00	
Satd. Flow (prot)			1130		1365		2515				2410	
Flt Permitted			1.00		1.00		0.95				1.00	
Satd. Flow (perm)			1130		1365		2515				2410	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	0	0	153	0	433	0	142	0	0	0	235	149
RTOR Reduction (vph)	0	0	86	0	0	0	0	0	0	0	120	0
Lane Group Flow (vph)	0	0	67	0	433	0	142	0	0	0	264	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm		Perm	Perm	NA	Perm	Prot			Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)			30.2		30.2		9.3				13.4	
Effective Green, g (s)			30.2		30.2		9.3				13.4	
Actuated g/C Ratio			0.44		0.44		0.14				0.20	
Clearance Time (s)			5.5		5.5		5.0				5.2	
Vehicle Extension (s)			3.0		3.0		3.0				3.0	
Lane Grp Cap (vph)			497		600		340				470	
v/s Ratio Prot					c0.32		c0.06				c0.11	
v/s Ratio Perm			0.06									
v/c Ratio			0.14		0.72		0.42				0.56	
Uniform Delay, d1			11.4		15.8		27.2				24.9	
Progression Factor			1.00		1.00		1.00				1.00	
Incremental Delay, d2			0.1		4.3		0.8				1.5	
Delay (s)			11.6		20.0		28.0				26.5	
Level of Service			B		C		C				C	
Approach Delay (s)		11.6			20.0			28.0			26.5	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	68.6	Sum of lost time (s)	15.7
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	98	118	3	4	602	10	5	6	1	11	2	48
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.86	1.00	1.00		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1251	1621	1674		1490	1359	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.72	1.00		0.75	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1251	1229	1674		1180	1359	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	110	133	3	4	676	11	6	7	1	12	2	54
RTOR Reduction (vph)	0	0	1	0	0	6	0	1	0	0	44	0
Lane Group Flow (vph)	110	133	2	4	676	5	6	7	0	12	12	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	11.6	48.8	48.8	2.5	39.7	39.7	15.0	15.0		15.0	15.0	
Effective Green, g (s)	11.6	48.8	48.8	2.5	39.7	39.7	15.0	15.0		15.0	15.0	
Actuated g/C Ratio	0.14	0.60	0.60	0.03	0.49	0.49	0.18	0.18		0.18	0.18	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	231	1024	870	49	833	610	226	308		217	250	
v/s Ratio Prot	c0.07	0.08		0.00	c0.40			0.00			0.01	
v/s Ratio Perm			0.00			0.00	0.00			c0.01		
v/c Ratio	0.48	0.13	0.00	0.08	0.81	0.01	0.03	0.02		0.06	0.05	
Uniform Delay, d1	32.1	7.0	6.5	38.3	17.6	10.7	27.2	27.2		27.3	27.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	0.3	0.0	0.7	6.0	0.0	0.0	0.0		0.1	0.1	
Delay (s)	33.6	7.3	6.5	39.0	23.7	10.7	27.2	27.2		27.4	27.4	
Level of Service	C	A	A	D	C	B	C	C		C	C	
Approach Delay (s)		19.1			23.6			27.2			27.4	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	81.3	Sum of lost time (s)	15.0
Intersection Capacity Utilization	83.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	171	6	11	630	13	12	67	14	33	530	98
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1045	1540	3000			3070	1071
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.19	1.00			0.93	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1045	316	3000			2861	1071
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	28	209	7	13	768	16	15	82	17	40	646	120
RTOR Reduction (vph)	0	0	3	0	0	7	0	12	0	0	0	87
Lane Group Flow (vph)	28	209	4	13	768	9	15	87	0	0	686	33
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	3.1	70.2	70.2	1.5	67.6	67.6	32.9	32.9			31.9	31.9
Effective Green, g (s)	3.1	70.2	70.2	1.5	67.6	67.6	32.9	32.9			31.9	31.9
Actuated g/C Ratio	0.03	0.60	0.60	0.01	0.57	0.57	0.28	0.28			0.27	0.27
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	32	725	822	19	698	600	88	839			776	290
v/s Ratio Prot	c0.02	c0.17		0.01	c0.63			0.03				
v/s Ratio Perm			0.00			0.01	0.05				c0.24	0.03
v/c Ratio	0.88	0.29	0.01	0.68	1.10	0.02	0.17	0.10			0.88	0.11
Uniform Delay, d1	57.1	11.5	9.6	57.8	25.0	10.7	32.0	31.4			41.1	32.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	107.3	0.2	0.0	69.9	64.8	0.0	0.9	0.1			11.7	0.2
Delay (s)	164.3	11.8	9.6	127.7	89.8	10.7	33.0	31.5			52.8	32.4
Level of Service	F	B	A	F	F	B	C	C			D	C
Approach Delay (s)		29.2			88.9			31.7			49.7	
Approach LOS		C			F			C			D	

Intersection Summary			
HCM 2000 Control Delay	62.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	117.6	Sum of lost time (s)	15.0
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	133	56	14	299	426	15	145	12	55	23	6
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.92	1.00	1.00	0.96	1.00	0.99	
Flpb, ped/bikes	1.00	1.00		0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1333	903		1330	1126	877	1070	957	922	1070	1080	
Flt Permitted	0.18	1.00		0.59	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	254	903		820	1126	877	1070	957	922	1070	1080	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	24	160	67	17	360	513	18	175	14	66	28	7
RTOR Reduction (vph)	0	14	0	0	0	227	0	0	10	0	5	0
Lane Group Flow (vph)	24	213	0	17	360	286	18	175	4	66	30	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	31.8	31.8		33.0	33.0	44.7	5.0	25.6	25.6	11.7	32.3	
Effective Green, g (s)	31.8	31.8		33.0	33.0	44.7	5.0	25.6	25.6	11.7	32.3	
Actuated g/C Ratio	0.35	0.35		0.36	0.36	0.49	0.05	0.28	0.28	0.13	0.35	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	103	313		309	405	475	58	267	257	136	380	
v/s Ratio Prot	0.00	c0.24		0.00	c0.32	c0.08	0.02	c0.18		0.06	0.03	
v/s Ratio Perm	0.08			0.02		0.25			0.00			
v/c Ratio	0.23	0.68		0.06	0.89	0.60	0.31	0.66	0.02	0.49	0.08	
Uniform Delay, d1	22.0	25.5		19.1	27.6	17.0	41.6	29.1	23.9	37.2	19.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.2	5.8		0.1	20.4	2.1	3.0	5.7	0.0	2.7	0.1	
Delay (s)	23.2	31.3		19.2	48.0	19.1	44.7	34.8	23.9	39.9	19.8	
Level of Service	C	C		B	D	B	D	C	C	D	B	
Approach Delay (s)		30.5			30.8			34.9			32.9	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	91.6	Sum of lost time (s)	20.0
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	175	19	374	47	1	5	17	9	0	11	326
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		1.00		1.00	1.00			1.00	0.98		0.97	
Flpb, ped/bikes		1.00		0.98	1.00			1.00	1.00		1.00	
Frt		0.99		1.00	1.00			1.00	0.85		0.87	
Flt Protected		1.00		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)		1503		1683	1795			1779	1494		1293	
Flt Permitted		1.00		0.59	1.00			0.60	1.00		1.00	
Satd. Flow (perm)		1500		1046	1795			1073	1494		1293	
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	4	224	24	479	60	1	6	22	12	0	14	418
RTOR Reduction (vph)	0	3	0	0	1	0	0	0	9	0	329	0
Lane Group Flow (vph)	0	249	0	479	60	0	0	28	3	0	103	0
Confl. Peds. (#/hr)	13		16	16		13	16		19	19		16
Parking (#/hr)		10	10								10	10
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm		NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4		4	8		
Actuated Green, G (s)		32.6		32.6	32.6			15.4	15.4		15.4	
Effective Green, g (s)		32.6		32.6	32.6			15.4	15.4		15.4	
Actuated g/C Ratio		0.45		0.45	0.45			0.21	0.21		0.21	
Clearance Time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		675		470	808			228	317		275	
v/s Ratio Prot					0.03						c0.08	
v/s Ratio Perm		0.17		c0.46				0.03	0.00			
v/c Ratio		0.37		1.02	0.07			0.12	0.01		0.37	
Uniform Delay, d1		13.1		19.9	11.3			23.0	22.5		24.4	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.3		46.4	0.0			0.2	0.0		0.9	
Delay (s)		13.5		66.3	11.4			23.3	22.5		25.2	
Level of Service		B		E	B			C	C		C	
Approach Delay (s)		13.5			60.1			23.0			25.2	
Approach LOS		B			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	37.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	72.4	Sum of lost time (s)	14.0
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.
4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	124	25	25	339	14	82	72	9	64	134	131
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	0.98	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.98		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1683	3316		1682	3394		1260	2466		1260	2295	
Flt Permitted	0.45	1.00		0.64	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	795	3316		1131	3394		1260	2466		1260	2295	
Peak-hour factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Adj. Flow (vph)	42	149	30	30	408	17	99	87	11	77	161	158
RTOR Reduction (vph)	0	19	0	0	3	0	0	7	0	0	100	0
Lane Group Flow (vph)	42	160	0	30	422	0	99	91	0	77	219	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	29.7	29.7		29.7	29.7		11.9	32.9		11.9	32.9	
Effective Green, g (s)	29.7	29.7		29.7	29.7		11.9	32.9		11.9	32.9	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.13	0.37		0.13	0.37	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	262	1094		373	1120		166	901		166	838	
v/s Ratio Prot		0.05			c0.12		c0.08	0.04		c0.06	c0.10	
v/s Ratio Perm	0.05			0.03								
v/c Ratio	0.16	0.15		0.08	0.38		0.60	0.10		0.46	0.26	
Uniform Delay, d1	21.3	21.2		20.8	23.1		36.8	18.8		36.1	20.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.1		0.1	0.2		5.7	0.2		2.0	0.2	
Delay (s)	21.6	21.3		20.8	23.3		42.4	19.0		38.1	20.2	
Level of Service	C	C		C	C		D	B		D	C	
Approach Delay (s)		21.4			23.1			30.8			23.7	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	87.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	187	11	3	637	3	13	0	4	6	0	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00			0.97		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3393		1711	3419			1681		1711	1531	
Flt Permitted	0.39	1.00		0.62	1.00			0.80		0.75	1.00	
Satd. Flow (perm)	698	3393		1111	3419			1402		1343	1531	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	203	12	3	692	3	14	0	4	7	0	11
RTOR Reduction (vph)	0	7	0	0	1	0	0	14	0	0	8	0
Lane Group Flow (vph)	7	208	0	3	694	0	0	4	0	7	3	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	13.6	13.6		13.6	13.6			7.8		7.8	7.8	
Effective Green, g (s)	13.6	13.6		13.6	13.6			7.8		7.8	7.8	
Actuated g/C Ratio	0.43	0.43		0.43	0.43			0.25		0.25	0.25	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	302	1469		481	1480			348		333	380	
v/s Ratio Prot		0.06			c0.20						0.00	
v/s Ratio Perm	0.01			0.00				0.00		c0.01		
v/c Ratio	0.02	0.14		0.01	0.47			0.01		0.02	0.01	
Uniform Delay, d1	5.1	5.4		5.1	6.3			8.9		8.9	8.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.0		0.0	0.2			0.0		0.0	0.0	
Delay (s)	5.1	5.4		5.1	6.6			8.9		8.9	8.9	
Level of Service	A	A		A	A			A		A	A	
Approach Delay (s)		5.4			6.6			8.9			8.9	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	31.4	Sum of lost time (s)	10.0
Intersection Capacity Utilization	33.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	75	0	0	578	14	65	31	165	0	0	638
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frt		1.00			1.00		1.00	0.87				0.85
Flt Protected		0.99			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3398			5114		1711	2989				2694
Flt Permitted		0.89			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3048			5114		1711	2989				2694
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	14	87	0	0	672	16	76	36	192	0	0	742
RTOR Reduction (vph)	0	0	0	0	3	0	0	114	0	0	0	703
Lane Group Flow (vph)	0	101	0	0	685	0	76	114	0	0	0	39
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		35.5			26.5		31.0	31.0				4.0
Effective Green, g (s)		35.5			26.5		31.0	31.0				4.0
Actuated g/C Ratio		0.47			0.35		0.41	0.41				0.05
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1442			1783		697	1219				141
v/s Ratio Prot		0.00			c0.13		c0.04	0.04				c0.01
v/s Ratio Perm		0.03										
v/c Ratio		0.07			0.38		0.11	0.09				0.28
Uniform Delay, d1		11.2			18.6		13.9	13.9				34.6
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			0.6		0.3	0.2				4.8
Delay (s)		11.3			19.2		14.3	14.0				39.4
Level of Service		B			B		B	B				D
Approach Delay (s)		11.3			19.2			14.1			39.4	
Approach LOS		B			B			B			D	

Intersection Summary			
HCM 2000 Control Delay	26.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.

4/27/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	87	144	1032	248	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.96	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1629	1426	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1629	1426	3319	1801		
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	104	171	1229	295	0	0
RTOR Reduction (vph)	6	6	0	0	0	0
Lane Group Flow (vph)	139	124	1229	295	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	22.1	22.1	27.9	60.0		
Effective Green, g (s)	22.1	22.1	27.9	60.0		
Actuated g/C Ratio	0.37	0.37	0.46	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	600	525	1543	1801		
v/s Ratio Prot	0.09		c0.37	0.16		
v/s Ratio Perm		c0.09				
v/c Ratio	0.23	0.24	0.80	0.16		
Uniform Delay, d1	13.1	13.1	13.6	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.2	0.2	2.9	0.0		
Delay (s)	13.3	13.3	16.6	0.0		
Level of Service	B	B	B	A		
Approach Delay (s)	13.3			13.4	0.0	
Approach LOS	B			B	A	

Intersection Summary			
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	69	111	4	66	3	120	116	2	5	201	83
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	6.7	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.95		1.00	1.00		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	0.97	1.00		0.95	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.99		1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1183	1959		1152	1267		1215	2422		1215	2268	
Flt Permitted	0.44	1.00		0.63	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	551	1959		759	1267		1215	2422		1215	2268	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	43	77	123	4	73	3	133	129	2	6	223	92
RTOR Reduction (vph)	0	83	0	0	2	0	0	1	0	0	37	0
Lane Group Flow (vph)	43	117	0	4	74	0	133	130	0	6	278	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	22.6	22.6		11.2	11.2		10.9	26.3		4.1	19.5	
Effective Green, g (s)	22.6	22.6		11.2	11.2		10.9	26.3		4.1	19.5	
Actuated g/C Ratio	0.33	0.33		0.16	0.16		0.16	0.38		0.06	0.28	
Clearance Time (s)	6.7	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	222	638		122	204		191	919		71	638	
v/s Ratio Prot	0.01	c0.06			c0.06		c0.11	0.05		0.00	c0.12	
v/s Ratio Perm	0.05			0.01								
v/c Ratio	0.19	0.18		0.03	0.36		0.70	0.14		0.08	0.44	
Uniform Delay, d1	16.7	16.7		24.5	25.9		27.6	14.1		30.8	20.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.1		0.1	1.1		10.5	0.1		0.5	0.5	
Delay (s)	17.1	16.9		24.6	27.0		38.1	14.2		31.3	20.9	
Level of Service	B	B		C	C		D	B		C	C	
Approach Delay (s)		16.9			26.9			26.3			21.1	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	69.3	Sum of lost time (s)	23.0
Intersection Capacity Utilization	73.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

EXISTING 2015 PLUS PROJECT – BASKETBALL GAME
NO TSP – SATURDAY EVENING

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	637	670	58	484	569	78	43	523	174	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	0.90			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	0.99		1.00	0.98			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	3017		2987	2982			5518	1234			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	3017		2987	2982			5518	1234			
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	708	744	64	538	632	87	48	581	193	0	0	0
RTOR Reduction (vph)	0	6	0	0	8	0	0	0	156	0	0	0
Lane Group Flow (vph)	708	802	0	538	711	0	0	629	37	0	0	0
Confl. Peds. (#/hr)			100			100	100		100			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	25.3	38.7		31.3	44.7			21.1	21.1			
Effective Green, g (s)	25.3	38.7		31.3	44.7			21.1	21.1			
Actuated g/C Ratio	0.23	0.35		0.28	0.41			0.19	0.19			
Clearance Time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	1030	1061		849	1211			1058	236			
v/s Ratio Prot	0.16	c0.27		0.18	c0.24							
v/s Ratio Perm								0.11	0.03			
v/c Ratio	0.69	0.76		0.63	0.59			0.59	0.16			
Uniform Delay, d1	38.7	31.5		34.3	25.5			40.5	37.0			
Progression Factor	0.63	0.54		0.72	0.32			1.15	3.59			
Incremental Delay, d2	1.4	3.6		0.7	0.3			0.8	0.3			
Delay (s)	25.9	20.7		25.4	8.6			47.5	133.3			
Level of Service	C	C		C	A			D	F			
Approach Delay (s)		23.1			15.8			67.6			0.0	
Approach LOS		C			B			E			A	

Intersection Summary			
HCM 2000 Control Delay	30.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.9
Intersection Capacity Utilization	93.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	152	1277	79	51	517	44	7	49	28	60	663	97
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.98		1.00	0.95			1.00	0.64	1.00	0.99	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00	0.67	1.00	1.00
Frt	1.00	0.99		1.00	0.99			1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	4288		1296	2436			1581	857	1033	2922	581
Flt Permitted	0.95	1.00		0.95	1.00			0.91	1.00	0.72	1.00	1.00
Satd. Flow (perm)	1540	4288		1296	2436			1441	857	781	2922	581
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	162	1359	84	54	550	47	7	52	30	64	705	103
RTOR Reduction (vph)	0	5	0	0	6	0	0	0	21	0	1	64
Lane Group Flow (vph)	162	1438	0	54	591	0	0	59	9	64	714	29
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.9	47.5		9.6	40.6			33.0	33.0	34.0	34.0	34.0
Effective Green, g (s)	14.9	47.5		9.6	40.6			33.0	33.0	34.0	34.0	34.0
Actuated g/C Ratio	0.14	0.43		0.09	0.37			0.30	0.30	0.31	0.31	0.31
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	208	1851		113	899			432	257	241	903	179
v/s Ratio Prot	0.11	c0.34		0.04	c0.24						c0.24	
v/s Ratio Perm								0.04	0.01	0.08		0.05
v/c Ratio	0.78	0.78		0.48	0.66			0.14	0.04	0.27	0.79	0.16
Uniform Delay, d1	46.0	26.7		47.8	28.9			28.1	27.2	28.6	34.8	27.6
Progression Factor	0.92	1.23		0.85	0.71			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	13.2	2.5		2.6	1.5			0.1	0.1	0.6	4.8	0.4
Delay (s)	55.5	35.3		43.2	21.9			28.2	27.3	29.2	39.5	28.0
Level of Service	E	D		D	C			C	C	C	D	C
Approach Delay (s)		37.4			23.7			27.9			37.6	
Approach LOS		D			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	34.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	110.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1458	80	3	618	30	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3052			3078	1540	1357
Flt Permitted	1.00			0.95	0.95	1.00
Satd. Flow (perm)	3052			2922	1540	1357
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	1602	88	3	679	33	55
RTOR Reduction (vph)	1	0	0	0	0	21
Lane Group Flow (vph)	1689	0	0	682	33	35
Confl. Peds. (#/hr)		10	10			3
Confl. Bikes (#/hr)		1				
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Actuated Green, G (s)	91.2			91.2	7.5	7.5
Effective Green, g (s)	91.2			91.2	7.5	7.5
Actuated g/C Ratio	0.83			0.83	0.07	0.07
Clearance Time (s)	4.9			4.9	6.4	6.4
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	2530			2422	105	92
v/s Ratio Prot	c0.55				0.02	
v/s Ratio Perm				0.23		c0.03
v/c Ratio	0.67			0.28	0.31	0.38
Uniform Delay, d1	3.6			2.1	48.8	49.0
Progression Factor	1.00			0.15	1.00	1.00
Incremental Delay, d2	1.4			0.1	1.7	2.6
Delay (s)	5.0			0.4	50.5	51.6
Level of Service	A			A	D	D
Approach Delay (s)	5.0			0.4	51.2	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	5.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	262	1267	145	34	172	356	188	481	1138	262
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		3.5			3.0	3.0			3.0	3.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.95			1.00	1.00
Flpb, ped/bikes		0.99			0.99	1.00			1.00	1.00
Frt		0.99			1.00	0.95			1.00	0.85
Flt Protected		0.99			0.99	1.00			0.95	1.00
Satd. Flow (prot)		5749			2844	2411			4105	1122
Flt Permitted		0.99			0.78	1.00			0.95	1.00
Satd. Flow (perm)		5749			2224	2411			4105	1122
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	270	1306	149	35	177	367	194	496	1173	270
RTOR Reduction (vph)	0	18	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	1707	0	0	212	560	0	0	1696	243
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Prot
Protected Phases		6			4	4		7	7	7
Permitted Phases	6			4						
Actuated Green, G (s)		24.0			21.5	21.5			27.0	27.0
Effective Green, g (s)		26.0			24.5	24.5			30.0	30.0
Actuated g/C Ratio		0.29			0.27	0.27			0.33	0.33
Clearance Time (s)		5.5			6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1660			605	656			1368	374
v/s Ratio Prot						c0.23			c0.41	0.22
v/s Ratio Perm		0.30			0.10					
v/c Ratio		1.03			0.35	0.85			1.24	0.65
Uniform Delay, d1		32.0			26.3	31.0			30.0	25.5
Progression Factor		1.55			1.00	1.00			1.00	1.00
Incremental Delay, d2		25.9			0.4	10.4			114.3	3.9
Delay (s)		75.5			26.7	41.5			144.3	29.4
Level of Service		E			C	D			F	C
Approach Delay (s)		75.5			26.7	41.5			129.9	
Approach LOS		E			C	D			F	

Intersection Summary			
HCM 2000 Control Delay	92.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	107.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	51	342	276	49	155	105	14	231	55	813
Ideal Flow (vphpl)	1400	1400	1400	1400	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.88		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.98		0.94		0.85		1.00	1.00
Flt Protected		0.95	0.99		1.00		1.00		0.95	1.00
Satd. Flow (prot)		1700	2619		2297		1161		1327	2558
Flt Permitted		0.95	0.99		1.00		1.00		0.44	0.95
Satd. Flow (perm)		1700	2619		2297		1161		621	2444
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	63	422	341	60	191	130	17	285	68	1004
RTOR Reduction (vph)	0	0	18	0	1	0	12	0	0	0
Lane Group Flow (vph)	0	350	518	0	322	0	3	0	346	1011
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	8	0	5	0	0	0	0	5
Parking (#/hr)		10	10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		18.5	18.5		16.0		16.0		31.0	31.0
Effective Green, g (s)		18.5	21.0		17.5		16.0		32.5	32.5
Actuated g/C Ratio		0.25	0.28		0.23		0.21		0.43	0.43
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		419	733		535		247		386	1078
v/s Ratio Prot		c0.21	0.20		0.14				0.15	c0.16
v/s Ratio Perm							0.00		0.24	c0.25
v/c Ratio		0.84	0.71		0.60		0.01		0.90	0.94
Uniform Delay, d1		26.8	24.2		25.6		23.3		21.1	20.3
Progression Factor		1.00	1.00		1.00		1.00		1.00	1.00
Incremental Delay, d2		17.6	5.7		5.0		0.1		25.9	16.0
Delay (s)		44.4	29.9		30.6		23.4		47.0	36.3
Level of Service		D	C		C		C		D	D
Approach Delay (s)			35.6		30.3					39.0
Approach LOS			D		C					D

Intersection Summary			
HCM 2000 Control Delay	36.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	1198	145	8	4	14	9	381	83	165	262	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.98		1.00	0.96		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.93		1.00	0.97		1.00	0.99	
Flt Protected		1.00	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1620	1353		1455		1272	2388		1540	3056	
Flt Permitted		1.00	1.00		0.62		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1618	1353		911		1272	2388		1540	3056	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	10	1235	149	8	4	14	9	393	86	170	270	11
RTOR Reduction (vph)	0	0	60	0	6	0	0	17	0	0	3	0
Lane Group Flow (vph)	0	1245	89	0	20	0	9	462	0	170	278	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		61.1	61.1		61.1		1.0	23.5		12.7	35.5	
Effective Green, g (s)		61.1	61.1		61.1		1.0	23.5		12.7	35.5	
Actuated g/C Ratio		0.54	0.54		0.54		0.01	0.21		0.11	0.31	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Vehicle Extension (s)		3.0	3.0		3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		873	730		491		11	495		172	958	
v/s Ratio Prot							0.01	c0.19		c0.11	0.09	
v/s Ratio Perm		c0.77	0.07		0.02							
v/c Ratio		1.43	0.12		0.04		0.82	0.93		0.99	0.29	
Uniform Delay, d1		26.1	12.8		12.3		56.0	44.1		50.2	29.3	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		198.4	0.1		0.0		162.4	24.6		64.4	0.2	
Delay (s)		224.5	12.9		12.3		218.4	68.7		114.6	29.5	
Level of Service		F	B		B		F	E		F	C	
Approach Delay (s)		201.9			12.3			71.5			61.6	
Approach LOS		F			B			E			E	

Intersection Summary			
HCM 2000 Control Delay	146.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.25		
Actuated Cycle Length (s)	113.2	Sum of lost time (s)	15.9
Intersection Capacity Utilization	113.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	995	7	2	6	16	5	29	1	355	200	15
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00	0.97	1.00	1.00		1.00	0.97	
Flpb, ped/bikes		1.00			1.00	1.00	0.75	1.00		1.00	1.00	
Frt		1.00			1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected		1.00			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2599			1434	1190	1035	1440		1377	1399	
Flt Permitted		0.95			0.88	1.00	0.89	1.00		0.95	1.00	
Satd. Flow (perm)		2480			1283	1190	969	1440		1377	1399	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	8	1144	8	2	7	18	6	33	1	408	230	17
RTOR Reduction (vph)	0	1	0	0	0	5	0	1	0	0	4	0
Lane Group Flow (vph)	0	1159	0	0	9	13	6	33	0	408	243	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Parking (#/hr)		2										
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		32.3			32.3	49.5	4.5	4.5		17.2	26.7	
Effective Green, g (s)		32.3			32.3	49.5	4.5	4.5		17.2	26.7	
Actuated g/C Ratio		0.47			0.47	0.72	0.07	0.07		0.25	0.39	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	2.0	3.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		1160			600	939	63	93		343	541	
v/s Ratio Prot						0.00		0.02		c0.30	c0.17	
v/s Ratio Perm		c0.47			0.01	0.01	0.01					
v/c Ratio		1.00			0.01	0.01	0.10	0.36		1.19	0.45	
Uniform Delay, d1		18.3			9.8	2.8	30.3	30.9		25.9	15.7	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		26.1			0.0	0.0	0.7	2.3		110.7	0.6	
Delay (s)		44.4			9.8	2.8	31.0	33.2		136.6	16.3	
Level of Service		D			A	A	C	C		F	B	
Approach Delay (s)		44.4			5.1			32.9			91.2	
Approach LOS		D			A			C			F	

Intersection Summary			
HCM 2000 Control Delay	59.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	69.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	77.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.

4/27/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	20	129	216	25	1044	170
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.97	1.00	0.93	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1741	1535	809	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1741	1535	809	1134	1194
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	23	148	248	29	1200	195
RTOR Reduction (vph)	0	136	0	22	0	0
Lane Group Flow (vph)	23	12	248	7	1200	195
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	8.0	8.0	20.0	15.0	53.0	78.0
Effective Green, g (s)	8.0	8.0	20.0	15.0	53.0	78.0
Actuated g/C Ratio	0.08	0.08	0.21	0.16	0.55	0.81
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	94	145	319	168	626	970
v/s Ratio Prot	c0.02		c0.16	0.00	c1.06	0.16
v/s Ratio Perm		0.01		0.01		
v/c Ratio	0.24	0.09	0.78	0.04	1.92	0.20
Uniform Delay, d1	41.2	40.6	35.9	34.4	21.5	2.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	0.3	11.3	0.1	418.5	0.1
Delay (s)	42.5	40.9	47.2	34.5	440.0	2.1
Level of Service	D	D	D	C	F	A
Approach Delay (s)	41.1		45.9			378.8
Approach LOS	D		D			F

Intersection Summary			
HCM 2000 Control Delay	297.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.57		
Actuated Cycle Length (s)	96.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	117.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	3	1	242	96	43	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frpb, ped/bikes	0.98		1.00	1.00	1.00	
Flpb, ped/bikes	0.97		0.97	1.00	1.00	
Frt	0.97		1.00	1.00	0.99	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1589		1668	1531	3119	
Flt Permitted	0.96		0.72	1.00	1.00	
Satd. Flow (perm)	1589		1263	1531	3119	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	4	1	288	114	51	4
RTOR Reduction (vph)	1	0	0	0	1	0
Lane Group Flow (vph)	4	0	288	114	54	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	0.8		25.4	25.4	25.4	
Effective Green, g (s)	0.8		25.4	25.4	25.4	
Actuated g/C Ratio	0.02		0.70	0.70	0.70	
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	35		886	1074	2188	
v/s Ratio Prot	c0.00			0.07	0.02	
v/s Ratio Perm			c0.23			
v/c Ratio	0.11		0.33	0.11	0.02	
Uniform Delay, d1	17.4		2.1	1.7	1.6	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	1.5		0.2	0.0	0.0	
Delay (s)	18.8		2.3	1.8	1.6	
Level of Service	B		A	A	A	
Approach Delay (s)	18.8			2.2	1.6	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	2.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	36.2	Sum of lost time (s)	10.0
Intersection Capacity Utilization	42.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	10	105	368	59	351	226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.95	0.98		1.00	1.00
Flpb, ped/bikes	0.95	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1626	1452	3295		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1626	1452	3295		1711	3421
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	11	113	396	63	377	243
RTOR Reduction (vph)	0	103	11	0	0	0
Lane Group Flow (vph)	11	10	448	0	377	243
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	5.9	5.9	30.3		15.1	50.5
Effective Green, g (s)	5.9	5.9	30.3		15.1	50.5
Actuated g/C Ratio	0.09	0.09	0.45		0.23	0.76
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	144	128	1499		387	2594
v/s Ratio Prot			c0.14		c0.22	0.07
v/s Ratio Perm	0.01	c0.01				
v/c Ratio	0.08	0.08	0.30		0.97	0.09
Uniform Delay, d1	27.8	27.9	11.4		25.6	2.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.2	0.3	0.5		38.6	0.1
Delay (s)	28.1	28.1	12.0		64.2	2.2
Level of Service	C	C	B		E	A
Approach Delay (s)	28.1		12.0			39.9
Approach LOS	C		B			D

Intersection Summary			
HCM 2000 Control Delay	28.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	66.6	Sum of lost time (s)	15.3
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	10	7	7	328	34	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.97		1.00	0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.97	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1518	1341		2883	2768	
Flt Permitted	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1518	1341		2742	2768	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	12	8	8	386	40	12
RTOR Reduction (vph)	0	8	0	0	9	0
Lane Group Flow (vph)	12	0	0	394	43	0
Confl. Peds. (#/hr)	1	1	25			25
Parking (#/hr)				5	5	
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	0.6	0.6		12.2	12.2	
Effective Green, g (s)	0.6	0.6		12.2	12.2	
Actuated g/C Ratio	0.01	0.01		0.25	0.25	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	18	16		692	699	
v/s Ratio Prot	c0.01				0.02	
v/s Ratio Perm		0.00		c0.14		
v/c Ratio	0.67	0.01		0.57	0.06	
Uniform Delay, d1	23.8	23.6		15.8	13.7	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	66.1	0.2		1.1	0.0	
Delay (s)	89.8	23.7		16.8	13.7	
Level of Service	F	C		B	B	
Approach Delay (s)	63.4			16.8	13.7	
Approach LOS	E			B	B	

Intersection Summary			
HCM 2000 Control Delay	18.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	48.3	Sum of lost time (s)	15.0
Intersection Capacity Utilization	25.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	150	1	20	4	2	5	28	256	8	5	92	66
Peak Hour Factor	0.92	0.79	0.79	0.79	0.79	0.92	0.79	0.92	0.79	0.92	0.92	0.92
Hourly flow rate (vph)	163	1	25	5	3	5	35	278	10	5	100	72

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	163	27	5	8	324	105	72
Volume Left (vph)	163	0	5	0	35	5	0
Volume Right (vph)	0	25	0	5	10	0	72
Hadj (s)	0.53	-0.63	0.53	-0.44	0.04	0.06	-0.67
Departure Headway (s)	6.4	5.2	6.7	5.7	5.4	5.5	4.8
Degree Utilization, x	0.29	0.04	0.01	0.01	0.48	0.16	0.10
Capacity (veh/h)	531	645	488	566	653	618	708
Control Delay (s)	10.7	7.2	8.6	7.6	13.3	8.4	7.1
Approach Delay (s)	10.2		8.0		13.3	7.9	
Approach LOS	B		A		B	A	

Intersection Summary			
Delay	11.0		
Level of Service	B		
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	165	153	99	1	89	6	69	256	17	1	163	71
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1274	1365	1131	1290	1365	1116	2515	2563		1296	2454	
Flt Permitted	0.69	1.00	1.00	0.65	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	929	1365	1131	880	1365	1116	2515	2563		1296	2454	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	185	172	111	1	100	7	78	288	19	1	183	80
RTOR Reduction (vph)	0	0	75	0	0	5	0	5	0	0	53	0
Lane Group Flow (vph)	185	172	36	1	100	2	78	302	0	1	210	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	16.1	16.1	16.1	16.1	16.1	16.1	4.0	17.0		0.8	13.8	
Effective Green, g (s)	16.1	16.1	16.1	16.1	16.1	16.1	4.0	17.0		0.8	13.8	
Actuated g/C Ratio	0.32	0.32	0.32	0.32	0.32	0.32	0.08	0.34		0.02	0.28	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	301	443	367	285	443	362	202	878		20	682	
v/s Ratio Prot		0.13			0.07		0.03	c0.12		0.00	c0.09	
v/s Ratio Perm	c0.20		0.03	0.00		0.00						
v/c Ratio	0.61	0.39	0.10	0.00	0.23	0.01	0.39	0.34		0.05	0.31	
Uniform Delay, d1	14.1	12.9	11.7	11.3	12.2	11.3	21.6	12.1		24.0	14.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.7	0.6	0.1	0.0	0.3	0.0	1.2	0.2		1.0	0.3	
Delay (s)	17.8	13.5	11.8	11.3	12.5	11.3	22.9	12.4		25.1	14.4	
Level of Service	B	B	B	B	B	B	C	B		C	B	
Approach Delay (s)		14.8			12.4			14.5			14.4	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	49.6	Sum of lost time (s)	15.7
Intersection Capacity Utilization	64.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	161	399	1	2	207	18	3	5	1	17	1	44
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.86	1.00	1.00		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1248	1621	1663		1489	1354	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.73	1.00		0.75	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1248	1239	1663		1181	1354	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	168	416	1	2	216	19	3	5	1	18	1	46
RTOR Reduction (vph)	0	0	0	0	0	11	0	1	0	0	37	0
Lane Group Flow (vph)	168	416	1	2	216	8	3	5	0	18	10	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	15.8	49.1	49.1	2.5	35.8	35.8	15.3	15.3		15.3	15.3	
Effective Green, g (s)	15.8	49.1	49.1	2.5	35.8	35.8	15.3	15.3		15.3	15.3	
Actuated g/C Ratio	0.19	0.60	0.60	0.03	0.44	0.44	0.19	0.19		0.19	0.19	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	312	1022	869	49	745	545	231	310		220	252	
v/s Ratio Prot	c0.10	c0.24		0.00	0.13			0.00			0.01	
v/s Ratio Perm			0.00			0.01	0.00			c0.02		
v/c Ratio	0.54	0.41	0.00	0.04	0.29	0.02	0.01	0.02		0.08	0.04	
Uniform Delay, d1	29.8	8.7	6.6	38.5	14.9	13.1	27.1	27.2		27.5	27.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	1.2	0.0	0.3	0.2	0.0	0.0	0.0		0.2	0.1	
Delay (s)	31.6	9.9	6.6	38.9	15.1	13.1	27.2	27.2		27.7	27.3	
Level of Service	C	A	A	D	B	B	C	C		C	C	
Approach Delay (s)		16.1			15.1			27.2			27.4	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	81.9	Sum of lost time (s)	15.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↑↱			↰↑↑	↱
Volume (vph)	16	423	3	5	245	5	11	549	118	21	14	39
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.97	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1046	1540	2997			2989	1072
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.73	1.00			0.72	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1046	1182	2997			2218	1072
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	18	475	3	6	275	6	12	617	133	24	16	44
RTOR Reduction (vph)	0	0	2	0	0	3	0	17	0	0	0	29
Lane Group Flow (vph)	18	475	1	6	275	3	12	733	0	0	40	15
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	2.2	40.9	40.9	1.0	38.7	38.7	28.9	28.9			27.9	27.9
Effective Green, g (s)	2.2	40.9	40.9	1.0	38.7	38.7	28.9	28.9			27.9	27.9
Actuated g/C Ratio	0.03	0.49	0.49	0.01	0.46	0.46	0.34	0.34			0.33	0.33
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	31	593	672	18	561	483	407	1033			738	356
v/s Ratio Prot	c0.01	c0.39		0.00	0.23			c0.24				
v/s Ratio Perm			0.00			0.00	0.01				0.02	0.01
v/c Ratio	0.58	0.80	0.00	0.33	0.49	0.01	0.03	0.71			0.05	0.04
Uniform Delay, d1	40.3	18.0	11.0	41.1	15.7	12.2	18.2	23.8			19.0	18.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	24.7	7.7	0.0	10.6	0.7	0.0	0.0	2.3			0.0	0.0
Delay (s)	65.1	25.7	11.0	51.7	16.4	12.2	18.2	26.1			19.0	19.0
Level of Service	E	C	B	D	B	B	B	C			B	B
Approach Delay (s)		27.0			17.0			25.9			19.0	
Approach LOS		C			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	24.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	83.8	Sum of lost time (s)	15.0
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑	↱	↰	↑	↱	↰	↑↱	
Volume (vph)	20	320	60	8	208	79	31	91	8	114	40	24
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.91	1.00	1.00	0.95	1.00	0.97	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1317	928		1335	1126	874	1070	957	911	1070	1033	
Flt Permitted	0.45	1.00		0.35	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	625	928		491	1126	874	1070	957	911	1070	1033	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	24	376	71	9	245	93	36	107	9	134	47	28
RTOR Reduction (vph)	0	6	0	0	0	34	0	0	8	0	22	0
Lane Group Flow (vph)	24	441	0	9	245	59	36	107	1	134	53	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	51.4	51.4		50.6	50.6	64.8	13.9	16.4	16.4	14.2	16.7	
Effective Green, g (s)	51.4	51.4		50.6	50.6	64.8	13.9	16.4	16.4	14.2	16.7	
Actuated g/C Ratio	0.50	0.50		0.49	0.49	0.63	0.14	0.16	0.16	0.14	0.16	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	322	464		247	554	594	144	152	145	147	167	
v/s Ratio Prot	0.00	c0.48		0.00	c0.22	0.01	0.03	c0.11		c0.13	0.05	
v/s Ratio Perm	0.04			0.02		0.05			0.00			
v/c Ratio	0.07	0.95		0.04	0.44	0.10	0.25	0.70	0.01	0.91	0.32	
Uniform Delay, d1	13.6	24.4		20.0	16.9	7.5	39.7	40.9	36.3	43.6	38.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	29.5		0.1	0.6	0.1	0.9	13.8	0.0	48.6	1.1	
Delay (s)	13.7	53.9		20.1	17.5	7.5	40.6	54.6	36.3	92.3	39.1	
Level of Service	B	D		C	B	A	D	D	D	F	D	
Approach Delay (s)		51.9			14.9			50.2			73.2	
Approach LOS		D			B			D			E	

Intersection Summary			
HCM 2000 Control Delay	44.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	102.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	258	303	27	26	54	7	22	24	30	5	24	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		1.00		1.00	0.99			1.00	0.97		0.97	
Flpb, ped/bikes		0.99		0.99	1.00			0.99	1.00		1.00	
Frt		0.99		1.00	0.98			1.00	0.85		0.90	
Flt Protected		0.98		0.95	1.00			0.98	1.00		1.00	
Satd. Flow (prot)		1467		1697	1759			1746	1489		1331	
Flt Permitted		0.82		0.40	1.00			0.80	1.00		0.99	
Satd. Flow (perm)		1233		719	1759			1434	1489		1321	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	322	379	34	32	68	9	28	30	38	6	30	124
RTOR Reduction (vph)	0	1	0	0	3	0	0	0	31	0	102	0
Lane Group Flow (vph)	0	734	0	32	74	0	0	58	7	0	58	0
Confl. Peds. (#/hr)	13		16	16		13	16		19	19		16
Parking (#/hr)		10	10								10	10
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4		4	8		
Actuated Green, G (s)		52.5		52.5	52.5			16.6	16.6		16.6	
Effective Green, g (s)		52.5		52.5	52.5			16.6	16.6		16.6	
Actuated g/C Ratio		0.56		0.56	0.56			0.18	0.18		0.18	
Clearance Time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		693		404	989			255	264		235	
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.60		0.04				0.04	0.00		c0.04	
v/c Ratio		1.06		0.08	0.07			0.23	0.03		0.25	
Uniform Delay, d1		20.4		9.3	9.3			32.9	31.7		33.0	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		50.8		0.1	0.0			0.5	0.0		0.6	
Delay (s)		71.2		9.4	9.3			33.3	31.7		33.5	
Level of Service		E		A	A			C	C		C	
Approach Delay (s)		71.2			9.4			32.7			33.5	
Approach LOS		E			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	56.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	93.3	Sum of lost time (s)	14.0
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.

4/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	46	532	21	25	137	13	16	283	43	12	179	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.98		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1668	3397		1697	3363		1260	2458		1260	2390	
Flt Permitted	0.64	1.00		0.29	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1129	3397		518	3363		1260	2458		1260	2390	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	53	611	24	29	157	15	18	325	49	14	206	83
RTOR Reduction (vph)	0	3	0	0	7	0	0	10	0	0	40	0
Lane Group Flow (vph)	53	632	0	29	165	0	18	364	0	14	249	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	30.1	30.1		30.1	30.1		6.8	43.9		2.6	39.7	
Effective Green, g (s)	30.1	30.1		30.1	30.1		6.8	43.9		2.6	39.7	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.07	0.48		0.03	0.43	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	368	1110		169	1099		93	1171		35	1030	
v/s Ratio Prot		c0.19			0.05		0.01	c0.15		0.01	c0.10	
v/s Ratio Perm	0.05			0.06								
v/c Ratio	0.14	0.57		0.17	0.15		0.19	0.31		0.40	0.24	
Uniform Delay, d1	21.9	25.6		22.1	21.9		40.1	14.8		44.0	16.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.7		0.5	0.1		1.0	0.7		7.3	0.1	
Delay (s)	22.1	26.3		22.6	22.0		41.1	15.5		51.3	16.8	
Level of Service	C	C		C	C		D	B		D	B	
Approach Delay (s)		26.0			22.1			16.7			18.4	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	21.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	92.1	Sum of lost time (s)	15.5
Intersection Capacity Utilization	80.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	622	11	2	220	1	13	0	1	2	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00			0.99		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3412		1711	3419			1705		1711	1621	
Flt Permitted	0.60	1.00		0.39	1.00			0.78		0.75	1.00	
Satd. Flow (perm)	1085	3412		702	3419			1387		1346	1621	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	676	12	2	239	1	14	0	1	2	1	2
RTOR Reduction (vph)	0	2	0	0	1	0	0	11	0	0	2	0
Lane Group Flow (vph)	2	686	0	2	239	0	0	4	0	2	1	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	13.2	13.2		13.2	13.2			7.7		7.7	7.7	
Effective Green, g (s)	13.2	13.2		13.2	13.2			7.7		7.7	7.7	
Actuated g/C Ratio	0.43	0.43		0.43	0.43			0.25		0.25	0.25	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	463	1457		299	1460			345		335	403	
v/s Ratio Prot		c0.20			0.07						0.00	
v/s Ratio Perm	0.00			0.00				c0.00		0.00		
v/c Ratio	0.00	0.47		0.01	0.16			0.01		0.01	0.00	
Uniform Delay, d1	5.1	6.3		5.1	5.5			8.7		8.7	8.7	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.2		0.0	0.1			0.0		0.0	0.0	
Delay (s)	5.1	6.6		5.1	5.5			8.7		8.7	8.7	
Level of Service	A	A		A	A			A		A	A	
Approach Delay (s)		6.6			5.5			8.7			8.7	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	30.9	Sum of lost time (s)	10.0
Intersection Capacity Utilization	33.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	85	0	0	290	12	155	655	558	0	0	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frt		1.00			0.99		1.00	0.93				0.85
Flt Protected		0.99			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3401			5101		1711	3185				2694
Flt Permitted		0.92			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3140			5101		1711	3185				2694
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	14	106	0	0	362	15	194	819	698	0	0	31
RTOR Reduction (vph)	0	0	0	0	6	0	0	203	0	0	0	29
Lane Group Flow (vph)	0	120	0	0	371	0	194	1314	0	0	0	2
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		35.5			26.5		31.0	31.0				4.0
Effective Green, g (s)		35.5			26.5		31.0	31.0				4.0
Actuated g/C Ratio		0.47			0.35		0.41	0.41				0.05
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1480			1778		697	1299				141
v/s Ratio Prot		c0.00			c0.07		0.11	c0.41				0.00
v/s Ratio Perm		0.03										
v/c Ratio		0.08			0.21		0.28	1.01				0.01
Uniform Delay, d1		11.2			17.4		15.0	22.5				34.1
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			0.3		1.0	27.8				0.1
Delay (s)		11.3			17.7		16.0	50.3				34.3
Level of Service		B			B		B	D				C
Approach Delay (s)		11.3			17.7			46.4			34.3	
Approach LOS		B			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	39.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	54.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↱	↱	↰↰	↑		
Volume (vph)	96	169	231	239	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.95	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1620	1428	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1620	1428	3319	1801		
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	117	206	282	291	0	0
RTOR Reduction (vph)	18	52	0	0	0	0
Lane Group Flow (vph)	153	100	282	291	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	39.6	39.6	10.4	60.0		
Effective Green, g (s)	39.6	39.6	10.4	60.0		
Actuated g/C Ratio	0.66	0.66	0.17	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	1069	942	575	1801		
v/s Ratio Prot	0.09		c0.08	c0.16		
v/s Ratio Perm		0.07				
v/c Ratio	0.14	0.11	0.49	0.16		
Uniform Delay, d1	3.8	3.7	22.4	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.1	0.1	0.7	0.0		
Delay (s)	3.9	3.8	23.1	0.0		
Level of Service	A	A	C	A		
Approach Delay (s)	3.8			11.4	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	8.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	24.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑↱		↰	↱		↰	↑↑↱		↰	↑↑↱	
Volume (vph)	62	33	105	2	25	0	85	216	0	6	165	56
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.94		1.00	1.00		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	0.98	1.00		0.95	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	1.00		1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1189	1902		1159	1279		1215	2431		1215	2296	
Flt Permitted	0.40	1.00		0.83	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	496	1902		1017	1279		1215	2431		1215	2296	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	70	37	118	2	28	0	96	243	0	7	185	63
RTOR Reduction (vph)	0	86	0	0	0	0	0	0	0	0	26	0
Lane Group Flow (vph)	70	69	0	2	28	0	96	243	0	7	222	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	15.5	15.5		4.8	4.8		6.0	23.7		2.0	19.7	
Effective Green, g (s)	15.5	15.5		4.8	4.8		6.0	23.7		2.0	19.7	
Actuated g/C Ratio	0.27	0.27		0.08	0.08		0.10	0.41		0.03	0.34	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	198	512		84	106		126	1001		42	786	
v/s Ratio Prot	c0.03	0.04			0.02		c0.08	0.10		0.01	c0.10	
v/s Ratio Perm	c0.06			0.00								
v/c Ratio	0.35	0.13		0.02	0.26		0.76	0.24		0.17	0.28	
Uniform Delay, d1	16.6	15.9		24.2	24.7		25.1	11.0		26.9	13.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	0.1		0.1	1.3		23.4	0.1		1.9	0.2	
Delay (s)	17.7	16.0		24.3	26.0		48.5	11.2		28.8	14.0	
Level of Service	B	B		C	C		D	B		C	B	
Approach Delay (s)		16.5			25.9			21.7			14.4	
Approach LOS		B			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	57.5	Sum of lost time (s)	21.6
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

INTERSECTION MITIGATION DISCUSSION

The proposed project would result in significant impacts at the following 16 study intersections under existing plus project and/or 2040 cumulative impacts.

- (#1) King/Third (*2040 cumulative*)
- (#2) King/Fourth (existing plus project, 2040 cumulative)
- (#3) King/Fifth/I-280 ramps (existing plus project, 2040 cumulative)
- (#4) Fifth/Harrison/I-80 westbound off-ramp (existing plus project, 2040 cumulative)
- (#5) Fifth/Bryant/I-80 eastbound on-ramp (existing plus project, 2040 cumulative)
- (#6) Third/Channel (existing plus project, 2040 cumulative)
- (#7) Fourth/Channel (existing plus project, 2040 cumulative)
- (#8) Seventh/Mission Bay Drive (existing plus project, 2040 cumulative)
- (#10) Third/South (existing plus project, 2040 cumulative)
- (#13) Third/16th (*2040 cumulative*)
- (#14) Fourth/16th (existing plus project, 2040 cumulative)
- (#15) Owens/16th (existing plus project, 2040 cumulative)
- (#16) Seventh/Mississippi/16th (existing plus project, 2040 cumulative)
- (#17) Illinois/Mariposa (existing plus project, 2040 cumulative)
- (#20) Mariposa/I-280 northbound off-ramp (existing plus project, 2040 cumulative)
- (#22) Third/Cesar Chavez (*2040 cumulative)*

Generally, to mitigate poor operating conditions of study intersections, additional travel lane capacity would be needed on one or more of the approaches to the intersection. The provision of additional travel lane capacity by narrowing sidewalks, removal of on-street parking, and/or removal of transit lanes or bicycle lanes would generally be infeasible and inconsistent with the transit, bicycle, and pedestrian environment encouraged by the City's *Transit First* Policy as it would remove space dedicated to transit, pedestrians, and/or bicycles and would increase the distances required for pedestrians to cross the street.

The proposed project would result in significant impacts at one intersection under the No Event scenario during the weekday p.m. peak hour.

- (#16) Seventh/Mississippi/16th – At this intersection, additional travel lane capacity would be required at all approaches to reduce impacts during the weekday p.m. peak hour. Provision of additional capacity at this intersection is constrained by the transit-only lanes om 16th Street (to be implemented as part of the 22 Fillmore Transit Priority Project, which would remove one eastbound and one westbound mixed-flow travel lane), and the bicycle lanes on Mississippi and Seventh Streets (City-designated bicycle route #23).

At the following 13 study intersections, the proposed project would result in significant impacts, primarily during the weekday evening and late evening peak hours for the Basketball Game scenario (the two time periods immediately before and immediately after a basketball game). During overlapping events, the project would result in additional impacts during the weekday p.m. peak and Saturday evening peak hours, as well as during the weekday evening and late evening peak hours. As noted in the EIR discussion, these traffic impacts would be event-related, primarily caused by large attendance events, and SFMTA PCOs would be stationed at a number of these intersections to actively manage traffic flows during pre-event and post-event periods for these scenarios.

- (#2) King/Fourth (Basketball Game scenario)
- (#3) King/Fifth/I-280 ramps (overlapping events)
- (#4) Fifth/Harrison/I-80 westbound off-ramp (Basketball Game scenario, overlapping events)
- (#5) Fifth/Bryant/I-80 eastbound on-ramp (Basketball Game scenario, overlapping events)
- (#6) Third/Channel (Basketball Game scenario)
- (#7) Fourth/Channel (Basketball Game scenario)
- (#8) Seventh/Mission Bay Drive (Basketball Game scenario)
- (#10) Third/South (overlapping events)
- (#14) Fourth/16th (overlapping events)
- (#15) Owens/16th (overlapping events)
- (#17) Illinois/Mariposa (overlapping events)
- (#20) Mariposa/I-280 northbound off-ramp (overlapping events)

To reduce intersection impacts during events to less than significant (i.e., to LOS D or better), additional travel lane capacity would generally be needed on multiple approaches, depending on the peak hour of analysis (e.g., weekday evening attendee arrivals versus weekday late evening attendee departures). Within Mission Bay the roadway network has virtually been built out already per the Mission Bay Infrastructure Plan, and additional right-of-way is not available to provide more travel lanes. Furthermore, many streets (e.g., Third Street, Fourth Street, Seventh Street, King Street, Channel Street, Owens Street, South Street, Mission Bay Drive, Mariposa Street) do not have parking lanes at the approaches to the study intersections that could be converted to a travel lane.

Sidewalk widths within Mission Bay are generally 12 feet wide, including landscaping and utilities near the curb edge; thus, narrowing of sidewalk would remove and limit space currently dedicated to pedestrians. In addition, the existing T Third light rail tracks on Third Street and the transit-only lanes on 16th Street (to be provided as part of the 22 Fillmore Transit Priority Project) constrain the provision of additional travel lanes on these two streets. The analysis of the northbound I-280 off-ramp at Mariposa Street already includes the near-term off-ramp widening at the approach to Mariposa Street to be completed by fall 2015, and additional capacity on the ramp itself is not available due to the columns supporting the I-280 freeway mainline above. At the downtown intersections at Fifth/Harrison/I-80 westbound off-ramp and Fifth/Bryant/I-80 eastbound on-ramp, intersection operations have been optimized to accommodate peak period travel demands. The geometry of the freeway ramps were already maximized a few years ago as part of the Bay Bridge West Approach seismic upgrade project conducted by Caltrans (between 2003 and 2009).

Under 2040 cumulative conditions, the proposed project would result in significant cumulative impacts or have a considerable contribution to LOS E or LOS F conditions at three additional study intersections: King/Fourth, Third/16th, and Third/Cesar Chavez. As noted above, the ability to add additional travel lane capacity on King, Third, 16th and Cesar Chavez Streets is not available.

- (#1) King/Third – additional eastbound, westbound, and northbound travel lane capacity would be required to reduce impacts during the weekday p.m. peak hour and Saturday evening peak hours.
- (#13) Third/16th – additional southbound capacity would be required to reduce impacts during the weekday p.m. peak hour.
- (#22) Third/Cesar Chavez – additional eastbound, westbound, northbound, and southbound capacity would be required to reduce impacts during the weekday p.m. peak hour.

APPENDIX TR-5
PROPOSED PROJECT
FREEWAY MAINLINE AND RAMP ANALYSIS

Level of Service Summary – All Scenarios

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32 Transportation Analysis
Freeway Analysis, HCM 2000
All scenarios and time periods

	2015 Existing Weekday PM - No Giants			2015 Existing Weekday Evening - No Giants			2015 Existing Weekday Late PM - No Giants			2015 Existing Saturday Evening - No Giants		
Ramp Location	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS
1 I-80 EB on-ramp at Sterling/Bryant	8,762	35	E	7,273	28	C	4,732	20	B	5,655	22	C
2 I-80 EB on-ramp at Fifth/Bryant	7,673	-	F	6,325	-	F	4,247	30	D	5,018	35	E
3 I-80 WB off-ramp at Fifth/Harrison	6,353	30	D	6,080	28	D	6,118	27	C	5,578	25	C
4 I-280 SB on-ramp at Pennsylvania	4,410	35	E	3,508	27	C	1,746	15	B	1,467	13	B
5 I-280 NB off-ramp at Mariposa	4,418	26	C	4,258	25	C	1,875	13	B	2,634	16	B
6 I-280 SB on-ramp at Mariposa	3,625	31	D	3,023	25	C	1,655	13	B	1,370	12	B

	2015 Existing Weekday PM - With Giants			2015 Existing Weekday Evening - With Giants			2015 Existing Weekday Late PM - With Giants			2015 Existing Saturday Evening - With Giants		
Ramp Location	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS
1 I-80 EB on-ramp at Sterling/Bryant	8,820	35	E	7,257	28	C	5,104	23	C	6,203	25	C
2 I-80 EB on-ramp at Fifth/Bryant	7,900	-	F	6,426	-	F	4,543	32	D	5,274	-	F
3 I-80 WB off-ramp at Fifth/Harrison	6,445	31	D	6,156	29	D	6,178	27	C	5,743	27	C
4 I-280 SB on-ramp at Pennsylvania	4,600	36	E	3,685	28	D	2,420	21	C	1,921	17	B
5 I-280 NB off-ramp at Mariposa	4,490	29	D	4,997	30	D	1,883	13	B	2,807	18	B
6 I-280 SB on-ramp at Mariposa	3,605	31	D	3,158	26	C	2,081	18	B	1,772	14	B

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32 Transportation Analysis
Freeway Analysis, HCM 2000
All scenarios and time periods

	Plus Project No Event Weekday PM - No Giants			Plus Project No Event Weekday Evening - No Giants			Plus Project No Event Weekday Late PM - No Giants			Plus Project No Event Saturday Evening - No Giants		
Ramp Location	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS
1 I-80 EB on-ramp at Sterling/Bryant	8,796	36	E							5,682	22	C
2 I-80 EB on-ramp at Fifth/Bryant	7,673	-	F							5,018	36	E
3 I-80 WB off-ramp at Fifth/Harrison	6,372	30	D							5,611	26	C
4 I-280 SB on-ramp at Pennsylvania	4,470	35	E							1,558	13	B
5 I-280 NB off-ramp at Mariposa	4,463	26	C							2,702	17	B
6 I-280 SB on-ramp at Mariposa	3,625	32	D							1,370	13	B

	Plus Project with Convention Weekday PM - No Giants			Plus Project with Convention Weekday Evening - No Giants			Plus Project with Convention Weekday Late PM - No Giants			Plus Project with Convention Saturday Evening - No Giants		
Ramp Location	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS
1 I-80 EB on-ramp at Sterling/Bryant	8,812	36	E									
2 I-80 EB on-ramp at Fifth/Bryant	7,673	-	F									
3 I-80 WB off-ramp at Fifth/Harrison	6,371	30	D									
4 I-280 SB on-ramp at Pennsylvania	4,565	36	E									
5 I-280 NB off-ramp at Mariposa	4,466	26	C									
6 I-280 SB on-ramp at Mariposa	3,625	33	D									

	Plus Project with Basketball Weekday PM - No Giants			Plus Project with Basketball Weekday Evening - No Giants			Plus Project with Basketball Weekday Late PM - No Giants			Plus Project with Basketball Saturday Evening - No Giants		
Ramp Location	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS
1 I-80 EB on-ramp at Sterling/Bryant	8,794	36	E	7,301	28	C	5,305	23	C	5,671	22	C
2 I-80 EB on-ramp at Fifth/Bryant	7,673	-	F	6,325	-	F	4,247	34	D	5,018	36	E
3 I-80 WB off-ramp at Fifth/Harrison	6,452	31	D	6,826	36	E	6,157	27	C	6,385	34	D
4 I-280 SB on-ramp at Pennsylvania	4,458	35	E	3,566	28	C	2,532	21	C	1,509	13	B
5 I-280 NB off-ramp at Mariposa	4,594	28	C	5,188	34	D	1,917	13	B	3,591	25	C
6 I-280 SB on-ramp at Mariposa	3,625	32	D	3,023	25	C	1,655	20	B	1,370	12	B

	Plus Project with Basketball Weekday PM - With Giants			Plus Project with Basketball Weekday Evening - With Giants			Plus Project with Basketball Weekday Late PM - With Giants			Plus Project with Basketball Saturday Evening - With Giants		
Ramp Location	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS
1 I-80 EB on-ramp at Sterling/Bryant	8,852	36	E	7,285	28	C	5,665	27	C	6,219	25	C
2 I-80 EB on-ramp at Fifth/Bryant	7,900	-	F	6,426	-	F	4,543	-	F	5,274	-	F
3 I-80 WB off-ramp at Fifth/Harrison	6,544	32	D	6,901	37	E	6,217	27	C	6,550	35	E
4 I-280 SB on-ramp at Pennsylvania	4,600	36	E	3,743	28	D	3,196	27	C	1,963	17	B
5 I-280 NB off-ramp at Mariposa	4,666	31	D	5,926	-	F	1,925	13	B	3,701	26	C
6 I-280 SB on-ramp at Mariposa	3,605	32	D	3,158	27	C	2,102	24	C	1,772	15	B

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32 Transportation Analysis
Freeway Analysis, HCM 2000
All scenarios and time periods

	Alternative - No Project Weekday PM - No Giants			Alternative - No Project Weekday Evening - No Giants			Alternative - No Project Weekday Late PM - No Giants			Alternative - No Project Saturday Evening - No Giants		
Ramp Location	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS
1 I-80 EB on-ramp at Sterling/Bryant	8,797	36	E							5,657	22	C
2 I-80 EB on-ramp at Fifth/Bryant	7,673	-	F							5,018	35	E
3 I-80 WB off-ramp at Fifth/Harrison	6,358	30	D							5,579	25	C
4 I-280 SB on-ramp at Pennsylvania	4,480	35	E							1,476	13	B
5 I-280 NB off-ramp at Mariposa	4,431	26	C							2,638	16	B
6 I-280 SB on-ramp at Mariposa	3,625	32	D							1,370	12	B

	Alternative - Reduced-Reduced Project Weekday PM - No Giants			Alternative - Reduced-Reduced Project Weekday Evening - No Giants			Alternative - Reduced-Reduced Project Weekday Late PM - No Giants			Alternative - Reduced-Reduced Project Saturday Evening - No Giants		
Ramp Location	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS
1 I-80 EB on-ramp at Sterling/Bryant	8,783	36	E							5,671	22	C
2 I-80 EB on-ramp at Fifth/Bryant	7,673	-	F							5,018	36	E
3 I-80 WB off-ramp at Fifth/Harrison	6,365	30	D							5,598	25	C
4 I-280 SB on-ramp at Pennsylvania	4,421	35	E							1,521	13	B
5 I-280 NB off-ramp at Mariposa	4,445	26	C							2,675	17	B
6 I-280 SB on-ramp at Mariposa	3,625	32	D							1,370	13	B

	No TSP - Plus Project with Basketball Weekday PM - No Giants			No TSP - Plus Project with Basketball Weekday Evening - No Giants			No TSP - Plus Project with Basketball Weekday Late PM - No Giants			No TSP - Plus Project with Basketball Saturday Evening - No Giants		
Ramp Location	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS
1 I-80 EB on-ramp at Sterling/Bryant	8,796	36	E	7,329	28	C	5,473	24	C	5,696	22	C
2 I-80 EB on-ramp at Fifth/Bryant	7,673	-	F	6,325	-	F	4,247	36	E	5,018	36	E
3 I-80 WB off-ramp at Fifth/Harrison	6,468	31	D	7,046	38	E	6,205	27	C	6,621	36	E
4 I-280 SB on-ramp at Pennsylvania	4,461	35	E	3,606	28	C	2,652	22	C	1,545	13	B
5 I-280 NB off-ramp at Mariposa	4,605	28	C	5,331	35	E	1,961	13	B	3,736	27	C
6 I-280 SB on-ramp at Mariposa	3,625	32	D	3,023	26	C	1,655	21	C	1,370	13	B

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32 Transportation Analysis
Freeway Analysis, HCM 2000
All scenarios and time periods

	2040 Cumulative No Event Weekday PM - No Giants			2040 Cumulative No Event Weekday Evening - No Giants			2040 Cumulative No Event Weekday Late PM - No Giants			2040 Cumulative No Event Saturday Evening - No Giants		
Ramp Location	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS
1 I-80 EB on-ramp at Sterling/Bryant	8,460	-	F							5,900	24	C
2 I-80 EB on-ramp at Fifth/Bryant	7,760	-	F							5,420	37	E
3 I-80 WB off-ramp at Fifth/Harrison	7,340	40	E							6,300	33	D
4 I-280 SB on-ramp at Pennsylvania	5,480	-	F							1,880	16	B
5 I-280 NB off-ramp at Mariposa	5,470	34	D							2,910	19	B
6 I-280 SB on-ramp at Mariposa	4,270	-	F							1,600	15	B

	2040 Cumulative with Convention Weekday PM - No Giants			2040 Cumulative with Convention Weekday Evening - No Giants			2040 Cumulative with Convention Weekday Late PM - No Giants			2040 Cumulative with Convention Saturday Evening - No Giants		
Ramp Location	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS
1 I-80 EB on-ramp at Sterling/Bryant	8,480	-	F									
2 I-80 EB on-ramp at Fifth/Bryant	7,760	-	F									
3 I-80 WB off-ramp at Fifth/Harrison	7,340	40	E									
4 I-280 SB on-ramp at Pennsylvania	5,570	-	F									
5 I-280 NB off-ramp at Mariposa	5,470	34	D									
6 I-280 SB on-ramp at Mariposa	4,270	-	F									

	2040 Cumulative with Basketball Weekday PM - No Giants			2040 Cumulative with Basketball Weekday Evening - No Giants			2040 Cumulative with Basketball Weekday Late PM - No Giants			2040 Cumulative with Basketball Saturday Evening - No Giants		
Ramp Location	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS	Volume (vph)	Density (pcplpm)	LOS
1 I-80 EB on-ramp at Sterling/Bryant	8,460	-	F							5,890	24	C
2 I-80 EB on-ramp at Fifth/Bryant	7,760	-	F							5,420	36	E
3 I-80 WB off-ramp at Fifth/Harrison	7,420	-	F							7,070	41	E
4 I-280 SB on-ramp at Pennsylvania	5,470	-	F							1,830	15	B
5 I-280 NB off-ramp at Mariposa	5,600	35	D							3,800	27	C
6 I-280 SB on-ramp at Mariposa	4,270	-	F							1,600	15	B

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32 Transportation Analysis
Freeway Analysis, HCM 2000
All scenarios and time periods

				Existing 2015				Plus Project No Event					
				Freeway Volume (vph)	Ramp (vph)	Density (pcplpm)	LOS	Project Trips	Freeway Volume (vph)	Ramp (vph)	Density (pcplpm)	LOS	% Contribution
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	7,673	1,089	-	F	34	7,673	1,123	-	F	3.0%
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	6,325	948	-	F	-	0	0			
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	4,247	485	30	D	-	0	0			
	I-80 EB	Fifth/Bryant on-ramp	Wkend	5,018	637	35	E	27	5,018	664	36	E	4.1%
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	7,900	920	-	F	-	0	0			
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	6,426	831	-	F	-	0	0			
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	4,543	561	32	D	-	0	0			
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	5,274	929	-	F	-	0	0			
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	8,762	1,089	35	E	17	8,796	1,106	36	E	1.5%
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	7,273	683	28	C	-	0	0			
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	4,732	347	20	B	-	0	0			
	I-80 EB	Sterling/Bryant on-ramp	Wkend	5,655	352	22	C	14	5,682	366	22	C	3.8%
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	8,820	1,031	35	E	-	0	0			
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	7,257	699	28	C	-	0	0			
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	5,104	671	23	C	-	0	0			
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	6,203	633	25	C	-	0	0			
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	6,353	1,180	30	D	19	6,372	1,199	30	D	1.6%
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	6,080	1,056	28	D	-	0	0			
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	6,118	350	27	C	-	0	0			
	I-80 WB	Fifth/Harrison off-ramp	Wkend	5,578	839	25	C	33	5,611	872	26	C	3.8%
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	6,445	1,272	31	D	-	0	0			
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	6,156	1,132	29	D	-	0	0			
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	6,178	410	27	C	-	0	0			
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	5,743	1,004	27	C	-	0	0			
D2	I-280 NB	Mariposa off-ramp	Wkday PM	4,418	688	26	C	45	4,463	733	26	C	6.1%
	I-280 NB	Mariposa off-ramp	Wkday Eve	4,258	658	25	C	-	0	0			
	I-280 NB	Mariposa off-ramp	Wkday Late	1,875	175	13	B	-	0	0			
	I-280 NB	Mariposa off-ramp	Wkend	2,634	266	16	B	68	2,702	334	17	B	20.4%
	I-280 NB	Mariposa off-ramp	Wkday PM w/	4,490	1,241	29	D	-	0	0			
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	4,997	997	30	D	-	0	0			
	I-280 NB	Mariposa off-ramp	Wkday Late w/	1,883	185	13	B	-	0	0			
	I-280 NB	Mariposa off-ramp	Wkend w/	2,807	420	18	B	-	0	0			
M3	I-280 SB	Mariposa on-ramp	Wkday PM	3,625	1,231	31	D	129	3,625	1,360	32	D	9.5%
	I-280 SB	Mariposa on-ramp	Wkday Eve	3,023	833	25	C	-	0	0			
	I-280 SB	Mariposa on-ramp	Wkday Late	1,655	270	13	B	-	0	0			
	I-280 SB	Mariposa on-ramp	Wkend	1,370	322	12	B	91	1,370	413	13	B	22.0%
	I-280 SB	Mariposa on-ramp	Wkday PM w/	3,605	1,272	31	D	-	0	0			
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	3,158	905	26	C	-	0	0			
	I-280 SB	Mariposa on-ramp	Wkday Late w/	2,081	562	18	B	-	0	0			
	I-280 SB	Mariposa on-ramp	Wkend w/	1,772	344	14	B	-	0	0			
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	4,410	1,130	35	E	0	4,470	1,130	35	E	0.0%
	I-280 SB	Penn/25th on-ramp	Wkday Eve	3,508	755	27	C	-	0	0			
	I-280 SB	Penn/25th on-ramp	Wkday Late	1,746	353	15	B	-	0	0			
	I-280 SB	Penn/25th on-ramp	Wkend	1,467	239	13	B	0	1,558	239	13	B	0.0%
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	4,600	1,139	36	E	-	0	0			
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	3,685	746	28	D	-	0	0			
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	2,420	635	21	C	-	0	0			
	I-280 SB	Penn/25th on-ramp	Wkend w/	1,921	483	17	B	-	0	0			

Event Center and Mixed-Use Development at Mission Ba
Freeway Analysis, HCM 2000
All scenarios and time periods

				Plus Project with Convention						Plus Project with Basketball					
				Project Trips	Freeway Volume (vph)	Ramp (vph)	Density (pcplpm)	LOS	% Contribution	Project Trips	Freeway Volume (vph)	Ramp (vph)	Density (pcplpm)	LOS	% Contribution
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	50	7,673	1,139	-	F	4.4%	32	7,673	1,121	-	F	2.9%
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	-	0	0				28	6,325	976	-	F	2.9%
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	-	0	0				573	4,247	1,058	34	D	54.2%
	I-80 EB	Fifth/Bryant on-ramp	Wkend	-	0	0				16	5,018	653	36	E	2.5%
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	-	0	0				32	7,900	952	-	F	3.4%
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	-	0	0				28	6,426	859	-	F	3.3%
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	-	0	0				561	4,543	1,122	-	F	50.0%
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	-	0	0				16	5,274	945	-	F	1.7%
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	25	8,812	1,114	36	E	2.2%	16	8,794	1,105	36	E	1.4%
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	-	0	0				14	7,301	697	28	C	2.0%
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	-	0	0				286	5,305	633	23	C	45.2%
	I-80 EB	Sterling/Bryant on-ramp	Wkend	-	0	0				8	5,671	360	22	C	2.2%
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	-	0	0				26	8,852	1,057	36	E	2.4%
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	-	0	0				14	7,285	713	28	C	1.9%
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	-	0	0				298	5,665	969	27	C	30.7%
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	-	0	0				8	6,219	641	25	C	1.2%
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	18	6,371	1,198	30	D	1.5%	99	6,452	1,279	31	D	7.7%
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	-	0	0				746	6,826	1,802	36	E	41.4%
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	-	0	0				38	6,157	388	27	C	9.9%
	I-80 WB	Fifth/Harrison off-ramp	Wkend	-	0	0				807	6,385	1,646	34	D	49.0%
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	-	0	0				99	6,544	1,371	32	D	7.2%
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	-	0	0				745	6,901	1,877	37	E	39.7%
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	-	0	0				38	6,217	448	27	C	8.5%
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	-	0	0				807	6,550	1,811	35	E	44.6%
D2	I-280 NB	Mariposa off-ramp	Wkday PM	48	4,466	736	26	C	6.5%	176	4,594	864	28	C	20.4%
	I-280 NB	Mariposa off-ramp	Wkday Eve	-	0	0				930	5,188	1,588	34	D	58.6%
	I-280 NB	Mariposa off-ramp	Wkday Late	-	0	0				42	1,917	217	13	B	19.4%
	I-280 NB	Mariposa off-ramp	Wkend	-	0	0				957	3,591	1,223	25	C	78.3%
	I-280 NB	Mariposa off-ramp	Wkday PM w/	-	0	0				176	4,666	1,417	31	D	12.4%
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	-	0	0				910	5,926	1,907	-	F	47.7%
	I-280 NB	Mariposa off-ramp	Wkday Late w/	-	0	0				42	1,925	227	13	B	18.6%
	I-280 NB	Mariposa off-ramp	Wkend w/	-	0	0				894	3,701	1,314	26	C	68.0%
M3	I-280 SB	Mariposa on-ramp	Wkday PM	224	3,625	1,455	33	D	15.4%	117	3,625	1,348	32	D	8.7%
	I-280 SB	Mariposa on-ramp	Wkday Eve	-	0	0				58	3,023	891	25	C	6.5%
	I-280 SB	Mariposa on-ramp	Wkday Late	-	0	0				786	1,655	1,056	20	B	74.4%
	I-280 SB	Mariposa on-ramp	Wkend	-	0	0				42	1,370	364	12	B	11.5%
	I-280 SB	Mariposa on-ramp	Wkday PM w/	-	0	0				117	3,605	1,389	32	D	8.4%
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	-	0	0				58	3,158	963	27	C	6.0%
	I-280 SB	Mariposa on-ramp	Wkday Late w/	-	0	0				755	2,102	1,317	24	C	57.3%
	I-280 SB	Mariposa on-ramp	Wkend w/	-	0	0				42	1,772	386	15	B	10.9%
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	0	4,565	1,130	36	E	0.0%	0	4,458	1,130	35	E	0.0%
	I-280 SB	Penn/25th on-ramp	Wkday Eve	-	0	0				0	3,566	755	28	C	0.0%
	I-280 SB	Penn/25th on-ramp	Wkday Late	-	0	0				262	2,532	615	21	C	42.6%
	I-280 SB	Penn/25th on-ramp	Wkend	-	0	0				0	1,509	239	13	B	0.0%
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	-	0	0				0	4,600	1,139	36	E	0.0%
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	-	0	0				0	3,743	746	28	D	0.0%
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	-	0	0				273	3,196	908	27	C	30.0%
	I-280 SB	Penn/25th on-ramp	Wkend w/	-	0	0				0	1,963	483	17	B	0.0%

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				Alternative - No Project						Alternative - Reduced-Reduced Project					
				Project Trips	Freeway Volume (vph)	Ramp (vph)	Density (pcplpm)	LOS	% Contribution	Project Trips	Freeway Volume (vph)	Ramp (vph)	Density (pcplpm)	LOS	% Contribution
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	35	7,673	1,124	-	F	3.1%	21	7,673	1,110	-	F	1.9%
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	-	0	0				-	0	0			
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	-	0	0				-	0	0			
	I-80 EB	Fifth/Bryant on-ramp	Wkend	2	5,018	639	35	E	0.3%	16	5,018	653	36	E	2.5%
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	-	0	0				-	0	0			
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	-	0	0				-	0	0			
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	-	0	0				-	0	0			
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	-	0	0				-	0	0			
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	17	8,797	1,106	36	E	1.5%	10	8,783	1,099	36	E	0.9%
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	-	0	0				-	0	0			
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	-	0	0				-	0	0			
	I-80 EB	Sterling/Bryant on-ramp	Wkend	1	5,657	353	22	C	0.3%	8	5,671	360	22	C	2.2%
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	-	0	0				-	0	0			
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	-	0	0				-	0	0			
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	-	0	0				-	0	0			
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	-	0	0				-	0	0			
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	5	6,358	1,185	30	D	0.4%	12	6,365	1,192	30	D	1.0%
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	-	0	0				-	0	0			
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	-	0	0				-	0	0			
	I-80 WB	Fifth/Harrison off-ramp	Wkend	1	5,579	840	25	C	0.1%	20	5,598	859	25	C	2.3%
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	-	0	0				-	0	0			
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	-	0	0				-	0	0			
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	-	0	0				-	0	0			
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	-	0	0				-	0	0			
D2	I-280 NB	Mariposa off-ramp	Wkday PM	13	4,431	701	26	C	1.9%	27	4,445	715	26	C	3.8%
	I-280 NB	Mariposa off-ramp	Wkday Eve	-	0	0				-	0	0			
	I-280 NB	Mariposa off-ramp	Wkday Late	-	0	0				-	0	0			
	I-280 NB	Mariposa off-ramp	Wkend	4	2,638	270	16	B	1.5%	41	2,675	307	17	B	13.4%
	I-280 NB	Mariposa off-ramp	Wkday PM w/	-	0	0				-	0	0			
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	-	0	0				-	0	0			
	I-280 NB	Mariposa off-ramp	Wkday Late w/	-	0	0				-	0	0			
	I-280 NB	Mariposa off-ramp	Wkend w/	-	0	0				-	0	0			
M3	I-280 SB	Mariposa on-ramp	Wkday PM	139	3,625	1,370	32	D	10.1%	80	3,625	1,311	32	D	6.1%
	I-280 SB	Mariposa on-ramp	Wkday Eve	-	0	0				-	0	0			
	I-280 SB	Mariposa on-ramp	Wkday Late	-	0	0				-	0	0			
	I-280 SB	Mariposa on-ramp	Wkend	9	1,370	331	12	B	2.7%	54	1,370	376	13	B	14.4%
	I-280 SB	Mariposa on-ramp	Wkday PM w/	-	0	0				-	0	0			
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	-	0	0				-	0	0			
	I-280 SB	Mariposa on-ramp	Wkday Late w/	-	0	0				-	0	0			
	I-280 SB	Mariposa on-ramp	Wkend w/	-	0	0				-	0	0			
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	0	4,480	1,130	35	E	0.0%	0	4,421	1,130	35	E	0.0%
	I-280 SB	Penn/25th on-ramp	Wkday Eve	-	0	0				-	0	0			
	I-280 SB	Penn/25th on-ramp	Wkday Late	-	0	0				-	0	0			
	I-280 SB	Penn/25th on-ramp	Wkend	0	1,476	239	13	B	0.0%	0	1,521	239	13	B	0.0%
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	-	0	0				-	0	0			
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	-	0	0				-	0	0			
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	-	0	0				-	0	0			
	I-280 SB	Penn/25th on-ramp	Wkend w/	-	0	0				-	0	0			

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				No TSP - Plus Project with Basketball						2040 Cumulative No Event					
				Project Trips	Freeway Volume (vph)	Ramp (vph)	Density (pcplpm)	LOS	% Contribution	Project Trips	Freeway Volume (vph)	Ramp (vph)	Density (pcplpm)	LOS	% Contribution
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	34	7,673	1,123	-	F	3.0%	34	7,758	705	-	F	4.8%
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	56	6,325	1,004	-	F	5.6%	-	0	0			
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	741	4,247	1,226	36	E	60.4%	-	0	0			
	I-80 EB	Fifth/Bryant on-ramp	Wkend	41	5,018	678	36	E	6.1%	27	5,425	477	37	E	5.7%
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	-	0	0				-	0	0			
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	-	0	0				-	0	0			
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	-	0	0				-	0	0			
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	-	0	0				-	0	0			
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	17	8,796	1,106	36	E	1.5%	17	8,463	1,757	-	F	1.0%
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	28	7,329	711	28	C	3.9%	-	0	0			
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	370	5,473	717	24	C	51.6%	-	0	0			
	I-80 EB	Sterling/Bryant on-ramp	Wkend	21	5,696	373	22	C	5.5%	14	5,902	644	24	C	2.2%
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	-	0	0				-	0	0			
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	-	0	0				-	0	0			
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	-	0	0				-	0	0			
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	-	0	0				-	0	0			
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	115	6,468	1,295	31	D	8.9%	19	7,340	2,167	40	E	0.9%
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	966	7,046	2,022	38	E	47.8%	-	0	0			
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	87	6,205	437	27	C	19.9%	-	0	0			
	I-80 WB	Fifth/Harrison off-ramp	Wkend	1042	6,621	1,881	36	E	55.4%	33	6,295	1,556	33	D	2.1%
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	-	0	0				-	0	0			
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	-	0	0				-	0	0			
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	-	0	0				-	0	0			
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	-	0	0				-	0	0			
D2	I-280 NB	Mariposa off-ramp	Wkday PM	187	4,605	875	28	C	21.4%	45	5,468	1,285	34	D	3.5%
	I-280 NB	Mariposa off-ramp	Wkday Eve	1073	5,331	1,731	35	E	62.0%	-	0	0			
	I-280 NB	Mariposa off-ramp	Wkday Late	86	1,961	261	13	B	32.9%	-	0	0			
	I-280 NB	Mariposa off-ramp	Wkend	1102	3,736	1,368	27	C	80.6%	68	2,909	541	19	B	12.6%
	I-280 NB	Mariposa off-ramp	Wkday PM w/	-	0	0				-	0	0			
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	-	0	0				-	0	0			
	I-280 NB	Mariposa off-ramp	Wkday Late w/	-	0	0				-	0	0			
	I-280 NB	Mariposa off-ramp	Wkend w/	-	0	0				-	0	0			
M3	I-280 SB	Mariposa on-ramp	Wkday PM	120	3,625	1,351	32	D	8.9%	129	4,273	1,846	-	F	7.0%
	I-280 SB	Mariposa on-ramp	Wkday Eve	98	3,023	931	26	C	10.6%	-	0	0			
	I-280 SB	Mariposa on-ramp	Wkday Late	906	1,655	1,176	21	C	77.0%	-	0	0			
	I-280 SB	Mariposa on-ramp	Wkend	78	1,370	400	13	B	19.5%	91	1,602	515	15	B	17.7%
	I-280 SB	Mariposa on-ramp	Wkday PM w/	-	0	0				-	0	0			
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	-	0	0				-	0	0			
	I-280 SB	Mariposa on-ramp	Wkday Late w/	-	0	0				-	0	0			
	I-280 SB	Mariposa on-ramp	Wkend w/	-	0	0				-	0	0			
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	0	4,461	1,130	35	E	0.0%	0	5,477	1,517	-	F	0.0%
	I-280 SB	Penn/25th on-ramp	Wkday Eve	0	3,606	755	28	C	0.0%	-	0	0			
	I-280 SB	Penn/25th on-ramp	Wkday Late	302	2,652	655	22	C	46.1%	-	0	0			
	I-280 SB	Penn/25th on-ramp	Wkend	0	1,545	239	13	B	0.0%	0	1,880	323	16	B	0.0%
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	-	0	0				-	0	0			
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	-	0	0				-	0	0			
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	-	0	0				-	0	0			
	I-280 SB	Penn/25th on-ramp	Wkend w/	-	0	0				-	0	0			

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				2040 Cumulative with Convention						2040 Cumulative with Basketball					
				Project Trips	Freeway Volume (vph)	Ramp (vph)	Density (pcplpm)	LOS	% Contribution	Project Trips	Freeway Volume (vph)	Ramp (vph)	Density (pcplpm)	LOS	% Contribution
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	50	7,758	721	-	F	6.9%	32	7,758	703	-	F	4.6%
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	-	0	0				28	0	0			
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	-	0	0				573	0	0			
	I-80 EB	Fifth/Bryant on-ramp	Wkend	-	0	0				16	5,425	466	36	E	3.4%
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	-	0	0				32	0	0			
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	-	0	0				28	0	0			
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	-	0	0				561	0	0			
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	-	0	0				16	0	0			
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	25	8,479	1,766	-	F	1.4%	16	8,461	1,756	-	F	0.9%
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	-	0	0				14	0	0			
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	-	0	0				286	0	0			
	I-80 EB	Sterling/Bryant on-ramp	Wkend	-	0	0				8	5,891	638	24	C	1.2%
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	-	0	0				26	0	0			
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	-	0	0				14	0	0			
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	-	0	0				298	0	0			
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	-	0	0				8	0	0			
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	18	7,338	2,165	40	E	0.8%	99	7,419	2,246	-	F	4.4%
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	-	0	0				746	0	0			
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	-	0	0				38	0	0			
	I-80 WB	Fifth/Harrison off-ramp	Wkend	-	0	0				807	7,069	2,330	41	E	34.6%
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	-	0	0				99	0	0			
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	-	0	0				745	0	0			
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	-	0	0				38	0	0			
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	-	0	0				807	0	0			
D2	I-280 NB	Mariposa off-ramp	Wkday PM	48	5,472	1,289	34	D	3.7%	176	5,599	1,416	35	D	12.4%
	I-280 NB	Mariposa off-ramp	Wkday Eve	-	0	0				930	0	0			
	I-280 NB	Mariposa off-ramp	Wkday Late	-	0	0				42	0	0			
	I-280 NB	Mariposa off-ramp	Wkend	-	0	0				957	3,798	1,430	27	C	66.9%
	I-280 NB	Mariposa off-ramp	Wkday PM w/	-	0	0				176	0	0			
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	-	0	0				910	0	0			
	I-280 NB	Mariposa off-ramp	Wkday Late w/	-	0	0				42	0	0			
	I-280 NB	Mariposa off-ramp	Wkend w/	-	0	0				894	0	0			
M3	I-280 SB	Mariposa on-ramp	Wkday PM	224	4,273	1,941	-	F	11.5%	117	4,273	1,834	-	F	6.4%
	I-280 SB	Mariposa on-ramp	Wkday Eve	-	0	0				58	0	0			
	I-280 SB	Mariposa on-ramp	Wkday Late	-	0	0				786	0	0			
	I-280 SB	Mariposa on-ramp	Wkend	-	0	0				42	1,602	466	15	B	9.0%
	I-280 SB	Mariposa on-ramp	Wkday PM w/	-	0	0				117	0	0			
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	-	0	0				58	0	0			
	I-280 SB	Mariposa on-ramp	Wkday Late w/	-	0	0				755	0	0			
	I-280 SB	Mariposa on-ramp	Wkend w/	-	0	0				42	0	0			
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	0	5,572	1,517	-	F	0.0%	0	5,465	1,517	-	F	0.0%
	I-280 SB	Penn/25th on-ramp	Wkday Eve	-	0	0				0	0	0			
	I-280 SB	Penn/25th on-ramp	Wkday Late	-	0	0				262	0	0			
	I-280 SB	Penn/25th on-ramp	Wkend	-	0	0				0	1,831	323	15	B	0.0%
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	-	0	0				0	0	0			
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	-	0	0				0	0	0			
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	-	0	0				273	0	0			
	I-280 SB	Penn/25th on-ramp	Wkend w/	-	0	0				0	0	0			

EXISTING – MERGE AND DIVERGE LOS

HCM 2000
Merge Ramp Junctions
Capacity Analysis

Jurisdiction San Francisco
Analysis Year Existing 2013/2014
Analyst DW

Agency or Company Fehr & Peers
Date 2/1/2015
Project Description GSW - based on Central SoMa and Seawall Lot analysis

General Information				*Freeway Data*			*Freeway Volume Adjustment*									Effective	*On-Ramp Data*							
	Freeway/ Direction	On-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Flow Rate v_p (pcph)	Type	Lanes	Lane Add?	S_{FR} (mph)	V_R (vph)	Accel Lane (ft) L_{A1}	L_{A2}	L_{Aeff}
Existing																								
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	3	60.0	7,673	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	8,549	8,549	Left	1	No	60.0	1,089	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	3	60.0	6,325	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,047	7,047	Left	1	No	60.0	948	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	3	60.0	4,247	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,732	4,732	Left	1	No	60.0	485	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkend	3	60.0	5,018	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	5,590	5,590	Left	1	No	60.0	637	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	3	60.0	7,900	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	8,802	8,802	Left	1	No	60.0	920	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	3	60.0	6,426	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,159	7,159	Left	1	No	60.0	831	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	3	60.0	4,543	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	5,061	5,061	Left	1	No	60.0	561	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	3	60.0	5,274	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	5,876	5,876	Left	1	No	60.0	929	700	0	700
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	5	60.0	8,762	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	9,762	7,262	Right	1	No	45.0	1,089	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	5	60.0	7,273	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	8,103	5,794	Right	1	No	45.0	683	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	5	60.0	4,732	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	5,272	4,112	Right	1	No	45.0	347	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkend	5	60.0	5,655	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,300	4,788	Right	1	No	45.0	352	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	5	60.0	8,820	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	9,827	7,327	Right	1	No	45.0	1,031	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	5	60.0	7,257	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	8,085	5,781	Right	1	No	45.0	699	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	5	60.0	5,104	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	5,686	4,322	Right	1	No	45.0	671	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	5	60.0	6,203	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,911	5,045	Right	1	No	45.0	633	250	0	250
M3	I-280 SB	Mariposa on-ramp	Wkday PM	3	60.0	3,625	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,039	4,039	Right	1	No	45.0	1,231	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Eve	3	60.0	3,023	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	3,368	3,368	Right	1	No	45.0	833	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Late	3	60.0	1,655	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	1,844	1,844	Right	1	No	45.0	270	480	0	480
	I-280 SB	Mariposa on-ramp	Wkend	3	60.0	1,370	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	1,526	1,526	Right	1	No	45.0	322	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday PM w/	3	60.0	3,605	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,017	4,017	Right	1	No	45.0	1,272	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	3	60.0	3,158	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	3,519	3,519	Right	1	No	45.0	905	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Late w/	3	60.0	2,081	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	2,318	2,318	Right	1	No	45.0	562	480	0	480
	I-280 SB	Mariposa on-ramp	Wkend w/	3	60.0	1,772	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	1,974	1,974	Right	1	No	45.0	344	480	0	480
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	3	60.0	4,410	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	4,913	4,913	Right	1	No	45.0	1,130	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Eve	3	60.0	3,508	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	3,908	3,908	Right	1	No	45.0	755	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Late	3	60.0	1,746	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	1,945	1,945	Right	1	No	45.0	353	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkend	3	60.0	1,467	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	1,634	1,634	Right	1	No	45.0	239	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	3	60.0	4,600	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	5,125	5,125	Right	1	No	45.0	1,139	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	3	60.0	3,685	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	4,105	4,105	Right	1	No	45.0	746	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	3	60.0	2,420	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	2,696	2,696	Right	1	No	45.0	635	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkend w/	3	60.0	1,921	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	2,140	2,140	Right	1	No	45.0	483	350	0	350

HCM 2000
Merge Ramp Junctions
Capacity Analysis

Juri
Analy:

	General Information			*On-Ramp Volume Adjustment*									*Adjacent Upstream Ramp Data*											
	Freeway/ Direction	On-ramp	Analysis Time Period	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
Existing																								
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,213	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,056	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	540	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	710	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,025	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	926	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	625	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,035	No											
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,213	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	761	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	387	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	392	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,149	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	779	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	748	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	705	No											
M3	I-280 SB	Mariposa on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,371	No											
	I-280 SB	Mariposa on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	928	No											
	I-280 SB	Mariposa on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	301	No											
	I-280 SB	Mariposa on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	359	No											
	I-280 SB	Mariposa on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,417	No											
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,008	No											
	I-280 SB	Mariposa on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	626	No											
	I-280 SB	Mariposa on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	383	No											
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	1,259	No											
	I-280 SB	Penn/25th on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	841	No											
	I-280 SB	Penn/25th on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	393	No											
	I-280 SB	Penn/25th on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	266	No											
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	1,269	No											
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	831	No											
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	707	No											
	I-280 SB	Penn/25th on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	538	No											

HCM 2000 Juri
Merge Ramp Junctions Analy:
Capacity Analysis

General Information				*Adjacent Downstream Ramp Data*												*v_{12} Estimation*						
	Freeway/		Analysis			Volume			Truck/						Flow Rate	L_{EQ}		P_{FM} Equations				v_{12}
	Direction	On-ramp	Time Period	Exists?	Distance	(vph)	PHF	Terrain	Bus %	RV %	E_T	E_R	f_{HV}	f_P	v_p (pcph)	25-2	25-3	1	2	3	P_{FM}	(pcph)
Existing																						
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	No														0.597			0.597	5,717
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	No														0.597			0.597	4,713
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	No														0.597			0.597	3,165
	I-80 EB	Fifth/Bryant on-ramp	Wkend	No														0.597			0.597	3,739
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	No														0.597			0.597	5,886
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	No														0.597			0.597	4,788
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	No														0.597			0.597	3,385
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	No														0.597			0.597	3,929
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	No														0.585			0.128	930
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	No														0.585			0.185	1,070
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	No														0.585			0.231	952
	I-80 EB	Sterling/Bryant on-ramp	Wkend	No														0.585			0.231	1,105
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	No														0.585			0.136	998
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	No														0.585			0.182	1,054
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	No														0.585			0.186	805
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	No														0.585			0.192	967
M3	I-280 SB	Mariposa on-ramp	Wkday PM	No														0.591			0.591	2,387
	I-280 SB	Mariposa on-ramp	Wkday Eve	No														0.591			0.591	1,990
	I-280 SB	Mariposa on-ramp	Wkday Late	No														0.591			0.591	1,090
	I-280 SB	Mariposa on-ramp	Wkend	No														0.591			0.591	902
	I-280 SB	Mariposa on-ramp	Wkday PM w/	No														0.591			0.591	2,374
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	No														0.591			0.591	2,079
	I-280 SB	Mariposa on-ramp	Wkday Late w/	No														0.591			0.591	1,370
	I-280 SB	Mariposa on-ramp	Wkend w/	No														0.591			0.591	1,167
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	No														0.587			0.587	2,886
	I-280 SB	Penn/25th on-ramp	Wkday Eve	No														0.587			0.587	2,295
	I-280 SB	Penn/25th on-ramp	Wkday Late	No														0.587			0.587	1,143
	I-280 SB	Penn/25th on-ramp	Wkend	No														0.587			0.587	960
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	No														0.587			0.587	3,010
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	No														0.587			0.587	2,411
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	No														0.587			0.587	1,583
	I-280 SB	Penn/25th on-ramp	Wkend w/	No														0.587			0.587	1,257

HCM 2000 Juri
Merge Ramp Junctions Analy:
Capacity Analysis

	General Information			*Capacity Checks*																*Results*	
	Freeway/ Direction	On-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	v_{R12a} (pcph)	Max v_{R12a} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?	Density, D (pcplpm)	Level of Service
Existing																					
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	8,549	6,900	**Yes**	9,762	6,900	**Yes**	2,832	Yes	No	5,849	7,062	4,600	**Yes**	1,213	2,200	No	**-**	**F**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	7,047	6,900	**Yes**	8,103	6,900	**Yes**	2,334	No	No	4,713	5,769	4,600	**Yes**	1,056	2,200	No	**-**	**F**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	4,732	6,900	No	5,272	6,900	No	1,567	No	No	3,165	3,705	4,600	No	540	2,200	No	**29.7**	**D**
	I-80 EB	Fifth/Bryant on-ramp	Wkend	5,590	6,900	No	6,300	6,900	No	1,852	No	No	3,739	4,448	4,600	No	710	2,200	No	**35.5**	**E**
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	8,802	6,900	**Yes**	9,827	6,900	**Yes**	2,916	Yes	No	6,102	7,127	4,600	**Yes**	1,025	2,200	No	**-**	**F**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	7,159	6,900	**Yes**	8,085	6,900	**Yes**	2,372	No	No	4,788	5,714	4,600	**Yes**	926	2,200	No	**-**	**F**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	5,061	6,900	No	5,686	6,900	No	1,676	No	No	3,385	4,010	4,600	No	625	2,200	No	**32.1**	**D**
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	5,876	6,900	No	6,911	6,900	**Yes**	1,946	No	No	3,929	4,965	4,600	**Yes**	1,035	2,200	No	**-**	**F**
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	7,262	11,500	No	8,475	11,500	No	3,166	Yes	Yes	2,905	4,118	4,600	No	1,213	2,100	No	**35.5**	**E**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	5,794	11,500	No	6,555	11,500	No	2,362	No	Yes	2,318	3,078	4,600	No	761	2,100	No	**27.6**	**C**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	4,112	11,500	No	4,499	11,500	No	1,580	No	Yes	1,645	2,032	4,600	No	387	2,100	No	**19.6**	**B**
	I-80 EB	Sterling/Bryant on-ramp	Wkend	4,788	11,500	No	5,180	11,500	No	1,842	No	Yes	1,915	2,307	4,600	No	392	2,100	No	**21.7**	**C**
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	7,327	11,500	No	8,475	11,500	No	3,165	Yes	Yes	2,931	4,079	4,600	No	1,149	2,100	No	**35.2**	**E**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	5,781	11,500	No	6,560	11,500	No	2,363	No	Yes	2,312	3,091	4,600	No	779	2,100	No	**27.7**	**C**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	4,322	11,500	No	5,069	11,500	No	1,758	No	Yes	1,729	2,476	4,600	No	748	2,100	No	**22.9**	**C**
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	5,045	11,500	No	5,750	11,500	No	2,039	No	Yes	2,018	2,723	4,600	No	705	2,100	No	**24.8**	**C**
M3	I-280 SB	Mariposa on-ramp	Wkday PM	4,039	6,900	No	5,410	6,900	No	1,652	No	No	2,387	3,758	4,600	No	1,371	2,100	No	**31.1**	**D**
	I-280 SB	Mariposa on-ramp	Wkday Eve	3,368	6,900	No	4,296	6,900	No	1,378	No	No	1,990	2,918	4,600	No	928	2,100	No	**24.8**	**C**
	I-280 SB	Mariposa on-ramp	Wkday Late	1,844	6,900	No	2,145	6,900	No	754	No	No	1,090	1,391	4,600	No	301	2,100	No	**13.2**	**B**
	I-280 SB	Mariposa on-ramp	Wkend	1,526	6,900	No	1,885	6,900	No	624	No	No	902	1,261	4,600	No	359	2,100	No	**12.1**	**B**
	I-280 SB	Mariposa on-ramp	Wkday PM w/	4,017	6,900	No	5,434	6,900	No	1,643	No	No	2,374	3,791	4,600	No	1,417	2,100	No	**31.4**	**D**
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	3,519	6,900	No	4,527	6,900	No	1,439	No	No	2,079	3,088	4,600	No	1,008	2,100	No	**26.1**	**C**
	I-280 SB	Mariposa on-ramp	Wkday Late w/	2,318	6,900	No	2,944	6,900	No	948	No	No	1,370	1,996	4,600	No	626	2,100	No	**17.7**	**B**
	I-280 SB	Mariposa on-ramp	Wkend w/	1,974	7,050	No	2,357	7,050	No	808	No	No	1,167	1,550	4,600	No	383	2,100	No	**14.4**	**B**
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	4,913	7,050	No	6,172	7,050	No	2,028	No	No	2,886	4,145	4,600	No	1,259	2,100	No	**35.0**	**E**
	I-280 SB	Penn/25th on-ramp	Wkday Eve	3,908	7,050	No	4,749	7,050	No	1,613	No	No	2,295	3,136	4,600	No	841	2,100	No	**27.4**	**C**
	I-280 SB	Penn/25th on-ramp	Wkday Late	1,945	7,050	No	2,339	7,050	No	803	No	No	1,143	1,536	4,600	No	393	2,100	No	**15.1**	**B**
	I-280 SB	Penn/25th on-ramp	Wkend	1,634	7,050	No	1,901	7,050	No	675	No	No	960	1,226	4,600	No	266	2,100	No	**12.7**	**B**
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	5,125	7,050	No	6,394	7,050	No	2,115	No	No	3,010	4,279	4,600	No	1,269	2,100	No	**36.1**	**E**
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	4,105	7,050	No	4,937	7,050	No	1,694	No	No	2,411	3,242	4,600	No	831	2,100	No	**28.2**	**D**
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	2,696	7,050	No	3,403	7,050	No	1,113	No	No	1,583	2,291	4,600	No	707	2,100	No	**20.8**	**C**
	I-280 SB	Penn/25th on-ramp	Wkend w/	2,140	7,050	No	2,678	7,050	No	883	No	No	1,257	1,795	4,600	No	538	2,100	No	**17.0**	**B**

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Jurisdiction San Francisco
Analysis Year Existing 2013/2014
Analyst DW

Agency or Company Fehr & Peers
Date 2/1/2015
Project Description GSW - based on Central SoMa and Seawall Lot analysis

General Information				*Freeway Data*			*Freeway Volume Adjustment*									Effective	*Off-Ramp Data*							
	Freeway/ Direction	Off-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Flow Rate v_p (pcph)	Type	Lanes	Lane Drop?	S_{FR} (mph)	V_R (vph)	Decel Lane (ft) L_{D1}	L_{D2}	L_{Deff}
Existing																								
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	4	60	6,353	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,078	7,078	Left	2	Yes	45.0	1,180	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	4	60	6,080	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,774	6,774	Left	2	Yes	45.0	1,056	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	4	60	6,118	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,817	6,817	Left	2	Yes	45.0	350	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkend	4	60	5,578	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,215	6,215	Left	2	Yes	45.0	839	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	4	60	6,445	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,181	7,181	Left	2	Yes	45.0	1,272	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	4	60	6,156	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,858	6,858	Left	2	Yes	45.0	1,132	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	4	60	6,178	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,883	6,883	Left	2	Yes	45.0	410	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	4	60	5,743	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,399	6,399	Left	2	Yes	45.0	1,004	50	0	100
D2	I-280 NB	Mariposa off-ramp	Wkday PM	4	60	4,418	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,922	4,922	Right	1	Yes	45.0	688	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Eve	4	60	4,258	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,744	4,744	Right	1	Yes	45.0	658	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Late	4	60	1,875	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	2,089	2,089	Right	1	Yes	45.0	175	50	0	50
	I-280 NB	Mariposa off-ramp	Wkend	4	60	2,634	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	2,934	2,934	Right	1	Yes	45.0	266	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday PM w/	4	60	4,490	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	5,002	5,002	Right	1	Yes	45.0	1,241	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	4	60	4,997	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	5,567	5,567	Right	1	Yes	45.0	997	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Late w/	4	60	1,883	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	2,098	2,098	Right	1	Yes	45.0	185	50	0	50
	I-280 NB	Mariposa off-ramp	Wkend w/	4	60	2,807	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	3,127	3,127	Right	1	Yes	45.0	420	50	0	50

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Juri
Analy:

	General Information			*Off-Ramp Volume Adjustment*									*Adjacent Upstream Ramp Data*											
	Freeway/ Direction	Off-ramp	Analysis Time Period	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
Existing																								
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,315	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,177	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	390	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	935	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,417	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,261	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	457	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,119	No											
D2	I-280 NB	Mariposa off-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	767	No											
	I-280 NB	Mariposa off-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	733	No											
	I-280 NB	Mariposa off-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	195	No											
	I-280 NB	Mariposa off-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	296	No											
	I-280 NB	Mariposa off-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,383	No											
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,111	No											
	I-280 NB	Mariposa off-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	206	No											
	I-280 NB	Mariposa off-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	468	No											

HCM 2000 Juri
Diverge Ramp Junctions Analy
Capacity Analysis

	General Information			*Adjacent Downstream Ramp Data*												*v_{12} Estimation*						
	Freeway/ Direction	Off-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	L_{EQ} 25-13	L_{EQ} 25-14	P_{FD} Equations 5	P_{FD} Equations 6	P_{FD} Equations 7	P_{FD}	v_{12} (pcph)
Existing																						
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	No														0.523			0.260	3,094
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	No														0.537			0.260	2,895
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	No														0.572			0.260	2,267
	I-80 WB	Fifth/Harrison off-ramp	Wkend	No														0.562			0.260	2,538
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	No														0.515			0.260	3,207
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	No														0.531			0.260	2,988
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	No														0.567			0.260	2,340
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	No														0.549			0.260	2,741
D2	I-280 NB	Mariposa off-ramp	Wkday PM	No														0.602			0.436	2,578
	I-280 NB	Mariposa off-ramp	Wkday Eve	No														0.608			0.436	2,482
	I-280 NB	Mariposa off-ramp	Wkday Late	No														0.699			0.436	1,021
	I-280 NB	Mariposa off-ramp	Wkend	No														0.673			0.436	1,447
	I-280 NB	Mariposa off-ramp	Wkday PM w/	No														0.571			0.436	2,961
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	No														0.570			0.436	3,054
	I-280 NB	Mariposa off-ramp	Wkday Late w/	No														0.698			0.436	1,031
	I-280 NB	Mariposa off-ramp	Wkend w/	No														0.660			0.436	1,627

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

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General Information				*Capacity Checks*																*Results*	
	Freeway/ Direction	Off-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	Max v_{12} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?	Density, D (pcplpm)	Level of Service
Existing																				
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	7,078	9,200	No	1,992	No	No	3,094	4,400	No	5,763	6,900	No	1,315	4,100	No	**30.0**	**D**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	6,774	9,200	No	1,939	No	No	2,895	4,400	No	5,597	6,900	No	1,177	4,100	No	**28.2**	**D**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	6,817	9,200	No	2,275	No	Yes	2,727	4,400	No	6,427	6,900	No	390	4,100	No	**26.8**	**C**
	I-80 WB	Fifth/Harrison off-ramp	Wkend	6,215	9,200	No	1,838	No	No	2,538	4,400	No	5,280	6,900	No	935	4,100	No	**25.2**	**C**
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	7,181	9,200	No	1,987	No	No	3,207	4,400	No	5,763	6,900	No	1,417	4,100	No	**30.9**	**D**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	6,858	9,200	No	1,935	No	No	2,988	4,400	No	5,597	6,900	No	1,261	4,100	No	**29.0**	**D**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	6,883	9,200	No	2,271	No	Yes	2,753	4,400	No	6,427	6,900	No	457	4,100	No	**27.0**	**C**
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	6,399	9,200	No	1,829	No	No	2,741	4,400	No	5,280	6,900	No	1,119	4,100	No	**26.9**	**C**
D2	I-280 NB	Mariposa off-ramp	Wkday PM	4,922	9,200	No	1,172	No	No	2,578	4,400	No	4,156	6,900	No	767	2,100	No	**26.0**	**C**
	I-280 NB	Mariposa off-ramp	Wkday Eve	4,744	9,200	No	1,131	No	No	2,482	4,400	No	4,011	6,900	No	733	2,100	No	**25.1**	**C**
	I-280 NB	Mariposa off-ramp	Wkday Late	2,089	9,200	No	534	No	No	1,021	4,400	No	1,894	6,900	No	195	2,100	No	**12.6**	**B**
	I-280 NB	Mariposa off-ramp	Wkend	2,934	9,200	No	744	No	No	1,447	4,400	No	2,638	6,900	No	296	2,100	No	**16.2**	**B**
	I-280 NB	Mariposa off-ramp	Wkday PM w/	5,002	9,200	No	1,021	No	No	2,961	4,400	No	3,620	6,900	No	1,383	2,100	No	**29.3**	**D**
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	5,567	9,200	No	1,257	No	No	3,054	4,400	No	4,456	6,900	No	1,111	2,100	No	**30.1**	**D**
	I-280 NB	Mariposa off-ramp	Wkday Late w/	2,098	9,200	No	534	No	No	1,031	4,400	No	1,892	6,900	No	206	2,100	No	**12.7**	**B**
	I-280 NB	Mariposa off-ramp	Wkend w/	3,127	9,200	No	750	No	No	1,627	4,400	No	2,659	6,900	No	468	2,100	No	**17.8**	**B**

EXISTING PLUS PROJECT – NO EVENT
MERGE AND DIVERGE LOS

HCM 2000
Merge Ramp Junctions
Capacity Analysis

Jurisdiction San Francisco
Analysis Year Plus Project No Event
Analyst DW
Agency or Company Fehr & Peers
Date 2/1/2015
Project Description GSW - based on Central SoMa and Seawall Lot analysis

General Information				*Freeway Data*			*Freeway Volume Adjustment*									Effective	*On-Ramp Data*							
	Freeway/ Direction	On-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Flow Rate v_p (pcph)	Type	Lanes	Lane Add?	S_{FR} (mph)	V_R (vph)	Accel Lane (ft) L_{A1}	L_{A2}	L_{Aeff}
Existing																								
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	3	60.0	7,673	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	8,549	8,549	Left	1	No	60.0	1,123	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkend	3	60.0	5,018	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	5,590	5,590	Left	1	No	60.0	664	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	5	60.0	8,796	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	9,800	7,300	Right	1	No	45.0	1,106	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkend	5	60.0	5,682	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,330	4,811	Right	1	No	45.0	366	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
M3	I-280 SB	Mariposa on-ramp	Wkday PM	3	60.0	3,625	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,039	4,039	Right	1	No	45.0	1,360	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Eve	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Late	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkend	3	60.0	1,370	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	1,526	1,526	Right	1	No	45.0	413	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	480	0	480
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	3	60.0	4,470	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	4,980	4,980	Right	1	No	45.0	1,130	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Eve	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Late	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkend	3	60.0	1,558	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	1,736	1,736	Right	1	No	45.0	239	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350

HCM 2000
Merge Ramp Junctions
Capacity Analysis

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	General Information			*On-Ramp Volume Adjustment*									*Adjacent Upstream Ramp Data*											
	Freeway/ Direction	On-ramp	Analysis Time Period	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
Existing																								
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,251	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	740	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,232	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	408	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
M3	I-280 SB	Mariposa on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,515	No											
	I-280 SB	Mariposa on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	460	No											
	I-280 SB	Mariposa on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	1,259	No											
	I-280 SB	Penn/25th on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	266	No											
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											

	General Information			*Adjacent Downstream Ramp Data*												*v_{12} Estimation*						
	Freeway/ Direction	On-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	L_{EQ} 25-2	L_{EQ} 25-3	P_{FM} Equations 1	2	3	P_{FM}	v_{12} (pcph)
Existing																						
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	No														0.597			0.597	5,717
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkend	No														0.597			0.597	3,739
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	No														0.597			0.597	0
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	No														0.585			0.126	918
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkend	No														0.585			0.229	1,101
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	No														0.585			0.280	0
M3	I-280 SB	Mariposa on-ramp	Wkday PM	No														0.591			0.591	2,387
	I-280 SB	Mariposa on-ramp	Wkday Eve	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Late	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkend	No														0.591			0.591	902
	I-280 SB	Mariposa on-ramp	Wkday PM w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Late w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkend w/	No														0.591			0.591	0
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	No														0.587			0.587	2,925
	I-280 SB	Penn/25th on-ramp	Wkday Eve	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Late	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkend	No														0.587			0.587	1,019
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkend w/	No														0.587			0.587	0

HCM 2000
Merge Ramp Junctions
Capacity Analysis

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General Information | *Capacity Checks* | *Results*

	Freeway/ Direction	On-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	v_{R12a} (pcph)	Max v_{R12a} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?	Density, D (pcplpm)	Level of Service
Existing																					
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	8,549	6,900	**Yes**	9,800	6,900	**Yes**	2,832	Yes	No	5,849	7,100	4,600	**Yes**	1,251	2,200	No	**-**	**F**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkend	5,590	6,900	No	6,330	6,900	No	1,852	No	No	3,739	4,478	4,600	No	740	2,200	No	**35.7**	**E**
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	7,300	11,500	No	8,532	11,500	No	3,191	Yes	Yes	2,920	4,152	4,600	No	1,232	2,100	No	**35.7**	**E**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkend	4,811	11,500	No	5,219	11,500	No	1,855	No	Yes	1,924	2,332	4,600	No	408	2,100	No	**21.9**	**C**
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
M3	I-280 SB	Mariposa on-ramp	Wkday PM	4,039	6,900	No	5,554	6,900	No	1,652	No	No	2,387	3,902	4,600	No	1,515	2,100	No	**32.2**	**D**
	I-280 SB	Mariposa on-ramp	Wkday Eve	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Late	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkend	1,526	6,900	No	1,987	6,900	No	624	No	No	902	1,362	4,600	No	460	2,100	No	**12.9**	**B**
	I-280 SB	Mariposa on-ramp	Wkday PM w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Late w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkend w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	4,980	7,050	No	6,239	7,050	No	2,055	No	No	2,925	4,184	4,600	No	1,259	2,100	No	**35.3**	**E**
	I-280 SB	Penn/25th on-ramp	Wkday Eve	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Late	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkend	1,736	7,050	No	2,002	7,050	No	716	No	No	1,019	1,286	4,600	No	266	2,100	No	**13.2**	**B**
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkend w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Jurisdiction San Francisco
Agency or Company Fehr & Peers
Analysis Year Plus Project No Event
Date 2/1/2015
Analyst DW
Project Description GSW - based on Central SoMa and Seawall Lot analysis

General Information				*Freeway Data*			*Freeway Volume Adjustment*									Effective	*Off-Ramp Data*							
	Freeway/ Direction	Off-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Flow Rate v_p (pcph)	Type	Lanes	Lane Drop?	S_{FR} (mph)	V_R (vph)	Decel Lane (ft) L_{D1}	L_{D2}	L_{Deff}
Existing																								
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	4	60	6,372	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,099	7,099	Left	2	Yes	45.0	1,199	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkend	4	60	5,611	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,252	6,252	Left	2	Yes	45.0	872	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
D2	I-280 NB	Mariposa off-ramp	Wkday PM	4	60	4,463	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,972	4,972	Right	1	Yes	45.0	733	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Eve	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Late	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkend	4	60	2,702	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	3,010	3,010	Right	1	Yes	45.0	334	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday PM w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Late w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkend w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Juri
Analy:

General Information				*Off-Ramp Volume Adjustment*									*Adjacent Upstream Ramp Data*											
	Freeway/ Direction	Off-ramp	Analysis Time Period	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
Existing																								
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,336	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	972	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
D2	I-280 NB	Mariposa off-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	817	No											
	I-280 NB	Mariposa off-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	372	No											
	I-280 NB	Mariposa off-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Juri
Analy:

	General Information			*Adjacent Downstream Ramp Data*												*v_{12} Estimation*						
	Freeway/ Direction	Off-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	L_{EQ} 25-13	L_{EQ} 25-14	P_{FD} Equations 5	6	7	P_{FD}	v_{12} (pcph)
Existing																						
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	No														0.521			0.260	3,118
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkend	No														0.559			0.260	2,579
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	No														0.760			0.260	0
D2	I-280 NB	Mariposa off-ramp	Wkday PM	No														0.598			0.436	2,629
	I-280 NB	Mariposa off-ramp	Wkday Eve	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Late	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkend	No														0.668			0.436	1,522
	I-280 NB	Mariposa off-ramp	Wkday PM w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Late w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkend w/	No														0.760			0.436	0

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Juri
Analy:

General Information				*Capacity Checks*															*Results*	
	Freeway/ Direction	Off-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	Max v_{12} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?	Density, D (pcplpm)	Level of Service
Existing																				
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	7,099	9,200	No	1,991	No	No	3,118	4,400	No	5,763	6,900	No	1,336	4,100	No	**30.2**	**D**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkend	6,252	9,200	No	1,836	No	No	2,579	4,400	No	5,280	6,900	No	972	4,100	No	**25.5**	**C**
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
D2	I-280 NB	Mariposa off-ramp	Wkday PM	4,972	9,200	No	1,172	No	No	2,629	4,400	No	4,156	6,900	No	817	2,100	No	**26.4**	**C**
	I-280 NB	Mariposa off-ramp	Wkday Eve	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Late	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkend	3,010	9,200	No	744	No	No	1,522	4,400	No	2,638	6,900	No	372	2,100	No	**16.9**	**B**
	I-280 NB	Mariposa off-ramp	Wkday PM w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Late w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkend w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**

EXISTING PLUS PROJECT – CONVENTION EVENT MERGE AND DIVERGE LOS

HCM 2000
Merge Ramp Junctions
Capacity Analysis

Jurisdiction San Francisco Agency or Company Fehr & Peers
Analysis Year Plus Project With Convention Date 2/1/2015
Analyst DW Project Description GSW - based on Central SoMa and Seawall Lot analysis

General Information				*Freeway Data*			*Freeway Volume Adjustment*									Effective	*On-Ramp Data*							
	Freeway/ Direction	On-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Flow Rate v_p (pcph)	Type	Lanes	Lane Add?	S_{FR} (mph)	V_R (vph)	Accel Lane (ft) L_{A1}	L_{A2}	L_{Aeff}
Existing																								
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	3	60.0	7,673	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	8,549	8,549	Left	1	No	60.0	1,139	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkend	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	5	60.0	8,812	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	9,818	7,318	Right	1	No	45.0	1,114	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkend	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
M3	I-280 SB	Mariposa on-ramp	Wkday PM	3	60.0	3,625	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,039	4,039	Right	1	No	45.0	1,455	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Eve	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Late	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkend	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	480	0	480
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	3	60.0	4,565	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	5,086	5,086	Right	1	No	45.0	1,130	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Eve	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Late	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkend	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350

HCM 2000
Merge Ramp Junctions
Capacity Analysis

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	General Information			*On-Ramp Volume Adjustment*									*Adjacent Upstream Ramp Data*											
	Freeway/ Direction	On-ramp	Analysis Time Period	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
Existing																								
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,269	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,241	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
M3	I-280 SB	Mariposa on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,621	No											
	I-280 SB	Mariposa on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	1,259	No											
	I-280 SB	Penn/25th on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											

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General Information | *Adjacent Downstream Ramp Data* | *v_{12} Estimation*

	Freeway/ Direction	On-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	L_{EQ} 25-2	L_{EQ} 25-3	P_{FM} Equations 1	P_{FM} Equations 2	P_{FM} Equations 3	P_{FM}	v_{12} (pcph)
Existing																						
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	No														0.597			0.597	5,717
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkend	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	No														0.597			0.597	0
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	No														0.585			0.125	912
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkend	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	No														0.585			0.280	0
M3	I-280 SB	Mariposa on-ramp	Wkday PM	No														0.591			0.591	2,387
	I-280 SB	Mariposa on-ramp	Wkday Eve	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Late	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkend	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday PM w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Late w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkend w/	No														0.591			0.591	0
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	No														0.587			0.587	2,987
	I-280 SB	Penn/25th on-ramp	Wkday Eve	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Late	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkend	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkend w/	No														0.587			0.587	0

HCM 2000
Merge Ramp Junctions
Capacity Analysis

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	General Information			Capacity Checks																Results	
	Freeway/ Direction	On-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	v_{R12a} (pcph)	Max v_{R12a} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?	Density, D (pcplpm)	Level of Service
Existing																					
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	8,549	6,900	**Yes**	9,818	6,900	**Yes**	2,832	Yes	No	5,849	7,118	4,600	**Yes**	1,269	2,200	No	**-**	**F**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkend	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	7,318	11,500	No	8,559	11,500	No	3,203	Yes	Yes	2,927	4,168	4,600	No	1,241	2,100	No	**35.8**	**E**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkend	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
M3	I-280 SB	Mariposa on-ramp	Wkday PM	4,039	6,900	No	5,660	6,900	No	1,652	No	No	2,387	4,008	4,600	No	1,621	2,100	No	**33.0**	**D**
	I-280 SB	Mariposa on-ramp	Wkday Eve	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Late	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkend	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday PM w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Late w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkend w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	5,086	7,050	No	6,345	7,050	No	2,099	No	No	2,987	4,246	4,600	No	1,259	2,100	No	**35.8**	**E**
	I-280 SB	Penn/25th on-ramp	Wkday Eve	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Late	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkend	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkend w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Jurisdiction San Francisco — Agency or Company Fehr & Peers
Analysis Year Plus Project With Convention — Date 2/1/2015
Analyst DW — Project Description GSW - based on Central SoMa and Seawall Lot analysis

	General Information			*Freeway Data*			*Freeway Volume Adjustment*										Effective	*Off-Ramp Data*							
	Freeway/ Direction	Off-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Flow Rate v_p (pcph)	Type	Lanes	Lane Drop?	S_{FR} (mph)	V_R (vph)	Decel Lane (ft) L_{D1}	L_{D2}	L_{Deff}
Existing																								
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	4	60	6,371	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,098	7,098	Left	2	Yes	45.0	1,198	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkend	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
D2	I-280 NB	Mariposa off-ramp	Wkday PM	4	60	4,466	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,976	4,976	Right	1	Yes	45.0	736	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Eve	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Late	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkend	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday PM w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Late w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkend w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

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Analy

General Information				*Off-Ramp Volume Adjustment*									*Adjacent Upstream Ramp Data*											
	Freeway/ Direction	Off-ramp	Analysis Time Period	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
Existing																								
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,335	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
D2	I-280 NB	Mariposa off-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	820	No											
	I-280 NB	Mariposa off-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											

HCM 2000 Juri
Diverge Ramp Junctions Analy
Capacity Analysis

	General Information			*Adjacent Downstream Ramp Data*												*v_{12} Estimation*						
	Freeway/ Direction	Off-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	L_{EQ} 25-13	L_{EQ} 25-14	P_{FD} Equations 5	P_{FD} Equations 6	P_{FD} Equations 7	P_{FD}	v_{12} (pcph)
Existing																						
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	No														0.521			0.260	3,117
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkend	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	No														0.760			0.260	0
D2	I-280 NB	Mariposa off-ramp	Wkday PM	No														0.598			0.436	2,632
	I-280 NB	Mariposa off-ramp	Wkday Eve	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Late	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkend	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday PM w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Late w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkend w/	No														0.760			0.436	0

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Juri
Analy:

General Information				Capacity Checks															Results	
	Freeway/ Direction	Off-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	Max v_{12} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?	Density, D (pcplpm)	Level of Service
Existing																				
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	7,098	9,200	No	1,991	No	No	3,117	4,400	No	5,763	6,900	No	1,335	4,100	No	**30.2**	**D**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkend	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
D2	I-280 NB	Mariposa off-ramp	Wkday PM	4,976	9,200	No	1,172	No	No	2,632	4,400	No	4,156	6,900	No	820	2,100	No	**26.4**	**C**
	I-280 NB	Mariposa off-ramp	Wkday Eve	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Late	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkend	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday PM w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Late w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkend w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**

EXISTING PLUS PROJECT – BASKETBALL GAME
MERGE AND DIVERGE LOS

HCM 2000
Merge Ramp Junctions
Capacity Analysis

Jurisdiction San Francisco — Agency or Company Fehr & Peers
Analysis Year Plus Project With Basketball — Date 2/1/2015
Analyst DW — Project Description GSW - based on Central SoMa and Seawall Lot analysis

General Information				*Freeway Data*			*Freeway Volume Adjustment*									Effective	*On-Ramp Data*							
	Freeway/ Direction	On-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Flow Rate v_p (pcph)	Type	Lanes	Lane Add?	S_{FR} (mph)	V_R (vph)	Accel Lane (ft) L_{A1}	L_{A2}	L_{Aeff}
Existing																								
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	3	60.0	7,673	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	8,549	8,549	Left	1	No	60.0	1,121	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	3	60.0	6,325	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,047	7,047	Left	1	No	60.0	976	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	3	60.0	4,247	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,732	4,732	Left	1	No	60.0	1,058	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkend	3	60.0	5,018	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	5,590	5,590	Left	1	No	60.0	653	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	3	60.0	7,900	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	8,802	8,802	Left	1	No	60.0	952	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	3	60.0	6,426	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,159	7,159	Left	1	No	60.0	859	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	3	60.0	4,543	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	5,061	5,061	Left	1	No	60.0	1,122	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	3	60.0	5,274	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	5,876	5,876	Left	1	No	60.0	945	700	0	700
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	5	60.0	8,794	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	9,798	7,298	Right	1	No	45.0	1,105	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	5	60.0	7,301	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	8,134	5,816	Right	1	No	45.0	697	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	5	60.0	5,305	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	5,911	4,492	Right	1	No	45.0	633	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkend	5	60.0	5,671	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,318	4,802	Right	1	No	45.0	360	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	5	60.0	8,852	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	9,862	7,362	Right	1	No	45.0	1,057	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	5	60.0	7,285	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	8,117	5,803	Right	1	No	45.0	713	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	5	60.0	5,665	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,312	4,797	Right	1	No	45.0	969	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	5	60.0	6,219	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,929	5,058	Right	1	No	45.0	641	250	0	250
M3	I-280 SB	Mariposa on-ramp	Wkday PM	3	60.0	3,625	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,039	4,039	Right	1	No	45.0	1,348	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Eve	3	60.0	3,023	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	3,368	3,368	Right	1	No	45.0	891	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Late	3	60.0	1,655	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	1,844	1,844	Right	1	No	45.0	1,056	480	0	480
	I-280 SB	Mariposa on-ramp	Wkend	3	60.0	1,370	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	1,526	1,526	Right	1	No	45.0	364	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday PM w/	3	60.0	3,605	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,017	4,017	Right	1	No	45.0	1,389	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	3	60.0	3,158	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	3,519	3,519	Right	1	No	45.0	963	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Late w/	3	60.0	2,102	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	2,342	2,342	Right	1	No	45.0	1,317	480	0	480
	I-280 SB	Mariposa on-ramp	Wkend w/	3	60.0	1,772	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	1,974	1,974	Right	1	No	45.0	386	480	0	480
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	3	60.0	4,458	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	4,967	4,967	Right	1	No	45.0	1,130	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Eve	3	60.0	3,566	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	3,973	3,973	Right	1	No	45.0	755	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Late	3	60.0	2,532	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	2,821	2,821	Right	1	No	45.0	615	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkend	3	60.0	1,509	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	1,681	1,681	Right	1	No	45.0	239	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	3	60.0	4,600	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	5,125	5,125	Right	1	No	45.0	1,139	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	3	60.0	3,743	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	4,170	4,170	Right	1	No	45.0	746	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	3	60.0	3,196	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	3,560	3,560	Right	1	No	45.0	908	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkend w/	3	60.0	1,963	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	2,187	2,187	Right	1	No	45.0	483	350	0	350

HCM 2000
Merge Ramp Junctions
Capacity Analysis

Juri
Analy:

General Information				*On-Ramp Volume Adjustment*									*Adjacent Upstream Ramp Data*											
	Freeway/ Direction	On-ramp	Analysis Time Period	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
Existing																								
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,249	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,087	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,179	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	728	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,061	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	957	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,251	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,053	No											
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,231	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	776	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	706	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	401	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,177	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	794	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,079	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	714	No											
M3	I-280 SB	Mariposa on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,502	No											
	I-280 SB	Mariposa on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	993	No											
	I-280 SB	Mariposa on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,177	No											
	I-280 SB	Mariposa on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	406	No											
	I-280 SB	Mariposa on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,548	No											
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,073	No											
	I-280 SB	Mariposa on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,467	No											
	I-280 SB	Mariposa on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	430	No											
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	1,259	No											
	I-280 SB	Penn/25th on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	841	No											
	I-280 SB	Penn/25th on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	685	No											
	I-280 SB	Penn/25th on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	266	No											
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	1,269	No											
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	831	No											
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	1,011	No											
	I-280 SB	Penn/25th on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	538	No											

General Information				*Adjacent Downstream Ramp Data*												*v_{12} Estimation*						
	Freeway/ Direction	On-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	L_{EQ} 25-2	L_{EQ} 25-3	P_{FM} Equations 1	P_{FM} Equations 2	P_{FM} Equations 3	P_{FM}	v_{12} (pcph)
Existing																						
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	No														0.597			0.597	5,717
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	No														0.597			0.597	4,713
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	No														0.597			0.597	3,165
	I-80 EB	Fifth/Bryant on-ramp	Wkend	No														0.597			0.597	3,739
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	No														0.597			0.597	5,886
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	No														0.597			0.597	4,788
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	No														0.597			0.597	3,385
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	No														0.597			0.597	3,929
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	No														0.585			0.126	919
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	No														0.585			0.183	1,063
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	No														0.585			0.192	860
	I-80 EB	Sterling/Bryant on-ramp	Wkend	No														0.585			0.230	1,103
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	No														0.585			0.133	976
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	No														0.585			0.180	1,047
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	No														0.585			0.145	695
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	No														0.585			0.191	964
M3	I-280 SB	Mariposa on-ramp	Wkday PM	No														0.591			0.591	2,387
	I-280 SB	Mariposa on-ramp	Wkday Eve	No														0.591			0.591	1,990
	I-280 SB	Mariposa on-ramp	Wkday Late	No														0.591			0.591	1,090
	I-280 SB	Mariposa on-ramp	Wkend	No														0.591			0.591	902
	I-280 SB	Mariposa on-ramp	Wkday PM w/	No														0.591			0.591	2,374
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	No														0.591			0.591	2,079
	I-280 SB	Mariposa on-ramp	Wkday Late w/	No														0.591			0.591	1,384
	I-280 SB	Mariposa on-ramp	Wkend w/	No														0.591			0.591	1,167
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	No														0.587			0.587	2,917
	I-280 SB	Penn/25th on-ramp	Wkday Eve	No														0.587			0.587	2,333
	I-280 SB	Penn/25th on-ramp	Wkday Late	No														0.587			0.587	1,657
	I-280 SB	Penn/25th on-ramp	Wkend	No														0.587			0.587	987
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	No														0.587			0.587	3,010
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	No														0.587			0.587	2,449
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	No														0.587			0.587	2,091
	I-280 SB	Penn/25th on-ramp	Wkend w/	No														0.587			0.587	1,284

HCM 2000
Merge Ramp Junctions
Capacity Analysis

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Analy:

	Freeway/ Direction	On-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	v_{R12a} (pcph)	Max v_{R12a} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?	Density, D (pcplpm)	Level of Service
	General Information			*Capacity Checks*																*Results*	
Existing																					
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	8,549	6,900	**Yes**	9,798	6,900	**Yes**	2,832	Yes	No	5,849	7,098	4,600	**Yes**	1,249	2,200	No	**-**	**F**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	7,047	6,900	**Yes**	8,134	6,900	**Yes**	2,334	No	No	4,713	5,800	4,600	**Yes**	1,087	2,200	No	**-**	**F**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	4,732	6,900	No	5,911	6,900	No	1,567	No	No	3,165	4,343	4,600	No	1,179	2,200	No	**34.4**	**D**
	I-80 EB	Fifth/Bryant on-ramp	Wkend	5,590	6,900	No	6,318	6,900	No	1,852	No	No	3,739	4,466	4,600	No	728	2,200	No	**35.6**	**E**
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	8,802	6,900	**Yes**	9,862	6,900	**Yes**	2,916	Yes	No	6,102	7,162	4,600	**Yes**	1,061	2,200	No	**-**	**F**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	7,159	6,900	**Yes**	8,117	6,900	**Yes**	2,372	No	No	4,788	5,745	4,600	**Yes**	957	2,200	No	**-**	**F**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	5,061	6,900	No	6,312	6,900	No	1,676	No	No	3,385	4,635	4,600	**Yes**	1,251	2,200	No	**-**	**F**
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	5,876	6,900	No	6,929	6,900	**Yes**	1,946	No	No	3,929	4,982	4,600	**Yes**	1,053	2,200	No	**-**	**F**
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	7,298	11,500	No	8,529	11,500	No	3,190	Yes	Yes	2,919	4,150	4,600	No	1,231	2,100	No	**35.7**	**E**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	5,816	11,500	No	6,592	11,500	No	2,377	No	Yes	2,326	3,103	4,600	No	776	2,100	No	**27.8**	**C**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	4,492	11,500	No	5,198	11,500	No	1,816	No	Yes	1,797	2,503	4,600	No	706	2,100	No	**23.1**	**C**
	I-80 EB	Sterling/Bryant on-ramp	Wkend	4,802	11,500	No	5,202	11,500	No	1,849	No	Yes	1,921	2,321	4,600	No	401	2,100	No	**21.8**	**C**
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	7,362	11,500	No	8,540	11,500	No	3,193	Yes	Yes	2,945	4,122	4,600	No	1,177	2,100	No	**35.5**	**E**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	5,803	11,500	No	6,597	11,500	No	2,378	No	Yes	2,321	3,115	4,600	No	794	2,100	No	**27.8**	**C**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	4,797	11,500	No	5,876	11,500	No	2,051	No	Yes	1,919	2,998	4,600	No	1,079	2,100	No	**26.8**	**C**
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	5,058	11,500	No	5,772	11,500	No	2,047	No	Yes	2,023	2,737	4,600	No	714	2,100	No	**24.9**	**C**
M3	I-280 SB	Mariposa on-ramp	Wkday PM	4,039	6,900	No	5,541	6,900	No	1,652	No	No	2,387	3,888	4,600	No	1,502	2,100	No	**32.1**	**D**
	I-280 SB	Mariposa on-ramp	Wkday Eve	3,368	6,900	No	4,361	6,900	No	1,378	No	No	1,990	2,983	4,600	No	993	2,100	No	**25.3**	**C**
	I-280 SB	Mariposa on-ramp	Wkday Late	1,844	6,900	No	3,021	6,900	No	754	No	No	1,090	2,266	4,600	No	1,177	2,100	No	**19.6**	**B**
	I-280 SB	Mariposa on-ramp	Wkend	1,526	6,900	No	1,932	6,900	No	624	No	No	902	1,308	4,600	No	406	2,100	No	**12.5**	**B**
	I-280 SB	Mariposa on-ramp	Wkday PM w/	4,017	6,900	No	5,564	6,900	No	1,643	No	No	2,374	3,921	4,600	No	1,548	2,100	No	**32.3**	**D**
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	3,519	6,900	No	4,592	6,900	No	1,439	No	No	2,079	3,152	4,600	No	1,073	2,100	No	**26.6**	**C**
	I-280 SB	Mariposa on-ramp	Wkday Late w/	2,342	6,900	No	3,809	6,900	No	958	No	No	1,384	2,851	4,600	No	1,467	2,100	No	**24.0**	**C**
	I-280 SB	Mariposa on-ramp	Wkend w/	1,974	7,050	No	2,404	7,050	No	808	No	No	1,167	1,597	4,600	No	430	2,100	No	**14.7**	**B**
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	4,967	7,050	No	6,226	7,050	No	2,050	No	No	2,917	4,176	4,600	No	1,259	2,100	No	**35.3**	**E**
	I-280 SB	Penn/25th on-ramp	Wkday Eve	3,973	7,050	No	4,814	7,050	No	1,640	No	No	2,333	3,174	4,600	No	841	2,100	No	**27.7**	**C**
	I-280 SB	Penn/25th on-ramp	Wkday Late	2,821	7,050	No	3,507	7,050	No	1,164	No	No	1,657	2,342	4,600	No	685	2,100	No	**21.2**	**C**
	I-280 SB	Penn/25th on-ramp	Wkend	1,681	7,050	No	1,948	7,050	No	694	No	No	987	1,254	4,600	No	266	2,100	No	**12.9**	**B**
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	5,125	7,050	No	6,394	7,050	No	2,115	No	No	3,010	4,279	4,600	No	1,269	2,100	No	**36.1**	**E**
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	4,170	7,050	No	5,001	7,050	No	1,721	No	No	2,449	3,280	4,600	No	831	2,100	No	**28.5**	**D**
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	3,560	7,050	No	4,571	7,050	No	1,469	No	No	2,091	3,102	4,600	No	1,011	2,100	No	**27.0**	**C**
	I-280 SB	Penn/25th on-ramp	Wkend w/	2,187	7,050	No	2,725	7,050	No	903	No	No	1,284	1,822	4,600	No	538	2,100	No	**17.2**	**B**

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Jurisdiction San Francisco   Agency or Company Fehr & Peers
Analysis Year Plus Project With Basketball   Date 2/1/2015
Analyst DW   Project Description GSW - based on Central SoMa and Seawall Lot analysis

General Information				*Freeway Data*			*Freeway Volume Adjustment*								Flow Rate	Effective Flow Rate	*Off-Ramp Data*					Decel Lane (ft)		
	Freeway/ Direction	Off-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	v_p (pcph)	v_p (pcph)	Type	Lanes	Lane Drop?	S_{FR} (mph)	V_R (vph)	L_{D1}	L_{D2}	L_{Deff}
Existing																								
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	4	60	6,452	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,188	7,188	Left	2	Yes	45.0	1,279	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	4	60	6,826	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,605	7,605	Left	2	Yes	45.0	1,802	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	4	60	6,157	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,859	6,859	Left	2	Yes	45.0	388	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkend	4	60	6,385	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,114	7,114	Left	2	Yes	45.0	1,646	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	4	60	6,544	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,291	7,291	Left	2	Yes	45.0	1,371	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	4	60	6,901	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,688	7,688	Left	2	Yes	45.0	1,877	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	4	60	6,217	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,926	6,926	Left	2	Yes	45.0	448	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	4	60	6,550	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,298	7,298	Left	2	Yes	45.0	1,811	50	0	100
D2	I-280 NB	Mariposa off-ramp	Wkday PM	4	60	4,594	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	5,118	5,118	Right	1	Yes	45.0	864	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Eve	4	60	5,188	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	5,780	5,780	Right	1	Yes	45.0	1,588	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Late	4	60	1,917	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	2,136	2,136	Right	1	Yes	45.0	217	50	0	50
	I-280 NB	Mariposa off-ramp	Wkend	4	60	3,591	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,001	4,001	Right	1	Yes	45.0	1,223	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday PM w/	4	60	4,666	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	5,198	5,198	Right	1	Yes	45.0	1,417	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	4	60	5,926	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,602	6,602	Right	1	Yes	45.0	1,907	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Late w/	4	60	1,925	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	2,145	2,145	Right	1	Yes	45.0	227	50	0	50
	I-280 NB	Mariposa off-ramp	Wkend w/	4	60	3,701	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,123	4,123	Right	1	Yes	45.0	1,314	50	0	50

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

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General Information				Off-Ramp Volume Adjustment									Adjacent Upstream Ramp Data											
	Freeway/ Direction	Off-ramp	Analysis Time Period	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
Existing																								
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,425	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	2,008	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	433	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,834	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,527	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	2,091	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	499	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	2,018	No											
D2	I-280 NB	Mariposa off-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	963	No											
	I-280 NB	Mariposa off-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,769	No											
	I-280 NB	Mariposa off-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	242	No											
	I-280 NB	Mariposa off-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,363	No											
	I-280 NB	Mariposa off-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,579	No											
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	2,125	No											
	I-280 NB	Mariposa off-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	253	No											
	I-280 NB	Mariposa off-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,464	No											

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

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	General Information			*Adjacent Downstream Ramp Data*												*v_{12} Estimation*						
	Freeway/ Direction	Off-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	L_{EQ} 25-13	L_{EQ} 25-14	P_{FD} Equations 5	P_{FD} Equations 6	P_{FD} Equations 7	P_{FD}	v_{12} (pcph)
Existing																						
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	No														0.515			0.260	3,216
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	No														0.478			0.260	3,809
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	No														0.569			0.260	2,314
	I-80 WB	Fifth/Harrison off-ramp	Wkend	No														0.498			0.260	3,527
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	No														0.507			0.260	3,329
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	No														0.472			0.260	3,901
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	No														0.564			0.260	2,387
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	No														0.485			0.260	3,730
D2	I-280 NB	Mariposa off-ramp	Wkday PM	No														0.588			0.436	2,774
	I-280 NB	Mariposa off-ramp	Wkday Eve	No														0.534			0.436	3,518
	I-280 NB	Mariposa off-ramp	Wkday Late	No														0.695			0.436	1,068
	I-280 NB	Mariposa off-ramp	Wkend	No														0.597			0.436	2,513
	I-280 NB	Mariposa off-ramp	Wkday PM w/	No														0.557			0.436	3,157
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	No														0.497			0.436	4,077
	I-280 NB	Mariposa off-ramp	Wkday Late w/	No														0.695			0.436	1,078
	I-280 NB	Mariposa off-ramp	Wkend w/	No														0.590			0.436	2,623

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

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	General Information			*Capacity Checks*															*Results*	
	Freeway/ Direction	Off-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	Max v_{12} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?	Density, D (pcplpm)	Level of Service
Existing																				
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	7,188	9,200	No	1,986	No	No	3,216	4,400	No	5,763	6,900	No	1,425	4,100	No	**31.0**	**D**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	7,605	9,200	No	1,898	No	No	3,809	4,400	No	5,597	6,900	No	2,008	4,100	No	**36.1**	**E**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	6,859	9,200	No	2,273	No	Yes	2,744	4,400	No	6,427	6,900	No	433	4,100	No	**26.9**	**C**
	I-80 WB	Fifth/Harrison off-ramp	Wkend	7,114	9,200	No	1,793	No	No	3,527	4,400	No	5,280	6,900	No	1,834	4,100	No	**33.7**	**D**
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	7,291	9,200	No	1,981	No	No	3,329	4,400	No	5,763	6,900	No	1,527	4,100	No	**32.0**	**D**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	7,688	9,200	No	1,894	No	No	3,901	4,400	No	5,597	6,900	No	2,091	4,100	No	**36.9**	**E**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	6,926	9,200	No	2,269	No	Yes	2,770	4,400	No	6,427	6,900	No	499	4,100	No	**27.2**	**C**
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	7,298	9,200	No	1,784	No	No	3,730	4,400	No	5,280	6,900	No	2,018	4,100	No	**35.4**	**E**
D2	I-280 NB	Mariposa off-ramp	Wkday PM	5,118	9,200	No	1,172	No	No	2,774	4,400	No	4,156	6,900	No	963	2,100	No	**27.7**	**C**
	I-280 NB	Mariposa off-ramp	Wkday Eve	5,780	9,200	No	1,131	No	No	3,518	4,400	No	4,011	6,900	No	1,769	2,100	No	**34.1**	**D**
	I-280 NB	Mariposa off-ramp	Wkday Late	2,136	9,200	No	534	No	No	1,068	4,400	No	1,894	6,900	No	242	2,100	No	**13.0**	**B**
	I-280 NB	Mariposa off-ramp	Wkend	4,001	9,200	No	744	No	No	2,513	4,400	No	2,638	6,900	No	1,363	2,100	No	**25.4**	**C**
	I-280 NB	Mariposa off-ramp	Wkday PM w/	5,198	9,200	No	1,021	No	No	3,157	4,400	No	3,620	6,900	No	1,579	2,100	No	**31.0**	**D**
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	6,602	9,200	No	1,263	No	No	4,077	4,400	No	4,477	6,900	No	2,125	2,100	**Yes**	**-**	**F**
	I-280 NB	Mariposa off-ramp	Wkday Late w/	2,145	9,200	No	534	No	No	1,078	4,400	No	1,892	6,900	No	253	2,100	No	**13.1**	**B**
	I-280 NB	Mariposa off-ramp	Wkend w/	4,123	9,200	No	750	No	No	2,623	4,400	No	2,659	6,900	No	1,464	2,100	No	**26.4**	**C**

2040 Cumulative with Project – No Event
Merge and Diverge LOS

HCM 2000
Merge Ramp Junctions
Capacity Analysis

Jurisdiction San Francisco　Agency or Company Fehr & Peers
Analysis Year 2040 Cumu No Event　Date 2/1/2015
Analyst DW　Project Description GSW - based on Central SoMa and Seawall Lot analysis

General Information				*Freeway Data*			*Freeway Volume Adjustment*									Effective	*On-Ramp Data*							
	Freeway/ Direction	On-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Flow Rate v_p (pcph)	Type	Lanes	Lane Add?	S_{FR} (mph)	V_R (vph)	Accel Lane (ft) L_{A1}	L_{A2}	L_{Aeff}
Existing																								
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	3	60.0	7,758	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	8,643	8,643	Left	1	No	60.0	705	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkend	3	60.0	5,425	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,044	6,044	Left	1	No	60.0	477	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	5	60.0	8,463	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	9,429	6,929	Right	1	No	45.0	1,757	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkend	5	60.0	5,902	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,575	4,800	Right	1	No	45.0	644	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
M3	I-280 SB	Mariposa on-ramp	Wkday PM	3	60.0	4,273	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,761	4,761	Right	1	No	45.0	1,846	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Eve	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Late	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkend	3	60.0	1,602	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	1,785	1,785	Right	1	No	45.0	515	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	480	0	480
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	3	60.0	5,477	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	6,102	6,102	Right	1	No	45.0	1,517	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Eve	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Late	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkend	3	60.0	1,880	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	2,095	2,095	Right	1	No	45.0	323	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350

HCM 2000
Merge Ramp Junctions
Capacity Analysis

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Analy:

	General Information			*On-Ramp Volume Adjustment*									*Adjacent Upstream Ramp Data*											
	Freeway/ Direction	On-ramp	Analysis Time Period	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
Existing																								
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	785	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	531	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,958	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	718	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
M3	I-280 SB	Mariposa on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	2,057	No											
	I-280 SB	Mariposa on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	574	No											
	I-280 SB	Mariposa on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	1,690	No											
	I-280 SB	Penn/25th on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	360	No											
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											

HCM 2000
Merge Ramp Junctions
Capacity Analysis

Juri
Analy:

General Information				*Adjacent Downstream Ramp Data*												*v_{12} Estimation*						
	Freeway/ Direction	On-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	L_{EQ} 25-2	L_{EQ} 25-3	P_{FM} Equations 1	P_{FM} Equations 2	P_{FM} Equations 3	P_{FM}	v_{12} (pcph)
Existing																						
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	No														0.597			0.597	5,780
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkend	No														0.597			0.597	4,042
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	No														0.597			0.597	0
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	No														0.585			0.035	243
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkend	No														0.585			0.190	912
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	No														0.585			0.280	0
M3	I-280 SB	Mariposa on-ramp	Wkday PM	No														0.591			0.591	2,813
	I-280 SB	Mariposa on-ramp	Wkday Eve	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Late	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkend	No														0.591			0.591	1,055
	I-280 SB	Mariposa on-ramp	Wkday PM w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Late w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkend w/	No														0.591			0.591	0
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	No														0.587			0.587	3,584
	I-280 SB	Penn/25th on-ramp	Wkday Eve	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Late	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkend	No														0.587			0.587	1,230
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkend w/	No														0.587			0.587	0

HCM 2000
Merge Ramp Junctions
Capacity Analysis

Juri
Analy:

General Information				*Capacity Checks*																*Results*	
	Freeway/ Direction	On-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	v_{R12a} (pcph)	Max v_{R12a} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?	Density, D (pcplpm)	Level of Service
Existing																					
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	8,643	6,900	**Yes**	9,429	6,900	**Yes**	2,863	Yes	No	5,943	6,729	4,600	**Yes**	785	2,200	No	**-**	**F**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkend	6,044	6,900	No	6,575	6,900	No	2,002	No	No	4,042	4,573	4,600	No	531	2,200	No	**36.5**	**E**
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	6,929	11,500	No	8,886	11,500	No	3,343	Yes	Yes	2,772	4,729	4,600	**Yes**	1,958	2,100	No	**-**	**F**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkend	4,800	11,500	No	5,517	11,500	No	1,944	No	Yes	1,920	2,637	4,600	No	718	2,100	No	**24.1**	**C**
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
M3	I-280 SB	Mariposa on-ramp	Wkday PM	4,761	6,900	No	6,817	6,900	No	1,947	No	No	2,813	4,870	4,600	**Yes**	2,057	2,100	No	**-**	**F**
	I-280 SB	Mariposa on-ramp	Wkday Eve	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Late	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkend	1,785	6,900	No	2,359	6,900	No	730	No	No	1,055	1,629	4,600	No	574	2,100	No	**14.9**	**B**
	I-280 SB	Mariposa on-ramp	Wkday PM w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Late w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkend w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	6,102	7,050	No	7,792	7,050	**Yes**	2,518	No	No	3,584	5,274	4,600	**Yes**	1,690	2,100	No	**-**	**F**
	I-280 SB	Penn/25th on-ramp	Wkday Eve	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Late	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkend	2,095	7,050	No	2,455	7,050	No	864	No	No	1,230	1,590	4,600	No	360	2,100	No	**15.5**	**B**
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkend w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Jurisdiction San Francisco
Analysis Year 2040 Cumu No Event
Analyst DW

Agency or Company Fehr & Peers
Date 2/1/2015
Project Description GSW - based on Central SoMa and Seawall Lot analysis

General Information				*Freeway Data*			*Freeway Volume Adjustment*									Effective	*Off-Ramp Data*					Decel Lane (ft)		
	Freeway/ Direction	Off-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Flow Rate v_p (pcph)	Type	Lanes	Lane Drop?	S_{FR} (mph)	V_R (vph)	L_{D1}	L_{D2}	L_{Deff}
Existing																								
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	4	60	7,340	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	8,178	8,178	Left	2	Yes	45.0	2,167	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkend	4	60	6,295	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,014	7,014	Left	2	Yes	45.0	1,556	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
D2	I-280 NB	Mariposa off-ramp	Wkday PM	4	60	5,468	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,092	6,092	Right	1	Yes	45.0	1,285	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Eve	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Late	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkend	4	60	2,909	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	3,241	3,241	Right	1	Yes	45.0	541	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday PM w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Late w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkend w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50

HCM 2000 Juri
Diverge Ramp Junctions Analy:
Capacity Analysis

General Information				Off-Ramp Volume Adjustment									Adjacent Upstream Ramp Data												
	Freeway/ Direction	Off-ramp	Analysis Time Period	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
Existing																								
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	2,414	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,734	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
D2	I-280 NB	Mariposa off-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,432	No											
	I-280 NB	Mariposa off-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	603	No											
	I-280 NB	Mariposa off-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Juri
Analy:

	General Information			*Adjacent Downstream Ramp Data*												*v_{12} Estimation*						
	Freeway/ Direction	Off-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	L_{EQ} 25-13	L_{EQ} 25-14	P_{FD} Equations 5	P_{FD} Equations 6	P_{FD} Equations 7	P_{FD}	v_{12} (pcph)
Existing																						
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	No														0.444			0.260	4,304
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkend	No														0.505			0.260	3,417
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	No														0.760			0.260	0
D2	I-280 NB	Mariposa off-ramp	Wkday PM	No														0.542			0.436	3,464
	I-280 NB	Mariposa off-ramp	Wkday Eve	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Late	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkend	No														0.651			0.436	1,753
	I-280 NB	Mariposa off-ramp	Wkday PM w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Late w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkend w/	No														0.760			0.436	0

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Juri
Analy:

General Information | *Capacity Checks* | *Results*

	Freeway/ Direction	Off-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	Max v_{12} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?	Density, D (pcplpm)	Level of Service
Existing																				
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	8,178	9,200	No	1,937	No	No	4,304	4,400	No	5,763	6,900	No	2,414	4,100	No	**40.4**	**E**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkend	7,014	9,200	No	1,798	No	No	3,417	4,400	No	5,280	6,900	No	1,734	4,100	No	**32.7**	**D**
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
D2	I-280 NB	Mariposa off-ramp	Wkday PM	6,092	9,200	No	1,314	No	No	3,464	4,400	No	4,660	6,900	No	1,432	2,100	No	**33.6**	**D**
	I-280 NB	Mariposa off-ramp	Wkday Eve	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Late	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkend	3,241	9,200	No	744	No	No	1,753	4,400	No	2,638	6,900	No	603	2,100	No	**18.9**	**B**
	I-280 NB	Mariposa off-ramp	Wkday PM w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Late w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkend w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**

2040 Cumulative with Project – Convention Event Merge and Diverge LOS

HCM 2000
Merge Ramp Junctions
Capacity Analysis

Jurisdiction San Francisco Agency or Company Fehr & Peers
Analysis Year 2040 Cumu With Convention Date 2/1/2015
Analyst DW Project Description GSW - based on Central SoMa and Seawall Lot analysis

General Information				*Freeway Data*			*Freeway Volume Adjustment*									Effective	*On-Ramp Data*							
	Freeway/ Direction	On-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Flow Rate v_p (pcph)	Type	Lanes	Lane Add?	S_{FR} (mph)	V_R (vph)	Accel Lane (ft) L_{A1}	L_{A2}	L_{Aeff}
Existing																								
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	3	60.0	7,758	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	8,643	8,643	Left	1	No	60.0	721	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkend	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	5	60.0	8,479	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	9,447	6,947	Right	1	No	45.0	1,766	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkend	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
M3	I-280 SB	Mariposa on-ramp	Wkday PM	3	60.0	4,273	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,761	4,761	Right	1	No	45.0	1,941	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Eve	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Late	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkend	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	480	0	480
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	3	60.0	5,572	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	6,208	6,208	Right	1	No	45.0	1,517	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Eve	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Late	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkend	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350

HCM 2000
Merge Ramp Junctions
Capacity Analysis

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	General Information			*On-Ramp Volume Adjustment*									*Adjacent Upstream Ramp Data*											
	Freeway/ Direction	On-ramp	Analysis Time Period	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
Existing																								
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	803	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,968	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
M3	I-280 SB	Mariposa on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	2,163	No											
	I-280 SB	Mariposa on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	1,690	No											
	I-280 SB	Penn/25th on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											

HCM 2000
Merge Ramp Junctions
Capacity Analysis

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General Information | *Adjacent Downstream Ramp Data* | *v_{12} Estimation*

	Freeway/ Direction	On-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	L_{EQ} 25-2	L_{EQ} 25-3	P_{FM} Equations 1	P_{FM} Equations 2	P_{FM} Equations 3	P_{FM}	v_{12} (pcph)
Existing																						
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	No														0.597			0.597	5,780
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkend	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	No														0.597			0.597	0
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	No														0.585			0.034	235
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkend	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	No														0.585			0.280	0
M3	I-280 SB	Mariposa on-ramp	Wkday PM	No														0.591			0.591	2,813
	I-280 SB	Mariposa on-ramp	Wkday Eve	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Late	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkend	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday PM w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Late w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkend w/	No														0.591			0.591	0
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	No														0.587			0.587	3,646
	I-280 SB	Penn/25th on-ramp	Wkday Eve	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Late	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkend	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkend w/	No														0.587			0.587	0

HCM 2000
Merge Ramp Junctions
Capacity Analysis

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	General Information			*Capacity Checks*																*Results*	
	Freeway/ Direction	On-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	v_{R12a} (pcph)	Max v_{R12a} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?	Density, D (pcplpm)	Level of Service
Existing																					
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	8,643	6,900	**Yes**	9,447	6,900	**Yes**	2,863	Yes	No	5,943	6,747	4,600	**Yes**	803	2,200	No	**-**	**F**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkend	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	6,947	11,500	No	8,914	11,500	No	3,356	Yes	Yes	2,779	4,746	4,600	**Yes**	1,968	2,100	No	**-**	**F**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkend	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
M3	I-280 SB	Mariposa on-ramp	Wkday PM	4,761	6,900	No	6,923	6,900	**Yes**	1,947	No	No	2,813	4,976	4,600	**Yes**	2,163	2,100	**Yes**	**-**	**F**
	I-280 SB	Mariposa on-ramp	Wkday Eve	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Late	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkend	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday PM w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Late w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkend w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	6,208	7,050	No	7,898	7,050	**Yes**	2,562	No	No	3,646	5,336	4,600	**Yes**	1,690	2,100	No	**-**	**F**
	I-280 SB	Penn/25th on-ramp	Wkday Eve	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Late	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkend	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkend w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Jurisdiction San Francisco | Agency or Company Fehr & Peers
Analysis Year 2040 Cumu With Convention | Date 2/1/2015
Analyst DW | Project Description GSW - based on Central SoMa and Seawall Lot analysis

General Information				*Freeway Data*			*Freeway Volume Adjustment*									Effective	*Off-Ramp Data*							
	Freeway/ Direction	Off-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Flow Rate v_p (pcph)	Type	Lanes	Lane Drop?	S_{FR} (mph)	V_R (vph)	Decel Lane (ft) L_{D1}	L_{D2}	L_{Deff}
Existing																								
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	4	60	7,338	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	8,175	8,175	Left	2	Yes	45.0	2,165	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkend	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
D2	I-280 NB	Mariposa off-ramp	Wkday PM	4	60	5,472	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,097	6,097	Right	1	Yes	45.0	1,289	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Eve	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Late	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkend	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday PM w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Late w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkend w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Juri
Analy:

General Information				Off-Ramp Volume Adjustment									Adjacent Upstream Ramp Data											
	Freeway/ Direction	Off-ramp	Analysis Time Period	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
Existing																								
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	2,412	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
D2	I-280 NB	Mariposa off-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,436	No											
	I-280 NB	Mariposa off-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Juri
Analy:

General Information				*Adjacent Downstream Ramp Data*												*v_{12} Estimation*						
	Freeway/ Direction	Off-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	L_{EQ} 25-13	L_{EQ} 25-14	P_{FD} Equations 5	6	7	P_{FD}	v_{12} (pcph)
Existing																						
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	No														0.445			0.260	4,302
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkend	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	No														0.760			0.260	0
D2	I-280 NB	Mariposa off-ramp	Wkday PM	No														0.542			0.436	3,468
	I-280 NB	Mariposa off-ramp	Wkday Eve	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Late	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkend	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday PM w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Late w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkend w/	No														0.760			0.436	0

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Juri
Analy:

General Information				Capacity Checks																Results	
	Freeway/ Direction	Off-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	Max v_{12} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?	Density, D (pcplpm)	Level of Service
Existing																				
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	8,175	9,200	No	1,937	No	No	4,302	4,400	No	5,763	6,900	No	2,412	4,100	No	**40.3**	**E**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkend	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
D2	I-280 NB	Mariposa off-ramp	Wkday PM	6,097	9,200	No	1,314	No	No	3,468	4,400	No	4,660	6,900	No	1,436	2,100	No	**33.6**	**D**
	I-280 NB	Mariposa off-ramp	Wkday Eve	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Late	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkend	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday PM w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Late w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkend w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**

2040 Cumulative with Project – Basketball Game Merge and Diverge LOS

HCM 2000
Merge Ramp Junctions
Capacity Analysis

Jurisdiction San Francisco   Agency or Company Fehr & Peers
Analysis Year 2040 Cumu With Basketball   Date 2/1/2015
Analyst DW   Project Description GSW - based on Central SoMa and Seawall Lot analysis

General Information				*Freeway Data*			*Freeway Volume Adjustment*										Effective	*On-Ramp Data*							
	Freeway/ Direction	On-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Flow Rate v_p (pcph)	Type	Lanes	Lane Add?	S_{FR} (mph)	V_R (vph)	Accel Lane (ft) L_{A1}	L_{A2}	L_{Aeff}
Existing																								
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	3	60.0	7,758	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	8,643	8,643	Left	1	No	60.0	703	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkend	3	60.0	5,425	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,044	6,044	Left	1	No	60.0	466	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	5	60.0	8,461	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	9,427	6,927	Right	1	No	45.0	1,756	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkend	5	60.0	5,891	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,563	4,791	Right	1	No	45.0	638	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
M3	I-280 SB	Mariposa on-ramp	Wkday PM	3	60.0	4,273	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,761	4,761	Right	1	No	45.0	1,834	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Eve	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Late	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkend	3	60.0	1,602	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	1,785	1,785	Right	1	No	45.0	466	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	480	0	480
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	3	60.0	5,465	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	6,089	6,089	Right	1	No	45.0	1,517	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Eve	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Late	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkend	3	60.0	1,831	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	2,040	2,040	Right	1	No	45.0	323	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350

HCM 2000 Juri
Merge Ramp Junctions Analy:
Capacity Analysis

	General Information			*On-Ramp Volume Adjustment*									*Adjacent Upstream Ramp Data*											
	Freeway/ Direction	On-ramp	Analysis Time Period	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
Existing																								
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	783	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	519	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,956	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	711	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
M3	I-280 SB	Mariposa on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	2,043	No											
	I-280 SB	Mariposa on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	519	No											
	I-280 SB	Mariposa on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	1,690	No											
	I-280 SB	Penn/25th on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	360	No											
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											

HCM 2000
Merge Ramp Junctions
Capacity Analysis

Juri
Analy:

	General Information			*Adjacent Downstream Ramp Data*												*v_{12} Estimation*						
	Freeway/ Direction	On-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	L_{EQ} 25-2	L_{EQ} 25-3	P_{FM} Equations 1	P_{FM} Equations 2	P_{FM} Equations 3	P_{FM}	v_{12} (pcph)
Existing																						
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	No														0.597			0.597	5,780
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkend	No														0.597			0.597	4,042
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	No														0.597			0.597	0
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	No														0.585			0.035	244
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkend	No														0.585			0.191	915
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	No														0.585			0.280	0
M3	I-280 SB	Mariposa on-ramp	Wkday PM	No														0.591			0.591	2,813
	I-280 SB	Mariposa on-ramp	Wkday Eve	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Late	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkend	No														0.591			0.591	1,055
	I-280 SB	Mariposa on-ramp	Wkday PM w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Late w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkend w/	No														0.591			0.591	0
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	No														0.587			0.587	3,576
	I-280 SB	Penn/25th on-ramp	Wkday Eve	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Late	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkend	No														0.587			0.587	1,198
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkend w/	No														0.587			0.587	0

HCM 2000
Merge Ramp Junctions
Capacity Analysis

Juri
Analy:

	General Information			*Capacity Checks*															*Results*	
	Freeway/ Direction	On-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	v_{R12a} (pcph)	Max v_{R12a} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?	Density, D (pcplpm)	Level of Service
Existing																					
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	8,643	6,900	**Yes**	9,427	6,900	**Yes**	2,863	Yes	No	5,943	6,727	4,600	**Yes**	783	2,200	No	**-**	**F**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkend	6,044	6,900	No	6,563	6,900	No	2,002	No	No	4,042	4,561	4,600	No	519	2,200	No	**36.4**	**E**
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	6,927	11,500	No	8,883	11,500	No	3,341	Yes	Yes	2,771	4,727	4,600	**Yes**	1,956	2,100	No	**-**	**F**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkend	4,791	11,500	No	5,502	11,500	No	1,938	No	Yes	1,916	2,627	4,600	No	711	2,100	No	**24.1**	**C**
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
M3	I-280 SB	Mariposa on-ramp	Wkday PM	4,761	6,900	No	6,804	6,900	No	1,947	No	No	2,813	4,857	4,600	**Yes**	2,043	2,100	No	**-**	**F**
	I-280 SB	Mariposa on-ramp	Wkday Eve	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Late	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkend	1,785	6,900	No	2,304	6,900	No	730	No	No	1,055	1,574	4,600	No	519	2,100	No	**14.5**	**B**
	I-280 SB	Mariposa on-ramp	Wkday PM w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Late w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkend w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	6,089	7,050	No	7,779	7,050	**Yes**	2,513	No	No	3,576	5,266	4,600	**Yes**	1,690	2,100	No	**-**	**F**
	I-280 SB	Penn/25th on-ramp	Wkday Eve	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Late	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkend	2,040	7,050	No	2,400	7,050	No	842	No	No	1,198	1,558	4,600	No	360	2,100	No	**15.3**	**B**
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkend w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Jurisdiction San Francisco
Agency or Company Fehr & Peers
Analysis Year 2040 Cumu With Basketball
Date 2/1/2015
Analyst DW
Project Description GSW - based on Central SoMa and Seawall Lot analysis

General Information				*Freeway Data*			*Freeway Volume Adjustment*									Effective	*Off-Ramp Data*							
	Freeway/ Direction	Off-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Flow Rate v_p (pcph)	Type	Lanes	Lane Drop?	S_{FR} (mph)	V_R (vph)	Decel Lane (ft) L_{D1}	L_{D2}	L_{Deff}
Existing																								
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	4	60	7,419	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	8,266	8,266	Left	2	Yes	45.0	2,246	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkend	4	60	7,069	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,876	7,876	Left	2	Yes	45.0	2,330	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
D2	I-280 NB	Mariposa off-ramp	Wkday PM	4	60	5,599	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,238	6,238	Right	1	Yes	45.0	1,416	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Eve	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Late	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkend	4	60	3,798	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,231	4,231	Right	1	Yes	45.0	1,430	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday PM w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Late w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkend w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Juri
Analy:

General Information | *Off-Ramp Volume Adjustment* | *Adjacent Upstream Ramp Data*

	Freeway/ Direction	Off-ramp	Analysis Time Period	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
Existing																								
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	2,502	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	2,596	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
D2	I-280 NB	Mariposa off-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,578	No											
	I-280 NB	Mariposa off-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,593	No											
	I-280 NB	Mariposa off-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											

HCM 2000 Juri
Diverge Ramp Junctions Analy
Capacity Analysis

General Information / *Adjacent Downstream Ramp Data* / *v_{12} Estimation*

	Freeway/ Direction	Off-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	L_{EQ} 25-13	L_{EQ} 25-14	P_{FD} Equations 5	6	7	P_{FD}	v_{12} (pcph)
Existing																						
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	No														0.438			0.260	4,401
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkend	No														0.444			0.260	4,366
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	No														0.760			0.260	0
D2	I-280 NB	Mariposa off-ramp	Wkday PM	No														0.531			0.436	3,610
	I-280 NB	Mariposa off-ramp	Wkday Eve	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Late	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkend	No														0.581			0.436	2,743
	I-280 NB	Mariposa off-ramp	Wkday PM w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Late w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkend w/	No														0.760			0.436	0

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Juri
Analy:

	General Information			*Capacity Checks*															*Results*	
	Freeway/ Direction	Off-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	Max v_{12} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?	Density, D (pcplpm)	Level of Service
Existing																				
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	8,266	9,200	No	1,932	No	No	4,401	4,400	**Yes**	5,763	6,900	No	2,502	4,100	No	**-**	**F**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkend	7,876	9,200	No	1,755	No	No	4,366	4,400	No	5,280	6,900	No	2,596	4,100	No	**40.9**	**E**
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
D2	I-280 NB	Mariposa off-ramp	Wkday PM	6,238	9,200	No	1,314	No	No	3,610	4,400	No	4,660	6,900	No	1,578	2,100	No	**34.8**	**D**
	I-280 NB	Mariposa off-ramp	Wkday Eve	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Late	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkend	4,231	9,200	No	744	No	No	2,743	4,400	No	2,638	6,900	No	1,593	2,100	No	**27.4**	**C**
	I-280 NB	Mariposa off-ramp	Wkday PM w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Late w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkend w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**

EXISTING PLUS PROJECT – BASKETBALL GAME – NO TSP MERGE AND DIVERGE LOS

HCM 2000
Merge Ramp Junctions
Capacity Analysis

Jurisdiction San Francisco Agency or Company Fehr & Peers
Analysis Year No TSP - PP with Basketball Date 2/1/2015
Analyst DW Project Description GSW - based on Central SoMa and Seawall Lot analysis

General Information				*Freeway Data*			*Freeway Volume Adjustment*									Effective	*On-Ramp Data*							
	Freeway/ Direction	On-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Flow Rate v_p (pcph)	Type	Lanes	Lane Add?	S_{FR} (mph)	V_R (vph)	Accel Lane (ft) L_{A1}	L_{A2}	L_{Aeff}
Existing																								
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	3	60.0	7,673	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	8,549	8,549	Left	1	No	60.0	1,123	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	3	60.0	6,325	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,047	7,047	Left	1	No	60.0	1,004	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	3	60.0	4,247	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,732	4,732	Left	1	No	60.0	1,226	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkend	3	60.0	5,018	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	5,590	5,590	Left	1	No	60.0	678	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	5	60.0	8,796	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	9,800	7,300	Right	1	No	45.0	1,106	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	5	60.0	7,329	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	8,166	5,838	Right	1	No	45.0	711	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	5	60.0	5,473	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,098	4,634	Right	1	No	45.0	717	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkend	5	60.0	5,696	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,346	4,823	Right	1	No	45.0	373	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
M3	I-280 SB	Mariposa on-ramp	Wkday PM	3	60.0	3,625	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,039	4,039	Right	1	No	45.0	1,351	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Eve	3	60.0	3,023	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	3,368	3,368	Right	1	No	45.0	931	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Late	3	60.0	1,655	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	1,844	1,844	Right	1	No	45.0	1,176	480	0	480
	I-280 SB	Mariposa on-ramp	Wkend	3	60.0	1,370	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	1,526	1,526	Right	1	No	45.0	400	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	480	0	480
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	3	60.0	4,461	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	4,970	4,970	Right	1	No	45.0	1,130	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Eve	3	60.0	3,606	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	4,018	4,018	Right	1	No	45.0	755	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Late	3	60.0	2,652	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	2,955	2,955	Right	1	No	45.0	655	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkend	3	60.0	1,545	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	1,721	1,721	Right	1	No	45.0	239	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350

HCM 2000
Merge Ramp Junctions
Capacity Analysis

Juri
Analy:

General Information				*On-Ramp Volume Adjustment*									*Adjacent Upstream Ramp Data*											
	Freeway/ Direction	On-ramp	Analysis Time Period	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
Existing																								
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,251	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,119	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,366	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	756	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,232	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	792	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	799	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	415	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
M3	I-280 SB	Mariposa on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,505	No											
	I-280 SB	Mariposa on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,038	No											
	I-280 SB	Mariposa on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,310	No											
	I-280 SB	Mariposa on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	445	No											
	I-280 SB	Mariposa on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	1,259	No											
	I-280 SB	Penn/25th on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	841	No											
	I-280 SB	Penn/25th on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	730	No											
	I-280 SB	Penn/25th on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	266	No											
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											

General Information				*Adjacent Downstream Ramp Data*												*v_{12} Estimation*						
	Freeway/ Direction	On-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	L_{EQ} 25-2	L_{EQ} 25-3	P_{FM} Equations 1	P_{FM} Equations 2	P_{FM} Equations 3	P_{FM}	v_{12} (pcph)
Existing																						
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	No														0.597			0.597	5,717
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	No														0.597			0.597	4,713
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	No														0.597			0.597	3,165
	I-80 EB	Fifth/Bryant on-ramp	Wkend	No														0.597			0.597	3,739
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	No														0.597			0.597	0
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	No														0.585			0.126	918
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	No														0.585			0.181	1,055
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	No														0.585			0.180	833
	I-80 EB	Sterling/Bryant on-ramp	Wkend	No														0.585			0.228	1,099
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	No														0.585			0.280	0
M3	I-280 SB	Mariposa on-ramp	Wkday PM	No														0.591			0.591	2,387
	I-280 SB	Mariposa on-ramp	Wkday Eve	No														0.591			0.591	1,990
	I-280 SB	Mariposa on-ramp	Wkday Late	No														0.591			0.591	1,090
	I-280 SB	Mariposa on-ramp	Wkend	No														0.591			0.591	902
	I-280 SB	Mariposa on-ramp	Wkday PM w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Late w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkend w/	No														0.591			0.591	0
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	No														0.587			0.587	2,919
	I-280 SB	Penn/25th on-ramp	Wkday Eve	No														0.587			0.587	2,360
	I-280 SB	Penn/25th on-ramp	Wkday Late	No														0.587			0.587	1,735
	I-280 SB	Penn/25th on-ramp	Wkend	No														0.587			0.587	1,011
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkend w/	No														0.587			0.587	0

HCM 2000
Merge Ramp Junctions
Capacity Analysis

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General Information				Capacity Checks																Results	
	Freeway/ Direction	On-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	v_{R12a} (pcph)	Max v_{R12a} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?	Density, D (pcplpm)	Level of Service
Existing																					
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	8,549	6,900	**Yes**	9,800	6,900	**Yes**	2,832	Yes	No	5,849	7,100	4,600	**Yes**	1,251	2,200	No	**-**	**F**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	7,047	6,900	**Yes**	8,166	6,900	**Yes**	2,334	No	No	4,713	5,831	4,600	**Yes**	1,119	2,200	No	**-**	**F**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	4,732	6,900	No	6,098	6,900	No	1,567	No	No	3,165	4,530	4,600	No	1,366	2,200	No	**35.8**	**E**
	I-80 EB	Fifth/Bryant on-ramp	Wkend	5,590	6,900	No	6,346	6,900	No	1,852	No	No	3,739	4,494	4,600	No	756	2,200	No	**35.8**	**E**
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	7,300	11,500	No	8,532	11,500	No	3,191	Yes	Yes	2,920	4,152	4,600	No	1,232	2,100	No	**35.7**	**E**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	5,838	11,500	No	6,631	11,500	No	2,392	No	Yes	2,335	3,128	4,600	No	792	2,100	No	**27.9**	**C**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	4,634	11,500	No	5,434	11,500	No	1,900	No	Yes	1,854	2,653	4,600	No	799	2,100	No	**24.2**	**C**
	I-80 EB	Sterling/Bryant on-ramp	Wkend	4,823	11,500	No	5,238	11,500	No	1,862	No	Yes	1,929	2,344	4,600	No	415	2,100	No	**22.0**	**C**
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
M3	I-280 SB	Mariposa on-ramp	Wkday PM	4,039	6,900	No	5,544	6,900	No	1,652	No	No	2,387	3,892	4,600	No	1,505	2,100	No	**32.1**	**D**
	I-280 SB	Mariposa on-ramp	Wkday Eve	3,368	6,900	No	4,406	6,900	No	1,378	No	No	1,990	3,028	4,600	No	1,038	2,100	No	**25.6**	**C**
	I-280 SB	Mariposa on-ramp	Wkday Late	1,844	6,900	No	3,154	6,900	No	754	No	No	1,090	2,400	4,600	No	1,310	2,100	No	**20.6**	**C**
	I-280 SB	Mariposa on-ramp	Wkend	1,526	6,900	No	1,972	6,900	No	624	No	No	902	1,347	4,600	No	445	2,100	No	**12.8**	**B**
	I-280 SB	Mariposa on-ramp	Wkday PM w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Late w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkend w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	4,970	7,050	No	6,229	7,050	No	2,051	No	No	2,919	4,178	4,600	No	1,259	2,100	No	**35.3**	**E**
	I-280 SB	Penn/25th on-ramp	Wkday Eve	4,018	7,050	No	4,859	7,050	No	1,658	No	No	2,360	3,201	4,600	No	841	2,100	No	**27.9**	**C**
	I-280 SB	Penn/25th on-ramp	Wkday Late	2,955	7,050	No	3,685	7,050	No	1,220	No	No	1,735	2,465	4,600	No	730	2,100	No	**22.2**	**C**
	I-280 SB	Penn/25th on-ramp	Wkend	1,721	7,050	No	1,987	7,050	No	710	No	No	1,011	1,277	4,600	No	266	2,100	No	**13.1**	**B**
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkend w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Jurisdiction San Francisco
Agency or Company Fehr & Peers
Analysis Year No TSP - PP with Basketball
Date 2/1/2015
Analyst DW
Project Description GSW - based on Central SoMa and Seawall Lot analysis

General Information				*Freeway Data*			*Freeway Volume Adjustment*										Effective	*Off-Ramp Data*							
	Freeway/ Direction	Off-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Flow Rate v_p (pcph)	Type	Lanes	Lane Drop?	S_{FR} (mph)	V_R (vph)	Decel Lane (ft) L_{D1}	L_{D2}	L_{Deff}
Existing																								
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	4	60	6,468	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,207	7,207	Left	2	Yes	45.0	1,295	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	4	60	7,046	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,850	7,850	Left	2	Yes	45.0	2,022	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	4	60	6,205	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,914	6,914	Left	2	Yes	45.0	437	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkend	4	60	6,621	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,376	7,376	Left	2	Yes	45.0	1,881	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
D2	I-280 NB	Mariposa off-ramp	Wkday PM	4	60	4,605	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	5,130	5,130	Right	1	Yes	45.0	875	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Eve	4	60	5,331	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	5,939	5,939	Right	1	Yes	45.0	1,731	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Late	4	60	1,961	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	2,184	2,184	Right	1	Yes	45.0	261	50	0	50
	I-280 NB	Mariposa off-ramp	Wkend	4	60	3,736	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,162	4,162	Right	1	Yes	45.0	1,368	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday PM w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Late w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkend w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Juri
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General Information				Off-Ramp Volume Adjustment									Adjacent Upstream Ramp Data												
	Freeway/ Direction	Off-ramp	Analysis Time Period	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
Existing																								
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,443	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	2,253	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	487	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	2,096	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
D2	I-280 NB	Mariposa off-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	975	No											
	I-280 NB	Mariposa off-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,929	No											
	I-280 NB	Mariposa off-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	291	No											
	I-280 NB	Mariposa off-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,524	No											
	I-280 NB	Mariposa off-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Juri
Analy

	General Information			*Adjacent Downstream Ramp Data*												*v_{12} Estimation*						
	Freeway/ Direction	Off-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	L_{EQ} 25-13	25-14	P_{FD} Equations 5	6	7	P_{FD}	v_{12} (pcph)
Existing																						
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	No														0.513			0.260	3,236
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	No														0.460			0.260	4,079
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	No														0.565			0.260	2,374
	I-80 WB	Fifth/Harrison off-ramp	Wkend	No														0.479			0.260	3,816
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	No														0.760			0.260	0
D2	I-280 NB	Mariposa off-ramp	Wkday PM	No														0.587			0.436	2,787
	I-280 NB	Mariposa off-ramp	Wkday Eve	No														0.523			0.436	3,677
	I-280 NB	Mariposa off-ramp	Wkday Late	No														0.692			0.436	1,116
	I-280 NB	Mariposa off-ramp	Wkend	No														0.586			0.436	2,675
	I-280 NB	Mariposa off-ramp	Wkday PM w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Late w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkend w/	No														0.760			0.436	0

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Juri
Analy

	General Information			*Capacity Checks*																*Results*	
	Freeway/ Direction	Off-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	Max v_{12} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?	Density, D (pcplpm)	Level of Service
Existing																				
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	7,207	9,200	No	1,985	No	No	3,236	4,400	No	5,763	6,900	No	1,443	4,100	No	**31.2**	**D**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	7,850	9,200	No	1,885	No	No	4,079	4,400	No	5,597	6,900	No	2,253	4,100	No	**38.4**	**E**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	6,914	9,200	No	2,270	No	Yes	2,765	4,400	No	6,427	6,900	No	487	4,100	No	**27.1**	**C**
	I-80 WB	Fifth/Harrison off-ramp	Wkend	7,376	9,200	No	1,780	No	No	3,816	4,400	No	5,280	6,900	No	2,096	4,100	No	**36.2**	**E**
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
D2	I-280 NB	Mariposa off-ramp	Wkday PM	5,130	9,200	No	1,172	No	No	2,787	4,400	No	4,156	6,900	No	975	2,100	No	**27.8**	**C**
	I-280 NB	Mariposa off-ramp	Wkday Eve	5,939	9,200	No	1,131	No	No	3,677	4,400	No	4,011	6,900	No	1,929	2,100	No	**35.4**	**E**
	I-280 NB	Mariposa off-ramp	Wkday Late	2,184	9,200	No	534	No	No	1,116	4,400	No	1,894	6,900	No	291	2,100	No	**13.4**	**B**
	I-280 NB	Mariposa off-ramp	Wkend	4,162	9,200	No	744	No	No	2,675	4,400	No	2,638	6,900	No	1,524	2,100	No	**26.8**	**C**
	I-280 NB	Mariposa off-ramp	Wkday PM w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Late w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkend w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**

APPENDIX TR-6
PROPOSED PROJECT TRAFFIC CONTRIBUTIONS TO LOS E OR LOS F

INTERSECTION TRAFFIC VOLUMES
2015 PLUS PROJECT CONDITIONS

EXISTING PLUS PROJECT, NO EVENT

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: 2015 Plus Project, No Event, PM Peak Hour No Giants Game

Intersection	Critical Movement Operating at E or F	Project Contribution	Total Volumes	% Project Contribution	Impact ?
1. King / Third	EBL	0	889	0.0%	No
3: King / Fifth / I-280 Ramps	EBT	0	1689	0.0%	No
5: Fifth / Bryant / I-80 EB on-ramp	NBT/R	0	700	0.0%	No
	SBL/L2	0	384	0.0%	No
	EBT/R	0	613	0.0%	No

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: 2015 Plus Project No Event, Saturday Evening, PM Peak Hour No Giants Game

No E → E or F→F intersections.

EXISTING PLUS PROJECT, CONVENTION

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: 2015 Plus Project, Convention Event, PM Peak Hour No Giants Game

Intersection	Critical Movement Operating at E or F	Project Contribution	Total Volumes	% Project Contribution	Impact ?
1. King / Third	EBL	0	889	0.0%	No
3: King / Fifth / I-280 Ramps	EBT	0	1689	0.0%	No
5: Fifth / Bryant / I-80 EB on-ramp	NBT/R	0	700	0.0%	No
	SBL/L2	0	384	0.0%	No
	EBT/R	0	613	0.0%	No

EXISTING PLUS PROJECT, WARRIORS GAME (NO GIANTS GAME)

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: 2015 Plus Project, Warriors Game, PM Peak Hour, No Giants Game

Intersection	Critical Movement Operating at E or F	Project Contribution	Total Volumes	% Project Contribution	Impact ?
1. King / Third	EBL	0	889	0.0%	No
3: King / Fifth / I-280 Ramps	EBT	0	1689	0.0%	No
5: Fifth / Bryant / I-80 EB on-ramp	NBT/R	0	700	0.0%	No
	SBL/L2	0	384	0.0%	No
	EBT/R	0	613	0.0%	No

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: 2015 Plus Project, Warriors Game, Weekday Evening, No Giants Game

Intersection	Critical Movement Operating at E or F	Project Contribution	Total Volumes	% Project Contribution	Impact ?
1: King / Third	EBL	0	808	0.0%	No
3: King / Fifth / I-280 Ramps	EBT	0	1581	0.0%	No
5: Fifth / Bryant / I-80 EB on-ramp	NBT/R	0	561	0.0%	No
	SBL/L2	0	317	0.0%	No
	EBT/R	0	702	0.0%	No

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: 2015 Plus Project, Warriors Game, Weekday Late Evening, No Giants Game

No E → E or F→F intersections.

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: 2015 Plus Project Warriors Game, Saturday Evening, PM Peak Hour No Giants Game

No E → E or F→F intersections.

EXISTING PLUS PROJECT, WARRIORS GAME, WITH GIANTS GAME

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: 2015 Plus Project, Warriors Game, PM Peak Hour with Giants Game

Intersection	Critical Movement Operating at E or F	Project Contribution	Total Volumes	% Project Contribution	Impact ?
2: King / Fourth	SBT	17	625	2.7%	No
	EBL	0	346	0.0%	No
	WBT/R	0	986	0.0%	No
3: King / Fifth / I-280 Ramps	EBT	0	1494	0.0%	No
4: Fifth / Harrison / I-80 WB off-ramp	SBT/R	0	866	0.0%	No
	NWL/L2	**99**	**1,110**	**8.9%**	**Yes**
5: Fifth / Bryant / I-80 EB on-ramp	NBT/R	0	543	0.0%	No
	SBL/L2	0	356	0.0%	No
	EBT/R	0	746	0.0%	No
16: 7th / Mississippi / 16th	NBT	0	357	0.0%	No
	SBL	**34**	**162**	**21.0%**	**Yes**
	WBT	**82**	**552**	**14.9%**	**Yes**
	EBT/R	**92**	**553**	**16.6%**	**Yes**

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: 2015 Plus Project, Warriors Game, Weekday Evening with Giants Game

Intersection	Critical Movement Operating at E or F	Project Contribution	Total Volumes	% Project Contribution	Impact ?
5: Fifth / Bryant / I-80 EB on-ramp	NBT/R	0	489	0.0%	No
	EBT/R	0	764	0.0%	No

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: 2015 Plus Project, Warriors Game, Weekday Late Evening with Giants Game

No E → E or F→F intersections.

0% contribution at intersection 3; manually adjusted to F (from Synchro result of C) and so no critical movements operate at E or F.

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: 2015 Plus Project, Warriors Game, Saturday Evening with Giants Game

No E → E or F→F intersections.

EXISTING PLUS PROJECT, BASKETBALL GAME, NO TSP, NO GIANTS GAME

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: 2015 Plus Project, Warriors Game, PM Peak Hour, No Giants Game, Without TSP

Intersection	Critical Movement Operating at E or F	Project Contribution	Total Volumes	% Project Contribution	Impact ?
1. King / Third	EBL	0	889	0.0%	No
3: King / Fifth / I-280 Ramps	EBT	0	1689	0.0%	No
	NBL	0	86	0.0%	No
5: Fifth / Bryant / I-80 EB on-ramp	NBT/R	0	700	0.0%	No
	SBL/L2	0	384	0.0%	No
	EBT/R	0	613	0.0%	No

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: 2015 Plus Project, Warriors Game, Weekday Evening, No Giants Game, Without TSP

Intersection	Critical Movement Operating at E or F	Project Contribution	Total Volumes	% Project Contribution	Impact ?
1. King / Third	EBL	0	808	0.0%	No
3: King / Fifth / I-280 Ramps	EBT	0	1581	0.0%	No
	NBL	0	74	0.0%	No
5: Fifth / Bryant / I-80 EB on-ramp	NBT/R	0	561	0.0%	No
	SBL/L2	0	317	0.0%	No
	EBT/R	0	702	0.0%	No

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: 2015 Plus Project, Warriors Game, Weekday Late Evening, No Giants Game, Without TSP

No E → E or F→F intersections.

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: 2015 Plus Project Warriors Game, Saturday Evening, PM Peak Hour No Giants Game, Without TSP

No E → E or F→F intersections.

INTERSECTION TRAFFIC VOLUMES
2040 CUMULATIVE CONDITIONS

CUMULATIVE PLUS PROJECT

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: 2040 Plus Project, No Event, PM Peak Hour

Intersection	Critical Movement Operating at E or F	Project Contribution	2040 Total Volumes	% Project Contribution	Impact ?
1: King / Third	NBR	21	481	4.4%	No
	EBL	0	924	0.0%	No
	WBT/R	0	984	0.0%	No
2: King / Fourth	SBT	17	625	2.7%	No
	EBL	0	346	0.0%	No
	WBT/R	0	986	0.0%	No
4: Fifth / Harrison / I-80 WB off-ramp	SBT	0	810	0.0%	No
	SBR	0	340	0.0%	No
	NWL2 / L	19	1707	1.1%	No
5: Fifth / Bryant / I-80 EB on-ramp	NBT	0	565	0.0%	No
	NBR	0	140	0.0%	No
	SBT	6	956	0.6%	No
	EBT/R	0	1160	0.0%	No
6: Third / Channel	NBL	0	39	0.0%	No
	NBT/R	53	1563	3.4%	No
	SBL	0	58	0.0%	No
15: Owens / 16th	NBL	0	138	0.0%	No
	EBL	0	137	0.0%	No
	WBT	**164**	**831**	**19.7%**	**Yes**
16: 7th / Mississippi / 16th	NBT	0	329	0.0%	No
	SBL	**34**	**162**	**21.0%**	**Yes**
	EBT/R	**82**	**637**	**12.9%**	**Yes**
18: Third / Mariposa	NBT/R	51	1257	4.1%	No
	EBL	0	205	0.0%	No
22: Third / Cesar Chavez	SBL	0	110	0.0%	No
	SBT/R	**67**	**1200**	**5.6%**	**Yes**
	EBL	10	227	4.4%	No

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: 2040 Plus Project, Convention Event, PM Peak Hour

Intersection	Critical Movement Operating at E or F	Project Contribution	2040 Total Volumes	% Project Contribution	Impact ?
1: King / Third	**NBR**	**71**	**531**	**13.4%**	**Yes**
	EBL	0	924	0.0%	No
	WBT/R	0	984	0.0%	No
2: King / Fourth	SBT	31	639	4.9%	No
	EBL	0	346	0.0%	No
	WBT/R	0	986	0.0%	No
4: Fifth / Harrison / I-80 WB off-ramp	SBT	0	810	0.0%	No
	SBR	0	340	0.0%	No
	NWL2 / L	18	1705	1.1%	No
5: Fifth / Bryant / I-80 EB on-ramp	NBT	0	565	0.0%	No
	NBR	0	140	0.0%	No
	SBT	6	955	0.6%	No
	EBT/R	0	1160	0.0%	No
6: Third / Channel	NBL	0	39	0.0%	No
	NBT/R	**146**	**1656**	**8.8%**	**Yes**
	SBL	0	58	0.0%	No
13: Third / 16th	NBT/R	33	1130	2.9%	No
	SBT/R	0	1159	0.0%	No
	EBL	0	193	0.0%	No
15: Owens / 16th	NBL	0	138	0.0%	No
	EBL	0	137	0.0%	No
	WBT	**193**	**860**	**22.4%**	**Yes**
16: 7th / Mississippi / 16th	NBT	0	329	0.0%	No
	SBL	**45**	**173**	**26.0%**	**Yes**
	EBT/R	**58**	**613**	**9.5%**	**Yes**
22: Third / Cesar Chavez	NBL	0	209	0.0%	No
	SBT/R	50	1182	4.2%	No
	EBL	7	224	3.1%	No

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: 2040 Plus Project, Basketball Game, PM Peak Hour

Intersection	Critical Movement Operating at E or F	Project Contribution	2040 Total Volumes	% Project Contribution	Impact ?
1: King / Third	NBR	18	477	3.8%	No
	EBL	0	924	0.0%	No
	WBT/R	0	984	0.0%	No
2: King / Fourth	**SBT**	**50**	**657**	**7.6%**	**Yes**
	EBL	0	346	0.0%	No
	WBT/R	0	986	0.0%	No
4: Fifth / Harrison / I-80 WB off-ramp	SBT	0	810	0.0%	No
	SBR	0	340	0.0%	No
	NWL2 / L	**99**	**1786**	**5.5%**	**Yes**
5: Fifth / Bryant / I-80 EB on-ramp	NBT	0	565	0.0%	No
	NBR	0	140	0.0%	No
	SBT	33	982	3.4%	No
	EBT/R	0	1160	0.0%	No
6: Third / Channel	NBT/R	78	1588	4.9%	No
	SBL	**12**	**70**	**17.1%**	**Yes**
8: Seventh / Mission Bay Drive	NBT	39	984	4.0%	No
	SBL	**109**	**420**	**26.0%**	**Yes**
13: Third / 16th	NBT/R	24	1121	2.1%	No
	SBT/R	1	1160	0.1%	No
	EBL	**56**	**249**	**22.5%**	**Yes**
15: Owens / 16th	NBL	0	138	0.0%	No
	EBL	5	142	3.5%	No
	WBT	**122**	**789**	**15.5%**	**Yes**
16: 7th / Mississippi / 16th	NBT	0	329	0.0%	No
	SBL	**14**	**142**	**9.9%**	**Yes**
	EBT/R	**92**	**647**	**14.2%**	**Yes**
	WBT	**82**	**581**	**14.1%**	**Yes**
22: Third / Cesar Chavez	NBL	0	209	0.0%	No
	SBT/R	47	1179	4.0%	No
	EBL	10	227	4.4%	No

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: 2040 Plus Project, No Event, Saturday Evening

Intersection	Critical Movement Operating at E or F	Project Contribution	2040 Total Volumes	% Project Contribution	Impact ?
4: Fifth / Harrison / I-80 WB off-ramp	SBT/R	0	840	0.0%	No
	NWR	0	455	0.0%	No

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: 2040 Plus Project, Basketball Game, Saturday Evening

Intersection	Critical Movement Operating at E or F	Project Contribution	2040 Total Volumes	% Project Contribution	Impact ?
1: King / Third	**WBL**	**289**	**651**	**44.4%**	**Yes**
2: King / Fourth	EBL	0	348	0.0%	No
	EBT/R	0	1553	0.0%	No
4: Fifth / Harrison / I-80 WB off-ramp	SBT/R	0	840	0.0%	No
	NWL2 / L	**807**	**1875**	**43.4%**	**Yes**
5: Fifth / Bryant / I-80 EB on-ramp	**SBT**	**269**	**985**	**27.3%**	**Yes**
	EBL2 / L	16	524	3.1%	No
6: Third / Channel	**NBT/R**	**94**	**608**	**15.5%**	**Yes**
	SBL	**130**	**164**	**79.3%**	**Yes**
	EBL	0	50	0.0%	No
	EBT	**980**	**993**	**98.7%**	**Yes**
7: Fourth / Channel	**SBL**	**238**	**400**	**59.5%**	**Yes**
8: Seventh / Mission Bay Dr	**SBL**	**795**	**966**	**82.3%**	**Yes**
16: 7th / Mississippi / 16th	NBT	0	120	0.0%	No
	SBL	**77**	**111**	**69.4%**	**Yes**
	EBT / R	**160**	**430**	**37.2%**	**Yes**

FREEWAY RAMP TRAFFIC VOLUMES

PERCENT CONTRIBUTIONS

FREEWAY RAMP LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITHOUT SF GIANTS GAME - WEEKDAY PM PEAK HOUR

#	Ramp Location		Existing plus Project		
			No Event	Convention Event	Basketball Game
1	I-80 EB On-ramp at Sterling		1.5%	2.2%	1.4%
2	I-80 EB On-ramp at Fifth/Bryant		3.0%	4.4%	2.9%
4	I-280 SB On-ramp at Pennsylvania		0.0%	0.0%	0.0%

FREEWAY RAMP LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITHOUT SF GIANTS GAME - WEEKDAY EVENING AND LATE EVENING PEAK HOURS

#	Ramp Location	Evening		Late Evening	
			Existing plus Project - Basketball Game		Existing plus Project - Basketball Game
2	I-80 EB On-ramp at Fifth/Bryant		2.9%		-
3	I-80 WB Off-ramp at Fifth/Harrison		41.4%		-

FREEWAY RAMP LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITHOUT SF GIANTS GAME – SATURDAY EVENING PEAK HOUR

#	Ramp Location		Existing plus Project	
			No Event	Basketball Game
2	I-80 EB On-ramp at Fifth/Bryant		4.1%	2.5%

FREEWAY RAMP LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITH SF GIANTS GAME - WEEKDAY PM AND SATURDAY EVENING PEAK HOURS

#	Ramp Location	Weekday PM		Saturday Evening	
			Existing plus Project - Basketball Game		Existing plus Project - Basketball Game
1	I-80 EB On-ramp at Sterling		2.4%		
2	I-80 EB On-ramp at Fifth/Bryant		3.4%		1.7%
3	I-80 WB Off-ramp at Fifth/Harrison				44.6%
4	I-280 SB On-ramp at Pennsylvania		0.0%		

FREEWAY RAMP LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS – WITH SF GIANTS GAME - WEEKDAY EVENING AND LATE EVENING PEAK HOURS

#	Ramp Location	Evening		Late Evening	
			Existing plus Project - Basketball Game		Existing plus Project - Basketball Game
2	I-80 EB On-ramp at Fifth/Bryant		3.3%		50.0%
3	I-80 WB Off-ramp at Fifth/Harrison		39.7%		
5	I-280 NB Off-ramp at Mariposa		47.7%		

FREEWAY RAMP LEVEL OF SERVICE – ALTERNATIVE NO PROJECT CONDITIONS – WITHOUT SF GIANTS GAME - WEEKDAY PM AND SATURDAY EVENING PEAK HOURS

#	Ramp Location	Weekday PM		Saturday Evening	
			Existing plus Project - Basketball Game		Existing plus Project - Basketball Game
1	I-80 EB On-ramp at Sterling		1.5%		
2	I-80 EB On-ramp at Fifth/Bryant		3.1%		0.3%
4	I-280 SB On-ramp at Pennsylvania		0.0%		

FREEWAY RAMP LEVEL OF SERVICE – ALTERNATIVE REDUCED-REDUCED PROJECT CONDITIONS – WITHOUT SF GIANTS GAME - WEEKDAY PM AND SATURDAY EVENING PEAK HOURS

#	Ramp Location	Weekday PM		Saturday Evening	
			Existing plus Project - Basketball Game		Existing plus Project - Basketball Game
1	I-80 EB On-ramp at Sterling		0.9%		
2	I-80 EB On-ramp at Fifth/Bryant		1.9%		2.5%
4	I-280 SB On-ramp at Pennsylvania		0.0%		

FREEWAY RAMP LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS (NO TSP) – WITHOUT SF GIANTS GAME - WEEKDAY PM AND SATURDAY EVENING PEAK HOURS

#	Ramp Location	Weekday PM		Saturday Evening	
			Existing plus Project - Basketball Game		Existing plus Project - Basketball Game
1	I-80 EB On-ramp at Sterling		1.5%		
2	I-80 EB On-ramp at Fifth/Bryant		3.0%		6.1%
3	I-80 WB Off-ramp at Fifth/Harrison				55.4%
4	I-280 SB On-ramp at Pennsylvania		0.0%		

FREEWAY RAMP LEVEL OF SERVICE - EXISTING PLUS PROJECT CONDITIONS (NO TSP) – WITHOUT SF GIANTS GAME - WEEKDAY EVENING AND LATE EVENING PEAK HOURS

#	Ramp Location	Evening		Late Evening	
			Existing plus Project - Basketball Game		Existing plus Project - Basketball Game
2	I-80 EB On-ramp at Fifth/Bryant		5.6%		60.4%
3	I-80 WB Off-ramp at Fifth/Harrison		47.8%		
5	I-280 NB Off-ramp at Mariposa		62.0%		

FREEWAY RAMP LEVEL OF SERVICE – 2040 CUMULATIVE CONDITIONS – WEEKDAY PM PEAK HOUR

#	Ramp Location	No Event	Convention Event	Basketball Game
1	I-80 EB On-ramp at Sterling	1.0%	1.4%	0.9%
2	I-80 EB On-ramp at Fifth/Bryant	4.8%	6.9%	4.6%
3	I-80 WB Off-ramp at Fifth/Harrison	0.9%	0.8%	4.4%
4	I-280 SB On-ramp at Pennsylvania	0.0%	0.0%	0.0%
6	I-280 SB On-ramp at Mariposa	7.0%	11.5%	6.4%

FREEWAY RAMP LEVEL OF SERVICE – 2040 CUMULATIVE CONDITIONS – SATURDAY EVENING PEAK HOUR

#	Ramp Location	No Event	Basketball Game
2	I-80 EB On-ramp at Fifth/Bryant	5.7%	3.4%
3	I-80 WB Off-ramp at Fifth/Harrison		34.6%

APPENDIX TR-7

PROPOSED PROJECT TRANSIT ANALYSES

TRANSIT DEMAND SUMMARY

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

PERSON TRANSIT TRIP SUMMARY - ALL LAND USES COMBINED

	WEEKDAY															SATURDAY					
	No Event			Basketball Game									Convention Event			No Event			Basketball Game		
ORIGIN / DESTINATION SERVICE PROVIDER	PM Peak Hour (1 hr bet. 4 & 6 PM)			PM Peak Hour (1 hr bet. 4 & 6 PM)			Evening Peak Hour (1 hr bet. 6 & 8 PM)			Late PM Peak Hour (1 hr bet. 9 & 11 PM)			PM Peak Hour (1 hr bet. 4 & 6 PM)			Evening Peak Hour (1 hr bet. 7 & 9 PM)			Evening Peak Hour (1 hr bet. 7 & 9 PM)		
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
Superdistrict 1	21	66	88	118	59	177	815	19	834	0	681	681	56	411	467	35	47	82	682	15	698
Superdistrict 2	17	76	93	78	71	149	160	24	184	0	157	157	17	82	99	28	44	72	133	18	151
Superdistrict 3	79	182	261	156	155	311	140	48	188	0	167	167	59	169	228	131	159	290	123	40	163
Superdistrict 4	9	52	61	54	50	104	107	17	125	0	107	107	11	70	81	16	27	43	81	13	94
East Bay	19	218	237	319	216	535	1,586	78	1,663	0	1,898	1,898	42	346	387	35	89	124	1,641	57	1,698
North Bay	1	17	18	38	17	55	289	6	295	0	460	460	2	18	19	0	5	5	395	4	399
South Bay	4	90	94	145	90	236	822	33	855	0	967	967	13	126	139	5	28	34	831	23	854
Out of Region	7	23	30	36	21	57	220	7	227	0	244	244	13	91	104	9	14	23	248	5	253
Total	**157**	**724**	**881**	**944**	**681**	**1,625**	**4,138**	**232**	**4,371**	**0**	**4,680**	**4,680**	**212**	**1,312**	**1,524**	**261**	**413**	**673**	**4,134**	**176**	**4,310**
SF Muni (incl. transfers)																					
San Francisco	126	376	503	405	336	741	1,222	109	1,330	0	1,111	1,111	143	732	874	210	277	487	1,019	86	1,105
East Bay	19	218	237	319	216	535	1,586	78	1,663	0	1,898	1,898	42	346	387	35	89	124	1,641	57	1,698
North Bay	1	17	18	38	17	55	289	6	295	0	460	460	2	18	19	0	5	5	395	4	399
South Bay (except Caltra	1	23	24	38	23	61	212	8	221	0	250	250	3	33	36	1	7	9	214	6	220
Out of Region	7	23	30	36	21	57	220	7	227	0	244	244	13	91	104	9	14	23	248	5	253
Subtotal	**154**	**658**	**811**	**836**	**614**	**1,450**	**3,528**	**208**	**3,736**	**0**	**3,962**	**3,962**	**202**	**1,219**	**1,421**	**257**	**392**	**648**	**3,517**	**159**	**3,676**

GS Warriors Trip Gen 2015 01 20 v7 - TRANSIT SUMMARIES.xlsx — Project

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32 (No TSP)

PERSON TRANSIT TRIP SUMMARY - ALL LAND USES COMBINED

	WEEKDAY															SATURDAY					
	No Event			Basketball Game									Convention Event			No Event			Basketball Game		
ORIGIN / DESTINATION SERVICE PROVIDER	PM Peak Hour (1 hr bet. 4 & 6 PM)			PM Peak Hour (1 hr bet. 4 & 6 PM)			Evening Peak Hour (1 hr bet. 6 & 8 PM)			Late PM Peak Hour (1 hr bet. 9 & 11 PM)			PM Peak Hour (1 hr bet. 4 & 6 PM)			Evening Peak Hour (1 hr bet. 7 & 9 PM)			Evening Peak Hour (1 hr bet. 7 & 9 PM)		
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total
Superdistrict 1	21	66	88	92	59	151	478	19	498	0	409	409	56	411	467	35	47	82	399	15	415
Superdistrict 2	17	76	93	72	71	143	86	24	110	0	97	97	17	82	99	28	44	72	70	18	89
Superdistrict 3	79	182	261	151	155	306	76	48	124	0	115	115	59	169	228	131	159	290	67	40	107
Superdistrict 4	9	52	61	50	50	100	55	17	73	0	65	65	11	70	81	16	27	43	42	13	55
East Bay	19	218	237	271	216	487	964	78	1,042	0	1,188	1,188	42	346	387	35	89	124	981	57	1,038
North Bay	1	17	18	28	17	46	163	6	170	0	263	263	2	18	19	0	5	5	218	4	223
South Bay	4	90	94	117	90	207	449	33	482	0	545	545	13	126	139	5	28	34	446	23	469
Out of Region	7	23	30	27	21	48	105	7	112	0	121	121	13	91	104	9	14	23	149	5	154
Total	**157**	**724**	**881**	**808**	**681**	**1,489**	**2,377**	**232**	**2,609**	**0**	**2,802**	**2,802**	**212**	**1,312**	**1,524**	**261**	**413**	**673**	**2,372**	**176**	**2,548**
SF Muni (incl. transfers)																					
San Francisco	126	376	503	365	336	701	696	109	804	0	685	685	143	732	874	210	277	487	578	86	665
East Bay	19	218	237	271	216	487	964	78	1,042	0	1,188	1,188	42	346	387	35	89	124	981	57	1,038
North Bay	1	17	18	28	17	46	163	6	170	0	263	263	2	18	19	0	5	5	218	4	223
South Bay (except Caltrain)	1	23	24	30	23	53	116	8	124	0	141	141	3	33	36	1	7	9	115	6	121
Out of Region	7	23	30	27	21	48	105	7	112	0	121	121	13	91	104	9	14	23	149	5	154
Subtotal	**154**	**658**	**811**	**722**	**614**	**1,335**	**2,044**	**208**	**2,252**	**0**	**2,398**	**2,398**	**202**	**1,219**	**1,421**	**257**	**392**	**648**	**2,042**	**159**	**2,200**

GS Warriors Trip Gen 2015 01 20 v7 - TRANSIT SUMMARIES.xlsx — No TSP

TRANSIT UTILIZATION ANALYSIS

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

TRANSIT CAPACITY UTILIZATION ANALYSIS - EXISTING CONDITIONS - PEAK DIRECTION

ORIGIN / DESTINATION SERVICE PROVIDER	Weekday PM			Weekday Evening			Weekday Late Evening			Saturday Evening		
	No Event (outbound from site)			Basketball Game (inbound to site)			Basketball Game (outbound from site)			No Event (inbound to site)		
	Existing Ridership	Capacity	Percent Utilization	Existing Ridership	Capacity	Percent Utilization	Existing Ridership	Capacity	Percent Utilization	Existing Ridership	Capacity	Percent Utilization
San Francisco												
T Third	1,945	3,808	51.1%	1,880	2,285	82.3%	415	1,714	24.2%	336	1,714	19.6%
22 Fillmore	545	942	57.9%	249	628	39.6%	181	252	71.7%	230	378	60.9%
	2,490	4,750	52.4%	2,128	2,913	73.1%	595	1,966	30.3%	566	2,092	27.1%
East Bay												
BART	19,972	21,220	94.1%	4,184	15,870	26.4%	4,035	6,095	66.2%	2,364	8,740	27.0%
AC Transit	2,275	3,926	57.9%	149	520	28.7%	104	200	52.2%	51	200	25.4%
Ferries	805	1,615	49.8%	45	576	7.8%	0	0	#DIV/0!	0	0	#DIV/0!
Subtotal	**23,052**	26,761	86.1%	**4,378**	16,966	25.8%	**4,140**	6,295	65.8%	**2,415**	8,940	27.0%
North Bay												
Buses	1,389	2,817	49.3%	81	120	67.2%	27	80	33.8%	80	137	58.4%
Ferries	968	1,959	49.4%	209	1,357	15.4%	483	637	75.8%	826	1,594	51.8%
Subtotal	**2,357**	4,776	49.4%	**290**	1,477	19.6%	**510**	717	71.1%	**906**	1,731	52.3%
South Bay												
BART	8,698	16,693	52.1%	3,776	18,400	20.5%	1,951	5,290	36.9%	2,134	10,925	19.5%
Caltrain	2,405	3,100	77.6%	2,031	2,600	78.1%	185	650	28.4%	690	1,300	53.1%
SamTrans	146	320	45.6%	35	160	21.8%	21	40	53.2%	20	80	25.3%
Ferrries	0	0	0.0%	0	0	0.0%	0	0	0.0%	0	0	0.0%
Subtotal	**11,249**	20,113	55.9%	**5,842**	21,160	27.6%	**2,157**	5,980	36.1%	**2,844**	12,305	23.1%
Regional Total	**36,658**	**51,650**	71.0%	**10,510**	**39,603**	26.5%	**6,807**	**12,992**	52.4%	**6,165**	**22,976**	26.8%

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

TRANSIT CAPACITY UTILIZATION ANALYSIS - EXISTING PLUS PROJECT - WITHOUT SF GIANTS GAME - PEAK DIRECTION

ORIGIN / DESTINATION SERVICE PROVIDER	Weekday PM														
	No Event (outbound from site)					Convention Event (outbound from site)					Basketball Game (outbound from site)				
	Existing Ridership	Project Trips	Existing + Project	Capacity	Percent Utilization	Existing Ridership	Project Trips	Existing + Project	Capacity	Percent Utilization	Existing Ridership	Project Trips	Existing + Project	Capacity	Percent Utilization
San Francisco															
T Third	1,945	522	2,467	3,808	64.8%	1,945	1,092	3,037	3,808	79.7%	1,945	496	2,441	3,808	64.1%
22 Fillmore	545	169	714	942	75.8%	545	174	719	942	76.3%	545	151	696	942	73.9%
Special Event Shuttles															
Transbay/Ferry Bldg	0	0	0	0	--	0	0	0	0	--	0	0	0	0	--
Van Ness Ave	0	0	0	0	--	0	0	0	0	--	0	0	0	0	--
16th St BART	0	0	0	0	--	0	0	0	0	--	0	0	0	0	--
Total Shuttles	0	0	0	0	--	0	0	0	0	--	0	0	0	0	--
SF Total	**2,490**	**691**	**3,181**	**4,750**	**67.0%**	**2,490**	**1,265**	**3,755**	**4,750**	**79.1%**	**2,490**	**647**	**3,137**	**4,750**	**66.0%**
		3,181													
East Bay															
BART	19,972	188	20,160	21,220	95.0%	19,972	299	20,271	21,220	95.5%	19,972	187	20,159	21,220	95.0%
AC Transit	2,275	22	2,297	3,926	58.5%	2,275	34	2,309	3,926	58.8%	2,275	21	2,296	3,926	58.5%
Ferries	805	8	813	1,615	50.3%	805	12	817	1,615	50.6%	805	8	813	1,615	50.3%
Subtotal	**23,052**	**218**	**23,270**	26,761	87.0%	**23,052**	**346**	**23,398**	26,761	87.4%	**23,052**	**216**	**23,268**	26,761	86.9%
North Bay															
Buses	1,389	10	1,399	2,817	49.6%	1,389	10	1,399	2,817	49.7%	1,389	10	1,399	2,817	49.6%
Ferries	968	8	976	1,959	49.8%	968	8	976	1,959	49.8%	968	8	976	1,959	49.8%
Subtotal	**2,357**	**17**	**2,374**	4,776	49.7%	**2,357**	**18**	**2,375**	4,776	49.7%	**2,357**	**17**	**2,374**	4,776	49.7%
South Bay															
BART	8,698	22	8,720	16,963	51.4%	8,698	31	8,729	16,963	51.5%	8,698	22	8,720	16,963	51.4%
Caltrain	2,405	67	2,472	3,100	79.7%	2,405	93	2,498	3,100	80.6%	2,405	67	2,472	3,100	79.7%
SamTrans	146	1	147	320	45.9%	146	1	147	320	46.0%	146	1	147	320	45.9%
Ferrries	0	0	0	0	0.0%	0	0	0	0	0.0%	0	0	0	0	0.0%
Subtotal	**11,249**	**90**	**11,339**	20,383	55.6%	**11,249**	**126**	**11,375**	20,383	55.8%	**11,249**	**90**	**11,339**	20,383	55.6%
Regional Total	**36,658**	**325**	**36,983**	**51,920**	71.2%	**36,658**	**489**	**37,147**	**51,920**	71.5%	**36,658**	**324**	**36,982**	**50,697**	72.9%

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

TRANSIT CAPACITY UTILIZATION ANALYSIS - EXISTING PLUS PROJECT - WITHOUT SF GIANTS GAME - PEAK DIRECTION

ORIGIN / DESTINATION SERVICE PROVIDER	Weekday Evening Basketball Game (inbound to site)					Weekday Late Evening Basketball Game (outbound from site)				
	Existing Ridership	Project Trips	Existing + Project	Capacity	Percent Utilization	Existing Ridership	Project Trips	Existing + Project	Capacity	Percent Utilization
San Francisco										
T Third	1,880	2,663	4,542	4,886	93.0%	415	3,348	3,763	5,046	74.6%
22 Fillmore	249	32	281	628	44.7%	181	31	212	252	84.1%
Special Event Shuttles										
Transbay/Ferry Bldg	0	592	592	651	91.0%	0	372	372	372	100.0%
Van Ness Ave	0	259	259	283	91.4%	0	230	230	252	91.3%
16th St BART	0	288	288	284	101.2%	0	339	339	354	95.9%
Total Shuttles	0	1,139	1,139	1,218	93.5%	0	942	942	978	96.3%
SF Total	**2,128**	**3,833**	**5,962**	**6,732**	**88.6%**	**595**	**4,321**	**4,916**	**6,276**	**78.3%**
East Bay										
BART	4,184	1,373	5,557	15,870	35.0%	4,035	1,834	5,869	6,095	96.3%
AC Transit	149	157	306	520	58.9%	104	64	168	200	84.2%
Ferries	45	56	101	576	17.5%	0	0	0	0	0.0%
Subtotal	**4,378**	**1,586**	**5,964**	16,966	35.2%	**4,140**	**1,898**	**6,038**	6,295	95.9%
North Bay										
Buses	81	30	111	120	92.2%	27	24	51	80	63.8%
Ferries	209	259	468	1,357	34.5%	483	435	918	637	**144.1%**
Subtotal	**290**	**289**	**579**	1,477	39.2%	**510**	**459**	**969**	717	135.2%
South Bay										
BART	3,776	203	3,980	18,400	21.6%	1,951	239	2,190	5,290	41.4%
Caltrain	2,031	610	2,641	2,600	**101.6%**	185	718	902	650	**138.8%**
SamTrans	35	9	44	160	27.3%	21	10	32	40	79.0%
Ferrries	0	0	0	0	0.0%	0	0	0	0	0.0%
Subtotal	**5,842**	**822**	**6,664**	21,160	31.5%	**2,157**	**967**	**3,124**	5,980	52.2%
Regional Total	**10,510**	**2,697**	**13,207**	**39,603**	33.3%	**6,807**	**3,324**	**10,131**	**12,992**	78.0%

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

TRANSIT CAPACITY UTILIZATION ANALYSIS - EXISTING PLUS PROJECT - WITHOUT SF GIANTS GAME - PEAK DIRECTION

ORIGIN / DESTINATION SERVICE PROVIDER	Saturday Evening No Event (inbound to site)					Saturday Evening Basketball Game (inbound to site)				
	Existing Ridership	Project Trips	Existing + Project	Capacity	Percent Utilization	Existing Ridership	Project Trips	Existing + Project	Capacity	Percent Utilization
San Francisco										
T Third	336	172	508	1,714	29.6%	336	2,795	3,130	4,332	72.3%
22 Fillmore	230	87	317	378	84.0%	230	27	257	378	67.9%
Special Event Shuttles										
Transbay/Ferry Bldg	0	0	0	0	--	0	509	509	742	68.6%
Van Ness Ave	0	0	0	0	--	0	216	216	252	85.7%
16th St BART	0	0	0	0	--	0	279	279	378	73.9%
Total Shuttles	0	0	0	0	--	0	1,004	1,004	1,372	73.2%
SF Total	**566**	**259**	**825**	**2,092**	**39.4%**	**566**	**3,826**	**4,391**	**6,082**	**72.2%**
East Bay										
BART	2,364	35	2,399	8,740	27.4%	2,364	1,604	3,968	8,740	45.4%
AC Transit	51	1	52	200	25.9%	51	37	88	200	43.9%
Ferries	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!
Subtotal	**2,415**	**36**	**2,451**	8,940	27.4%	**2,415**	**1,641**	**4,056**	8,940	45.4%
North Bay										
Buses	80	0	80	137	58.6%	80	35	115	137	84.0%
Ferries	826	0	826	1,594	51.8%	826	360	1,186	1,594	74.4%
Subtotal	**906**	**0**	**906**	1,731	52.4%	**906**	**395**	**1,301**	1,731	75.2%
South Bay										
BART	2,134	1	2,135	10,925	19.5%	2,134	205	2,339	10,925	21.4%
Caltrain	690	4	694	1,300	53.4%	690	616	1,307	1,300	**100.5%**
SamTrans	20	0	20	80	25.4%	20	9	29	80	36.4%
Ferrries	0	0	0	0	0.0%	0	0	0	0	0.0%
Subtotal	**2,844**	**5**	**2,850**	12,305	23.2%	**2,844**	**831**	**3,675**	12,305	29.9%
Regional Total	**6,165**	**42**	**6,207**	**22,976**	27.0%	**6,165**	**2,867**	**9,032**	**22,976**	39.3%

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

TRANSIT CAPACITY UTILIZATION ANALYSIS - 2040 CUMULATIVE - WITHOUT SF GIANTS GAME - PEAK DIRECTION

ORIGIN / DESTINATION SERVICE PROVIDER	Weekday PM														
	No Event (outbound from site)					Convention Event (outbound from site)					Basketball Game (outbound from site)				
	2040 Ridership	Project Trips	2040 + Project	Capacity	Percent Utilization	2040 Ridership	Project Trips	2040 + Project	Capacity	Percent Utilization	2040 Ridership	Project Trips	Existing + Project	Capacity	Percent Utilization
San Francisco															
T Third	2,496	522	3,018	5,712	52.8%	2,496	1,092	3,588	5,712	62.8%	2,496	496	2,992	5,712	52.4%
22 Fillmore	545	169	714	942	75.8%	545	174	719	942	76.3%	545	151	696	942	73.9%
Special Event Shuttles															
Transbay/Ferry Bldg	0	0	0	0	--	0	0	0	0	--	0	0	0	0	--
Van Ness Ave	0	0	0	0	--	0	0	0	0	--	0	0	0	0	--
16th St BART	0	0	0	0	--	0	0	0	0	--	0	0	0	0	--
Total Shuttles	0	0	0	0	--	0	0	0	0	--	0	0	0	0	--
SF Total	**3,041**	**691**	**3,732**	**6,654**	**56.1%**	**3,041**	**1,265**	**4,306**	**6,654**	**64.7%**	**3,041**	**647**	**3,688**	**6,654**	**55.4%**
		3,732													
East Bay															
BART	19,972	188	20,160	21,220	95.0%	19,972	299	20,271	21,220	95.5%	19,972	187	20,159	21,220	95.0%
AC Transit	2,275	22	2,297	3,926	58.5%	2,275	34	2,309	3,926	58.8%	2,275	21	2,296	3,926	58.5%
Ferries	805	8	813	1,615	50.3%	805	12	817	1,615	50.6%	805	8	813	1,615	50.3%
Subtotal	**23,052**	**218**	**23,270**	26,761	87.0%	**23,052**	**346**	**23,398**	26,761	87.4%	**23,052**	**216**	**23,268**	26,761	86.9%
North Bay															
Buses	1,389	10	1,399	2,817	49.6%	1,389	10	1,399	2,817	49.7%	1,389	10	1,399	2,817	49.6%
Ferries	968	8	976	1,959	49.8%	968	8	976	1,959	49.8%	968	8	976	1,959	49.8%
Subtotal	**2,357**	**17**	**2,374**	4,776	49.7%	**2,357**	**18**	**2,375**	4,776	49.7%	**2,357**	**17**	**2,374**	4,776	49.7%
South Bay															
BART	8,698	22	8,720	16,963	51.4%	8,698	31	8,729	16,963	51.5%	8,698	22	8,720	16,963	51.4%
Caltrain	2,405	67	2,472	3,100	79.7%	2,405	93	2,498	3,100	80.6%	2,405	67	2,472	3,100	79.7%
SamTrans	146	1	147	320	45.9%	146	1	147	320	46.0%	146	1	147	320	45.9%
Ferrries	0	0	0	0	0.0%	0	0	0	0	0.0%	0	0	0	0	0.0%
Subtotal	**11,249**	**90**	**11,339**	20,383	55.6%	**11,249**	**126**	**11,375**	20,383	55.8%	**11,249**	**90**	**11,339**	20,383	55.6%
Regional Total	**36,658**	**325**	**36,983**	**51,920**	71.2%	**36,658**	**489**	**37,147**	**51,920**	71.5%	**36,658**	**324**	**36,982**	**50,697**	72.9%

ORIGIN / DESTINATION SERVICE PROVIDER	Weekday Evening					Weekday Late Evening				
	Basketball Game (inbound to site)					Basketball Game (outbound from site)				
	2040 Ridership	Project Trips	Existing + Project	Capacity	Percent Utilization	2040 Ridership	Project Trips	Existing + Project	Capacity	Percent Utilization
San Francisco										
T Third	2,771	2,663	5,434	6,028	90.1%	532	3,348	3,880	5,046	76.9%
22 Fillmore	273	32	304	628	48.5%	181	31	212	252	84.1%
Special Event Shuttles										
Transbay/Ferry Bldg	0	592	592	651	91.0%	0	372	372	372	100.0%
Van Ness Ave	0	259	259	283	91.4%	0	230	230	252	91.3%
16th St BART	0	288	288	284	101.2%	0	339	339	354	95.9%
Total Shuttles	0	1,139	1,139	1,218	93.5%	0	942	942	978	96.3%
SF Total	**3,043**	**3,833**	**6,877**	**7,874**	**87.3%**	**713**	**4,321**	**5,034**	**6,276**	**80.2%**
East Bay										
BART	4,184	1,373	5,557	15,870	35.0%	4,035	1,834	5,869	6,095	96.3%
AC Transit	149	157	306	520	58.9%	104	64	168	200	84.2%
Ferries	45	56	101	576	17.5%	0	0	0	0	0.0%
Subtotal	**4,378**	**1,586**	**5,964**	16,966	35.2%	**4,140**	**1,898**	**6,038**	6,295	95.9%
North Bay										
Buses	81	30	111	120	92.2%	27	24	51	80	63.8%
Ferries	209	259	468	1,357	34.5%	483	435	918	637	**144.1%**
Subtotal	**290**	**289**	**579**	1,477	39.2%	**510**	**459**	**969**	717	135.2%
South Bay										
BART	3,776	203	3,980	18,400	21.6%	1,951	239	2,190	5,290	41.4%
Caltrain	2,031	610	2,641	2,600	**101.6%**	185	718	902	650	**138.8%**
SamTrans	35	9	44	160	27.3%	21	10	32	40	79.0%
Ferrries	0	0	0	0	0.0%	0	0	0	0	0.0%
Subtotal	**5,842**	**822**	**6,664**	21,160	31.5%	**2,157**	**967**	**3,124**	5,980	52.2%
Regional Total	**10,510**	**2,697**	**13,207**	**39,603**	33.3%	**6,807**	**3,324**	**10,131**	**12,992**	78.0%

Adavant Consulting/Fehr Peers/LCW Consulting

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

TRANSIT CAPACITY UTILIZATION ANALYSIS - EXISTING PLUS PROJECT WITHOUT MUNI SPECIAL EVENT TRANSIT SERVICE PLAN - WITHOUT SF GIANTS GAME - PEAK DIRECTION

ORIGIN / DESTINATION SERVICE PROVIDER	Weekday Evening					Weekday Late Evening				
	Basketball Game (inbound to site)					Basketball Game (outbound from site)				
	Existing Ridership	Project Trips	Existing + Project	Capacity	Percent Utilization	Existing Ridership	Project Trips	Existing + Project	Capacity	Percent Utilization
San Francisco										
T Third	1,880	1,915	3,795	2,285	**166.1%**	415	2,268	2,682	1,714	**156.5%**
22 Fillmore	249	295	544	628	**86.6%**	181	334	515	252	**204.4%**
SF Total	**2,128**	**2,211**	**4,339**	**2,913**	**149.0%**	**595**	**2,602**	**3,197**	**1,966**	**162.7%**
East Bay										
BART	4,184	835	5,019	15,870	31.6%	4,035	1,149	5,184	6,095	85.1%
AC Transit	149	96	245	520	47.1%	104	40	144	200	72.2%
Ferries	45	34	79	576	13.7%	0	0	0	0	0.0%
Subtotal	**4,378**	**965**	**5,343**	16,966	31.5%	**4,140**	**1,189**	**5,329**	6,295	84.6%
North Bay										
Buses	81	25	106	120	88.0%	27	14	41	80	51.3%
Ferries	209	138	347	1,357	25.6%	483	249	**732**	**637**	**114.9%**
Subtotal	**290**	**163**	**453**	1,477	30.6%	**510**	**263**	**773**	717	107.8%
South Bay										
BART	3,776	111	3,887	18,400	21.1%	1,951	135	2,086	5,290	39.4%
Caltrain	2,031	333	2,364	2,600	90.9%	185	404	589	650	90.5%
SamTrans	35	5	40	160	24.9%	21	6	27	40	68.2%
Ferrries	0	0	0	0	0.0%	0	0	0	0	0.0%
Subtotal	**5,842**	**449**	**6,291**	21,160	29.7%	**2,157**	**545**	**2,702**	5,980	45.2%
Regional Total	**10,510**	**1,577**	**12,087**	**39,603**	30.5%	**6,807**	**1,997**	**8,804**	**12,992**	67.8%

ORIGIN / DESTINATION SERVICE PROVIDER	Saturday Evening					Saturday Evening				
	No Event (inbound to site)					Basketball Game (inbound to site)				
	Existing Ridership	Project Trips	Existing + Project	Capacity	Percent Utilization	Existing Ridership	Project Trips	Existing + Project	Capacity	Percent Utilization
San Francisco										
T Third	336	172	508	1,714	29.6%	336	1,943	2,278	1,714	**132.9%**
22 Fillmore	230	87	317	378	84.0%	230	265	495	378	**131.0%**
SF Total	**566**	**259**	**825**	**2,092**	**39.4%**	**566**	**2,208**	**2,773**	**2,092**	**132.6%**
East Bay										
BART	2,364	35	2,399	8,740	27.4%	2,364	959	3,323	8,740	38.0%
AC Transit	51	1	52	200	25.9%	51	22	73	200	36.4%
Ferries	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!
Subtotal	**2,415**	**36**	**2,451**	8,940	27.4%	**2,415**	**981**	**3,396**	8,940	38.0%
North Bay										
Buses	80	0	80	137	58.6%	80	19	99	137	72.3%
Ferries	826	0	826	1,594	51.8%	826	200	1,026	1,594	64.4%
Subtotal	**906**	**0**	**906**	1,731	52.4%	**906**	**219**	**1,125**	1,731	65.0%
South Bay										
BART	2,134	1	2,135	10,925	19.5%	2,134	110	2,244	10,925	20.5%
Caltrain	690	4	694	1,300	53.4%	690	331	1,021	1,300	78.6%
SamTrans	20	0	20	80	25.4%	20	5	25	80	31.6%
Ferrries	0	0	0	0	0.0%	0	0	0	0	0.0%
Subtotal	**2,844**	**5**	**2,850**	12,305	23.2%	**2,844**	**446**	**3,290**	12,305	26.7%
Regional Total	**6,165**	**42**	**6,207**	**22,976**	27.0%	**6,165**	**1,646**	**7,811**	**22,976**	34.0%

SF MUNI DOWNTOWN SCREENLINE ANALYSIS

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32
Muni Dowtown Screenlines - No Event
Weekday PM Peak Hour

	Existing			Project	Existing + Project		2040 Cumulative			Project
Screenline/Sub-corridor	Ridership	Capacity	Cap. Util.	Ridership	Ridership	Cap. Util.	Ridership	Capacity	Cap. Util.	Contributions to 2040
Northeast										
Kearny/Stockton	2,172	3,291	66.0%	35	2,207	67.1%	6,295	8,329	75.6%	
Other	570	1,078	52.9%	9	579	53.7%	1,229	2,065	59.5%	
Subtotal	***2,742***	***4,369***	***62.8%***	***45***	***2,787***	***63.8%***	***7,524***	***10,394***	72.4%	
Northwest										
Geary	1,821	2,528	72.0%	26	1,848	73.1%	2,996	3,621	82.7%	
California	1,371	1,686	81.3%	20	1,391	82.5%	**1,766**	**2,021**	**87.4%**	1.12%
Sutter/Clement	472	630	74.9%	7	479	76.0%	**749**	**756**	**99.1%**	0.91%
Fulton/Hayes	969	1,176	82.4%	14	983	83.6%	**1,762**	**1,878**	**93.8%**	0.79%
Balboa	640	929	68.8%	9	649	69.8%	776	974	79.7%	
Subtotal	***5,273***	***6,949***	***75.9%***	***76***	***5,349***	***77.0%***	***8,049***	***9,250***	**87.0%**	0.94%
Southeast										
Third	553	714	77.5%	23	576	80.7%	2,300	5,712	40.3%	
Mission	1,539	2,789	55.2%	63	1,601	57.4%	**2,673**	**3,008**	**88.9%**	2.34%
San Bruno/Bayshore	1,328	2,134	62.2%	54	1,382	64.8%	**1,817**	**2,134**	**85.1%**	2.98%
Other	1,040	1,712	60.8%	42	1,083	63.2%	1,582	1,927	82.1%	
Subtotal	***4,461***	***7,349***	***60.7%***	***182***	***4,642***	**63.2%**	***8,372***	***12,781***	**65.5%**	2.17%
Southwest										
Subway	4,766	6,294	75.7%	41	4,807	76.4%	5,692	6,804	83.7%	
Haight/Noriega	1,109	1,651	67.2%	9	1,119	67.8%	1,265	1,596	79.3%	
Other	277	700	39.6%	2	279	39.9%	380	840	45.2%	
Subtotal	***6,152***	***8,645***	***71.2%***	***52***	***6,205***	***71.8%***	*7,337*	*9,240*	79.4%	
Total All Screenlines	**18,628**	**27,312**	**68.2%**	**355**	**18,983**	***69.5%***	**31,282**	**41,665**	**75.1%**	

Source: SF Planning Department December 2013, LCW Consulting 2014

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32
Muni Dowtown Screenlines - Convention Event
Weekday PM Peak Hour

	Existing			Project	Existing + Project		2040 Cumulative			Project
Screenline/Sub-corridor	Ridership	Capacity	Cap. Util.	Ridership	Ridership	Cap. Util.	Ridership	Capacity	Cap. Util.	Contributions to 2040
Northeast										
Kearny/Stockton	2,172	3,291	66.0%	199	2,371	72.0%	6,295	8,329	75.6%	
Other	570	1,078	52.9%	52	622	57.7%	1,229	2,065	59.5%	
Subtotal	***2,742***	***4,369***	***62.8%***	***251***	***2,993***	***68.5%***	***7,524***	***10,394***	72.4%	
Northwest										
Geary	1,821	2,528	72.0%	28	1,850	73.2%	2,996	3,621	82.7%	
California	1,371	1,686	81.3%	21	1,393	82.6%	**1,766**	**2,021**	**87.4%**	1.21%
Sutter/Clement	472	630	74.9%	7	479	76.1%	**749**	**756**	**99.1%**	0.98%
Fulton/Hayes	969	1,176	82.4%	15	984	83.7%	**1,762**	**1,878**	**93.8%**	0.86%
Balboa	640	929	68.8%	10	650	69.9%	776	974	79.7%	
Subtotal	***5,273***	***6,949***	***75.9%***	***82***	***5,355***	***77.1%***	***8,049***	***9,250***	**87.0%**	1.02%
Southeast										
Third	553	714	77.5%	21	574	80.5%	2,300	5,712	40.3%	
Mission	1,539	2,789	55.2%	58	1,597	57.3%	**2,673**	**3,008**	**88.9%**	2.18%
San Bruno/Bayshore	1,328	2,134	62.2%	50	1,379	64.6%	**1,817**	**2,134**	**85.1%**	2.77%
Other	1,040	1,712	60.8%	39	1,080	63.1%	1,582	1,927	82.1%	
Subtotal	***4,461***	***7,349***	***60.7%***	***169***	***4,630***	**63.0%**	***8,372***	***12,781***	**65.5%**	2.02%
Southwest										
Subway	4,766	6,294	75.7%	54	4,820	76.6%	5,692	6,804	83.7%	
Haight/Noriega	1,109	1,651	67.2%	13	1,122	68.0%	1,265	1,596	79.3%	
Other	277	700	39.6%	3	280	40.0%	380	840	45.2%	
Subtotal	***6,152***	***8,645***	***71.2%***	***70***	***6,222***	***72.0%***	*7,337*	*9,240*	79.4%	
Total All Screenlines	**18,628**	**27,312**	**68.2%**	**572**	**19,200**	***70.3%***	**31,282**	**41,665**	**75.1%**	

Source: SF Planning Department December 2013, LCW Consulting 2014

T-Third UCSF Mission Bay Platform Analysis

TRANSIT COOPERATIVE RESEARCH PROGRAM

TCRP REPORT 165

Transit Capacity and Quality of Service Manual

Third Edition

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TRANSIT COOPERATIVE RESEARCH PROGRAM

The nation's growth and the need to meet mobility, environmental, and energy objectives place demands on public transit systems. Current systems, some of which are old and in need of upgrading, must expand service area, increase service frequency, and improve efficiency to serve these demands. Research is necessary to solve operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the transit industry. The Transit Cooperative Research Program (TCRP) serves as one of the principal means by which the transit industry can develop innovative near-term solutions to meet demands placed on it.

The need for TCRP was originally identified in *TRB Special Report 213—Research for Public Transit: New Directions,* published in 1987 and based on a study sponsored by the Urban Mass Transportation Administration—now the Federal Transit Administration (FTA). A report by the American Public Transportation Association (APTA), Transportation 2000, also recognized the need for local, problem-solving research. TCRP, modeled after the longstanding and successful National Cooperative Highway Research Program, undertakes research and other technical activities in response to the needs of transit service providers. The scope of TCRP includes a variety of transit research fields including planning, service configuration, equipment, facilities, operations, human resources, maintenance, policy, and administrative practices.

TCRP was established under FTA sponsorship in July 1992. Proposed by the U.S. Department of Transportation, TCRP was authorized as part of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). On May 13, 1992, a memorandum agreement outlining TCRP operating procedures was executed by the three cooperating organizations: FTA, the National Academies, acting through the Transportation Research Board (TRB); and the Transit Development Corporation, Inc. (TDC), a nonprofit educational and research organization established by APTA. TDC is responsible for forming the independent governing board, designated as the TCRP Oversight and Project Selection (TOPS) Committee.

Research problem statements for TCRP are solicited periodically but may be submitted to TRB by anyone at any time. It is the responsibility of the TOPS Committee to formulate the research program by identifying the highest priority projects. As part of the evaluation, the TOPS Committee defines funding levels and expected products.

Once selected, each project is assigned to an expert panel, appointed by the Transportation Research Board. The panels prepare project statements (requests for proposals), select contractors, and provide technical guidance and counsel throughout the life of the project. The process for developing research problem statements and selecting research agencies has been used by TRB in managing cooperative research programs since 1962. As in other TRB activities, TCRP project panels serve voluntarily without compensation.

Because research cannot have the desired impact if products fail to reach the intended audience, special emphasis is placed on disseminating TCRP results to the intended end users of the research: transit agencies, service providers, and suppliers. TRB provides a series of research reports, syntheses of transit practice, and other supporting material developed by TCRP research. APTA will arrange for workshops, training aids, field visits, and other activities to ensure that results are implemented by urban and rural transit industry practitioners.

The TCRP provides a forum where transit agencies can cooperatively address common operational problems. The TCRP results support and complement other ongoing transit research and training programs.

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PLATFORMS AND WAITING AREAS

Levels of Service for Bus Stops and Station Platforms

Levels of service for passenger queuing and waiting areas, such as station platforms, are shown in Exhibit 10-32. The thresholds were developed based on average pedestrian space, personal comfort, and degrees of internal mobility. LOS is presented in terms of average area per person and average interpersonal space (distance between people).

The LOS required for waiting within a facility is a function of the amount of time spent waiting, the number of people waiting, the waiting pattern (in a queue versus looser standing),and a desired level of comfort. Typically, the longer the wait or the looser the waiting pattern, the greater the space per person required. A person's tolerance of a level of crowding will vary with time. People will accept being tightly packed on an elevator for one minute, but not in a waiting area for 15 minutes (*17*).

A person's acceptance of close interpersonal spacing will also depend on the characteristics of the population, the weather conditions, and the type of facility. For example, commuters may be willing to accept higher levels or longer periods of crowding than intercity and recreational travelers (*17*).

Exhibit 10-32
Levels of Service for Queuing Areas

LOS	Average Pedestrian Area (ft²/p)	Average Pedestrian Area (m²/p)	Average Inter-Person Spacing (ft)	Average Inter-Person Spacing (m)
A	≥ 13	≥ 1.2	≥ 4.0	≥ 1.2
B	10–13	0.9–1.2	3.5–4.0	1.1–1.2
C	7–10	0.7–0.9	3.0–3.5	0.9–1.1
D	3–7	0.3–0.7	2.0–3.0	0.6–0.9
E	2–3	0.2–0.3	<2.0	<0.6
F	< 2	< 0.2	*Variable*	*Variable*

Source: *Fruin (2).*

The typical design LOS used for bus stops and station platforms is LOS C to D or better. Passenger congestion in the LOS E range is experienced only on the most crowded elevators or transit vehicles. LOS D represents crowding with some internal circulation possible; however, this LOS is not recommended for long-term waiting periods. The presence of passengers who use wheelchairs, strollers, or bicycles, or carry luggage or packages should be assessed and suitable provision made in station space.

Platform Usage

The shape and configuration of a station platform is dictated by many systemwide factors. Platform length is typically based on transit vehicle length and the number of transit vehicles using the platform at any one time. Platform width is dependent upon structural considerations, passenger queuing space, circulation requirements, and entry/exit locations.

Transit platforms can be divided into the following areas (*20*):

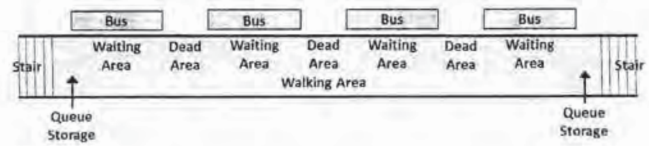
- Walking areas;
- Waiting areas;

2 OF 3

- Waiting area buffers (adjacent to the platform edge and to waiting areas), with the platform edge denoted by a 18-in. (0.5-m) detectable warning strip;
- Dead areas between bus loading areas or train doors;
- Space taken up by seats, pillars, and other obstructions; and
- Queue storage.

Exhibit 10-33 illustrates the use of these areas for a transit platform serving buses.

Exhibit 10-33
Transit Platform Areas



Source: Benz (*20*).

There are several different platform components which impact capacity and size requirements.

Walking and waiting do not occur evenly over the platform area. Some areas are used primarily for walking (e.g., near entry/exit locations and along the back edge of the platform) while other areas are used primarily for waiting (e.g., loading areas). Areas that are generally not used by passengers are termed *dead areas*. These areas are typically present between buses at a bus terminal or in front of or behind a train at a rail station. Dead areas should be taken into consideration when choosing the size and configuration of a platform. Where a platform serves multiple routes, special consideration should be made of passengers who will continue to wait on the platform until their train or bus arrives.

Platform Sizing

Evaluation Procedure

The procedures to determine the size of a transit platform are based on maintaining a desirable pedestrian LOS in the waiting and circulation areas, while providing needed buffer space and reserving space for physical objects, such as staircases or seating. The following is a list of steps recommended for determining the desired platform size:

1. Based on the desired LOS, choose the corresponding average pedestrian space from Exhibit 10-32; LOS D = 3 sf/ped
2. Adjust as appropriate for passenger characteristics (e.g., wheelchair usage, luggage, bicycles);
3. Estimate the maximum passenger demand for the platform at a given time; 240 train if all exit
4. Calculate the required waiting space by multiplying the average space per person by the maximum passenger demand; 10 on platform / 250 passengers
5. Calculate the additional walkway width needed to serve arriving passengers by using the appropriate procedures for walkways described previously; 250 x 3sf/ped =
6. Calculate the queue storage space required for exit points (at stairs, escalators, and elevators) as described previously; 750 sf

3 OF 3

PLATFORM
160 x 9 FEET =
160 x 5 FEET
EFFECTIVE = 800
RAMP
50 x 4 FEET =
50 x 3 FEET
EFFECTIVE = 150
950
sf

7. Consider the additional platform space that will be unused, including dead areas and physical obstructions;
8. Add a buffer zone to the width of the platform (18 in., or 0.5 m, on each side having direct access to a roadway or trackway); 2 FEET ON EITHER EDGE
9. Calculate the total platform area by summing the required waiting space, walkway width, queue storage at exit points, dead areas, and buffer zone width; and
10. Apply a safety or growth factor if appropriate.

The result of this calculation will be a minimum platform area required to meet demand. Actual platform area and dimensions may be determined by other factors, such as minimum clearances and architectural considerations, especially in low- to medium-volume stations. Calculation Example 3 later in this chapter demonstrates the application of this process.

Designing for Emergency Evacuation

NFPA 130 does not directly affect overall platform area unless obstacles, such as a stairway or open platform edge, require additional platform width to provide egress capacity past the obstacle (*1*). The standard specifies that egress routes must be at least 44 in. (1.12 m) wide. When such a route passes between an open platform edge, an additional 18 in. (450 mm) must be provided. When a route passes a sidewall or obstacle such as a stairway, an additional width of 12 in. (300 mm) must be provided. With both an open platform edge and a sidewall, a total width of 74 in. (1.87 m) would be required.

Shelters and Waiting Rooms

Level of Service

No specific LOS has been suggested for shelters, waiting rooms, or seating. The space provided within shelters or waiting rooms can be assessed using the LOS thresholds for queuing spaces, as presented in Exhibit 10-32. These thresholds are based on average pedestrian space, personal comfort, and degrees of mobility within the space. However, local circumstances must be taken into consideration when determining what the projected or desirable occupancy is, since such spaces are rarely used by all passengers and may only be used to the maximum extent on limited days of the year, depending on local climates. For example, shelters may be used on a daily basis for 6 months of the year in a colder northern climate but may be used only a few days a month in warmer, dryer climates. As a result, it may be more desirable to handle full stop or station loads in the more adverse climate, but provide more limited capacity relative to station passenger volumes where the shelter is used less often.

Evaluation Procedures

The LOS for persons standing in a shelter or waiting room may be assessed using the LOS criteria for queuing spaces, as presented in Exhibit 10-32. In larger waiting rooms where circulation is to be maintained or other activities such as ticket selling are occurring, the time-space analysis approach described in Equation 10-4 and Equation 10-5 can be applied or a pedestrian simulation software applied. A simpler analysis

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TO: Planning Department Transportation Consultant List
FROM: Planning Department Transportation Team
DATE: Updated – June 21, 2013
SUBJECT: Transit Data for Transportation Impact Studies

Purpose

The purpose of this memorandum is to provide an update to the data used in transportation analyses for determining capacity utilization for the San Francisco Municipal Transportation Agency (SFMTA) individual lines and screenlines and regional transit screenlines.

Background

The SFMTA Board has adopted an "85 percent" capacity utilization standard for transit vehicle loads. In other words, transit lines should operate at or below 85 percent capacity utilization. The SFMTA Board has determined that this threshold more accurately reflects actual operations and the likelihood of "pass-ups" (i.e., vehicles not stopping to pick up more passengers). The Planning Department, in preparing and reviewing transportation impact studies, has similarly utilized the 85 percent capacity utilization as a threshold of significance for determining peak period transit demand impacts to the SFMTA lines. Previously, SFTMA Transit Effectiveness Project ridership data, collected in 2007 and 2008, has been utilized by the Planning Department to determine capacity utilization at the maximum load point (MLP) for bus and light rail lines. SFMTA has recently began to provide to the Planning Department updated ridership counts using automatic passenger count data for buses and updated manual counts for rail.[1] SFMTA intends to update this data annually, or as needed.

SFMTA and Regional Transit Screenline Analysis

Typically, transit impacts are analyzed through a screenline analysis. A screenline analysis assumes that there are identifiable corridors or directions of travel which are served by a grouping of transit lines. Therefore, an individual line would be combined with other transit lines in a corridor and corridors combined into a screenline in determining significance. However, on a case-by-case basis the Planning Department may request individual line capacity utilization analysis. In either case, the same methodology for impact determination would apply.

Four screenlines have been established in San Francisco to analyze potential impacts of projects on SFMTA service: the northeast screenline, the northwest screenline, the southeast screenline, and the southwest screenline, with sub-corridors within each screenline. The SFMTA routes by screenline and sub-corridors are shown in Attachment A, along with a schematic illustration of the screenlines and updated screenline data. As discussed above, the Planning Department uses 85 percent capacity utilization as the threshold of significance for identifying transit crowding impacts.

[1] Tables included in Transportation Impact Studies should reference "SFMTA Transit Ridership Counts 2010/2011". The manual rail counts were taken in the Fall of 2010 and the automatic passenger counts are from 2011.

Four principal regional transit providers serve San Francisco: BART from the East Bay and Peninsula; SamTrans from the Peninsula; AC Transit from the East Bay, and Golden Gate Bridge, Highway and Transportation District (GGBHTD) from the North Bay. Two additional ferry providers exist besides GGBHTD: Alameda Harbor Bay Ferry from the East Bay and Blue & Gold Fleet from the North Bay and East Bay. For regional transit providers, the MLP is typically at the San Francisco City limit (i.e., the East Bay MLP would occur at the Transbay Tube and on the Bay Bridge; the North Bay MLP would occur at the Golden Gate Bridge; and the South Bay MLP would occur at the southern city border). The regional transit providers by screenline are shown in Attachment B, along with a schematic illustration of the screenlines and updated screenline data. The Planning Department uses 100 percent capacity utilization as the threshold of significance for identifying regional transit crowding impacts.

SFMTA Individual Line Analysis

Sometimes, transit impacts are analyzed on a corridor or line-by-line basis. The following table (see Attachment C for full data) provides an example of the data and capacity utilization calculation using updated SFMTA transit data for outbound (OB) and inbound (IB) 1 California and 10 Townsend during the PM peak hour. This is not meant to represent the format or content of the table that would be included in transportation impact studies, rather it is a sample of the full transit ridership and capacity data set.[2] Please refer to Attachment D for a Glossary of Terms.

TABLE 1
EXAMPLE OF SFMTA FALL 2010/2011 CAPACITY UTILIZATION DATA (PM PEAK HOUR)

SFMTA Line	(A) 100% Planning Capacity per Vehicle	(B) Headway (Mins)	(C) Average Max Load	(D) = (60/B * C) Peak Hour Load	MLP	(E) = (60/B * A) Peak Hour Capacity	(F) = (D/E) Peak Hour Capacity Utilization
1 (OB)	63	3.5	53	909	California/ Presidio	1,080	84.2%
1 (IB)	63	3.5	35	600	California/ Laurel	1,080	55.6%
10 (OB)	63	20.0	57	171	2nd/ Howard	189	90.5%
10 (IB)	63	20.0	62	186	Pacific/ Powell St	189	98.4%

In the above example, OB 1 California is 0.8 percent below the 85 percent threshold of significance and IB 1 California is 29.4 percent below the threshold at the respective MLPs. Generally, if a proposed project would generate enough trips on a particular line (in the above example for the 1 California, nine trips (OB) and 318 trips (IB)) that it would cause the route to exceed the 85 percent capacity utilization, it would be considered to result in a significant transit impact.

[2] Note: The methodology and threshold of significance used for analyzing transit impacts are remaining the same; only the data used for that analysis is changing.

Also in the above example, OB 10 Townsend is 5.5 percent above the 85 percent threshold of significance and IB 10 Townsend is 13.4 percent above the threshold of significance at the respective MLPs. In these situations, the analysis needs to calculate the percentage of trips that the proposed project contributes to the line. If the percent contribution to the total peak hour ridership at the MLP is five percent or greater, then the proposed project would contribute substantially to transit crowding and would result in a significant impact.

> Example: The proposed project would contribute 20 transit trips to the IB 10 Townsend, therefore the peak hour load would be 206 (186 + 20). The 20 transit trips would constitute 9.7 percent (20/206 = 9.71%) of the Existing plus Proposed Project peak hour load. This would be considered a significant impact. If on the on the other hand, the proposed project contributed nine transit trips to the IB 10 Townsend, the impact would be considered less than significant because proposed project transit trips would only account for 4.6 percent of the Existing plus Proposed Project peak hour load (9/195 = 4.61%).[3]

Applicability

Generally, the updated SFMTA data should be used in any transportation impact study that has yet to reach the screencheck submittal phase and all future transportation impact study (!) cases. The transportation planner, in coordination with the environmental planner, will determine on a case-by-case basis whether a project is not subject to this general applicability requirement. Applicability questions should be directed to the ! case planner.

[3] In the transportation impact study (TIS), numbers should be reported to the tenth of the percentage point, however, calculations should be done to the hundredth of the percentage point to determine significance. For example, if the calculation is 4.95 percent, the TIS should report 5.0 percent (significant impact). Conversely, if the calculation is 4.94 percent, the TIS should report 4.9 percent (less-than-significant impact).

Attachment A – SFMTA Screenlines

FIGURE A-1
SFMTA SCREENLINES

Muni Screenline

TABLE A-1
EXISTING PEAK HOUR[1]

Muni Screenline Sub-corridor	AM Peak Hour (Inbound)			PM Peak Hour (Outbound)		
	Ridership	Capacity	Utilization	Ridership	Capacity	Utilization
Northeast						
Kearny/Stockton[2]	2,532	3,366	75%	2,158	3,291	66%
Other Lines[3]	439	1,005	44%	570	1,078	53%
Screenline Total	*2,971*	*4,370*	*68%*	*2,727*	*4,369*	*62%*
Northwest						
Geary[4]	1,370	2,183	63%	1,814	2,528	72%
California[5]	1,863	2,369	79%	1,366	1,686	81%
Sutter/Clement[6]	485	630	77%	470	630	75%
Fulton/Hayes[7]	1,193	1,470	81%	965	1,176	82%
Balboa[8]	655	1,008	65%	637	929	69%
Screenline Total	*5,566*	*7,660*	*73%*	*5,252*	*6,949*	*76%*
Southeast						
Third Street[9]	428	714	60%	550	714	77%
Mission[10]	1,727	2,977	58%	1,529	2,789	55%
San Bruno/Bayshore[11]	1,561	2,087	75%	1,320	2,134	62%
Other Lines[12]	1,115	1,596	70%	1,034	1,712	60%
Screenline Total	*4,830*	*7,374*	*66%*	*4,433*	*7,349*	*60%*
Southwest						
Subway lines[13]	5,418	6,307	**86%**	4,747	6,294	75%
Haight/Noriega[14]	1,157	1,706	68%	1,105	1,651	67%
Other lines[15]	230	627	37%	276	700	39%
Screenline Total	*6,805*	*8,640*	*79%*	*6,128*	*8,645*	*71%*
Muni Screenlines Total	*20,172*	*28,044*	*72%*	*18,540*	*27,312*	*68%*

Screenlines and sub-corridors operating at capacity utilization of 85 percent or greater are highlighted in **bold**. Some of the individual lines within certain sub-corridors have been adjusted to be in the appropriate city "quadrant" per the screenline. Thus, for some sub-corridors (e.g., Kearny/Stockton AM Peak Hour), the total does not match the individual lines' maximum load point ridership and capacity shown in Appendix C.

1. Muni bus data collected between August 2011 and October 2011 (except 1AX and 1BX which is January to March 2012). Muni rail data collected between September 2007 and February 2010.
2. 8X Bayshore Express, 30 Stockton, 30X Marina Express, 41 Union, 45 Union-Stockton
3. F Market & Wharves, 10 Townsend, 12 Folsom-Pacific
4. 38 Geary, 38L Geary Limited, 38AX Geary 'A' Express, 38BX Geary 'B' Express
5. 1 California, 1AX California 'A' Express, 1AX California 'B' Express
6. 2 Clement, 3 Jackson
7. 5 Fulton, 21 Hayes
8. 31 Balboa, 31AX Balboa 'A' Express, 31BX Balboa 'B' Express
9. T Third Street
10. 14 Mission, 14L Mission Limited, 14X Mission Express, 49 Van Ness-Mission
11. 8AX Bayshore 'A' Express, 8BX Bayshore 'B' Express, 8X Bayshore Express, 9 San Bruno, 9L San Bruno Limited
12. J Church, 10 Townsend, 12 Folsom-Pacific, 19 Polk, 27 Bryant
13. K Ingleside, L Taraval, M Ocean View, N Judah
14. 6 Parnassus, 71/71L Haight-Noriega Limited, 16X Noriega Express, NX Judah Express
15. F Market & Wharves

Source: SFMTA TEP Project, Case No. 2011.0558E, October 2012

TABLE A-2
Cumulative (2035) PEAK HOUR

Muni Screenline Sub-corridor	**AM Peak Hour (Inbound)**			**PM Peak Hour (Outbound)**		
	Ridership	**Capacity**	**Utilization**	**Ridership**	**Capacity**	**Utilization**
Northeast						
Kearny/Stockton[1]	2,505	3,347	75%	1,841	2,359	78%
Other Lines[2]	452	903	50%	799	1,218	66%
Screenline Total	*2,957*	*4,250*	*70%*	*2,640*	*3,577*	*74%*
Northwest						
Geary[3]	2,842	3,952	72%	3,267	3,826	**85%**
California[4]	1,658	2,306	72%	1,178	1,841	64%
Sutter/Clement[5]	271	630	43%	433	630	69%
Fulton/Hayes[6]	1,129	1,470	77%	1,081	1,386	78%
Balboa[7]	690	1,008	68%	730	929	79%
Screenline Total	*6,590*	*9,366*	*70%*	*6,689*	*8,611*	*78%*
Southeast						
Third Street[8]	1,247	3,332	37%	1,974	2,856	69%
Mission[9]	2,349	2,836	83%	2,104	2,836	74%
San Bruno/Bayshore[10]	1,778	2,087	**85%**	1,739	2,134	82%
Other Lines[11]	1,387	1,801	77%	1,189	1,801	66%
Screenline Total	*6,761*	*10,056*	*67%*	*7,006*	*9,627*	*73%*
Southwest						
Subway lines[12]	5,851	6,522	**90%**	5,157	6,624	78%
Haight/Noriega[13]	1,241	1,554	80%	1,248	1,554	80%
Other lines[14]	212	627	34%	318	840	38%
Screenline Total	*7,304*	*8,703*	*84%*	*6,723*	*9,018*	*75%*
Muni Screenlines Total	*23,612*	*32,375*	*73%*	*23,058*	*30,833*	*75%*

Screenlines and corridors operating at capacity utilization of 85 percent or greater are highlighted in **bold**.

1. 8X Bayshore Express, 30 Stockton, 30X Marina Express, 41 Union, 45 Union-Stockton
2. F Market & Wharves, 10 Townsend, 12 Folsom-Pacific
3. 38 Geary, 38L Geary Limited, 38AX Geary 'A' Express, 38BX Geary 'B' Express
4. 1 California, 1AX California 'A' Express, 1AX California 'B' Express
5. 2 Clement, 3 Jackson
6. 5 Fulton, 21 Hayes
7. 31 Balboa, 31AX Balboa 'A' Express, 31BX Balboa 'B' Express
8. T Third Street
9. 14 Mission, 14L Mission Limited, 14X Mission Express, 49 Van Ness-Mission
10. 8AX Bayshore 'A' Express, 8BX Bayshore 'B' Express, 8X Bayshore Express, 9 San Bruno, 9L San Bruno Limited
11. J Church, 10 Townsend, 12 Folsom-Pacific, 19 Polk, 27 Bryant
12. K Ingleside, L Taraval, M Ocean View, N Judah
13. 6 Parnassus, 71/71L Haight-Noriega Limited, 16X Noriega Express, NX Judah Express
14. F Market & Wharves

Source: SFMTA TEP Project, Case No. 2011.0558E, October 2012

Attachment B – Regional Transit Providers Screenlines

FIGURE B-1
REGIONAL SCREENLINES

Regional Screenline

TABLE B-1
EXISTING (2012) PEAK HOUR

Regional Screenline Transit Provider/Service	AM Peak Hour (Inbound)			PM Peak Hour (Outbound)		
	Ridership	Capacity	Utilization	Ridership	Capacity	Utilization
East Bay						
BART	19,716	22,050	89%	19,716	22,050	89%
AC Transit	1,568	2,829	55%	2,256	3,926	57%
Ferries	810	1,170	69%	805	1,615	50%
Screenline Total	*22,094*	*26,049*	*85%*	*22,777*	*27,591*	*83%*
North Bay						
Golden Gate Transit Bus	1,330	2,543	52%	1,384	2,817	49%
Ferries	1,082	1,959	55%	968	1,959	49%
Screenline Total	*2,412*	*4,502*	*54%*	*2,352*	*4,776*	*49%*
South Bay						
BART	10,682	14,910	72%	10,682	14,910	72%
Caltrain	2,171	3,100	70%	2,377	3,100	77%
SamTrans	255	520	49%	141	320	44%
Ferries	--	--	--	--	--	--
Screenline Total	*13,108*	*18,530*	*71%*	*13,200*	*18,330*	*72%*
Regional Screenlines Total	*37,615*	*49,081*	*77%*	*38,330*	*50,697*	*76%*

Screenlines and transit providers/services operating at capacity utilization of 100 percent or greater are highlighted in **bold**.

Source: SFMTA TEP Project, Case No. 2011.0558E, October 2012

TABLE B-2
CUMULATIVE (2035) PEAK HOUR

Regional Screenline Transit Provider/Service	AM Peak Hour (Inbound)			PM Peak Hour (Outbound)		
	Ridership	Capacity	Utilization	Ridership	Capacity	Utilization
East Bay						
BART	28,780	33,170	87%	28,780	33,170	87%
AC Transit	7,000	12,000	58%	7,000	12,000	58%
Ferries	4,682	5,940	79%	5,319	5,940	90%
Screenline Total	*40,462*	*51,110*	*79%*	*41,099*	*51,110*	*80%*
North Bay						
Golden Gate Transit Bus	1,990	2,543	78%	2,070	2,817	73%
Ferries	1,619	1,959	83%	1,619	1,959	83%
Screenline Total	*3,609*	*4,502*	*80%*	*3,689*	*4,776*	*77%*
South Bay						
BART	13,847	24,182	57%	13,847	24,182	57%
Caltrain	2,310	3,600	64%	2,529	3,600	70%
SamTrans	271	520	52%	150	320	47%
Ferries	59	200	30%	59	200	30%
Screenline Total	*16,487*	*28,502*	*58%*	*16,585*	*28,302*	*59%*
Regional Screenlines Total	*60,558*	*84,114*	*72%*	*61,373*	*84,188*	*73%*

Screenlines and transit providers/services operating at capacity utilization of 100 percent or greater are highlighted in **bold**.

Source: SFMTA TEP Project, Case No. 2011.0558E, October 2012

Attachment C – Fall 2010/2011 SFMTA Line Load and Capacity by Time Period and Direction of Travel

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FALL 2011 Route Load and Capacity by Time Period and Direction of Travel

Line	AM - Outbound							AM - Inbound							Route
	100% capacity per vehicle	Headway (Mins)	Average Max Load	Peak Hour Load	MLP	Peak Hour Capacity	Peak Hour Capacity Utilization	100% capacity per vehicle	Headway (Mins)	Average Max Load	Peak Hour Load	MLP	Peak Hour Capacity	Peak Hour Capacity Utilization	
1	63	3.5	34	583	Sacramento/Van Ness Ave	1,080	54%	63	3.5	50	857	Clay/Taylor	1,080	79%	**1**
1AX*								73	9.0	57	380	California St/8th Ave	487	78%	**1AX***
1BX*								94	7.0	73	626	California St/Fillmore	806	78%	**1BX***
2	63	12.0	24	120	Sutter/Leavenworth	315	38%	63	12.0	49	245	Post/Jones	315	78%	**2**
3	63	15.0	18	72	Sutter/Leavenworth	252	29%	63	12.0	48	240	Post/Jones	315	76%	**3**
5	63	4.2	24	340	McAllister/Gough	893	38%	63	3.6	50	833	McAllister/Laguna	1,050	79%	**5**
6	63	11.0	20	109	Haight/Divisidero	344	32%	63	10.0	45	270	Page/Octavia Blvd	378	71%	**6**
8X	94	7.5	63	504	Geneva Ave/Madrid St	752	67%	94	7.5	77	616	San Bruno Ave/Silver Ave	752	82%	**8X**
8AX								94	7.5	76	608	Bryant/6th St	752	81%	**8AX**
8BX								94	8.0	65	488	Bayshore Blvd/Blanken Ave	705	69%	**8BX**
9	63	12.0	35	175	Potrero Ave/20th St	315	56%	63	12.0	45	225	Bayshore Blvd/Cortland Ave	315	71%	**9**
9L	63	12.0	23	115	11th St/Market St	315	37%	63	12.0	48	240	Bayshore Blvd/Cortland Ave	315	76%	**9L**
10	63	20.0	55	165	Pacific Ave/Taylor St	189	**87%**	63	20.0	47	141	2nd St/Townsend St	189	75%	**10**
12	63	20.0	48	144	Pacific Ave/Mason St	189	76%	63	20.0	41	123	Folsom St/7th St	189	65%	**12**
14	94	6.0	22	220	Mission/20th St	940	23%	94	6.0	37	370	Mission/29th St	940	39%	**14**
14L	94	9.0	27	180	Mission/24th St	627	29%	94	9.0	73	487	Mission/30th St	627	78%	**14L**
14X								94	8.0	70	525	Trumbull St/Stoneybrook Ave	705	74%	**14X**
16X								86	9.0	51	340	Lincoln Way/11t h Ave	572	59%	**16X**
17	63	30.0	6	12	West Portal Ave/14th Ave	126	10%	63	30.0	21	42	Crespi Dr/19th Ave	126	33%	**17**
18	63	20.0	33	99	Lake Merced/Lake Merced	189	52%	63	20.0	36	108	33rd Ave/Balboa St	189	57%	**18**
19	63	15.0	55	220	8th St/Mission St	252	**87%**	63	15.0	40	160	Larkin/O'Farrell	252	63%	**19**
21	63	9.0	20	133	Hayes/Franklin St	420	32%	63	9.0	54	360	Grove St/Gough St	420	**86%**	**21**
22	63	9.0	43	287	16th St/Mission St	420	68%	63	9.0	44	293	16th St/Guerrero St	420	70%	**22**
23	63	20.0	46	138	Crescent Ave/Leese St	189	73%	63	20.0	48	144	Monterey Blvd/Valdez Ave	189	76%	**23**
24	63	10.0	24	144	Castro St/Duboce Ave	378	38%	63	10.0	45	270	Castro/19th St	378	71%	**24**
27	63	15.0	35	140	Mason St/Ofarrell St	252	56%	63	15.0	33	132	Bryant/18th St	252	52%	**27**
28	63	12.0	39	195	19th Ave/Ulloa St	315	62%	63	10.0	46	276	19th Ave/Rivera St	378	73%	**28**
28L	63	12.0	34	170	19th Ave/Noriega St	315	54%	63	12.0	39	195	Daly City BART Station	315	62%	**28L**
29	63	10.0	49	294	Plymouth Ave/Ocean Ave	378	78%	63	10.0	50	300	Plymouth Ave/Ocean Ave	378	79%	**29**
30	69	7.0	51	437	Stockton St/Sutter St	591	74%	65	8.0	47	353	Stockton/Sacramento St	491	72%	**30**
30X								63	4.0	60	900	Chestnut st/Van Ness Ave	945	**95%**	**30X**
31	63	12.0	31	155	Eddy St/Larkin St	315	49%	63	12.0	46	230	Turk St/Arguello Blvd	315	73%	**31**
31AX								63	12.0	37	185	Balboa St/17th Ave	315	59%	**31AX**
31BX								63	10.0	40	240	Turk St/Stanyan St	378	63%	**31BX**
33	63	15.0	32	128	18th St/Sanchez St	252	51%	63	15.0	35	140	18th St/Guerrero St	252	56%	**33**

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FALL 2011 Route Load and Capacity by Time Period and Direction of Travel

Line	AM - Outbound							AM - Inbound							Route
	100% capacity per vehicle	Headway (Mins)	Average Max Load	Peak Hour Load	MLP	Peak Hour Capacity	Peak Hour Capacity Utilization	100% capacity per vehicle	Headway (Mins)	Average Max Load	Peak Hour Load	MLP	Peak Hour Capacity	Peak Hour Capacity Utilization	
35	45	30.0	5	10	Castro St/18th St	90	11%	45	30.0	21	42	Eureka St/19th St	90	47%	**35**
36	45	30.0	25	50	Monterey Blvd/Baden St	90	56%	45	30.0	21	42	Monterey Blvd/Baden St	90	47%	**36**
37	45	15.0	12	48	14th St/Castro St	180	27%	45	15.0	29	116	Corbett Ave/Douglass St	180	64%	**37**
38	94	12.0	39	195	Geary Blvd/Van Ness Ave	470	41%	94	12.0	46	230	O'Farrell St/Taylor St	470	49%	**38**
38L	94	5.5	59	644	Geary Blvd/Filmore St	1,025	63%	94	5.5	75	818	Geary Blvd/Laguna St	1,025	80%	**38L**
38AX								63	11.0	30	164	Geary Blvd/25th Ave	344	48%	**38AX**
38BX								63	11.0	29	158	Geary Blvd/Collins St	344	46%	**38BX**
39															**39**
41	94	12.0	14	70	Union St/Mason St	470	15%	94	8.0	59	443	Columbus Ave/Stockton St	705	63%	**41**
43	63	10.0	41	246	Laguna Honda Blvd/Clarendon	378	65%	63	10.0	58	348	Chestnut St/Fillmore St	378	**92%**	**43**
44	63	10.0	37	222	Laguna Honda Blvd/Noriega St	378	59%	63	8.0	53	398	Silver Ave/Congdon St	473	84%	**44**
45	63	7.0	49	420	Stockton St/Sutter St	540	78%	63	8.0	53	398	Stockton St/Washington St	473	84%	**45**
47	63	10.0	46	276	Van Ness Ave/Eddy St	378	73%	63	10.0	49	294	Van Ness Ave/O'Farrell St	378	78%	**47**
48	63	12.0	46	230	24th St/Valencia St	315	73%	63	10.0	46	276	24th St/Valencia St	378	73%	**48**
49	94	8.0	38	285	Van Ness Ave/Eddy St	705	40%	94	8.0	46	345	S. Van Ness Ave/Mission St	705	49%	**49**
52	63	20.0	26	78	Excelsior Ave/Mission St	189	41%	63	20.0	29	87	Rousseau St/Cayuga Ave	189	46%	**52**
54	63	20.0	39	117	Geneva Ave/Paris St	189	62%	63	20.0	35	105	Geneva Ave/Paris St	189	56%	**54**
56	45	30.0	6	12	Sunnydale Ave/Sawyer St	90	13%	45	30.0	12	24	Delta St/Tioga Ave	90	27%	**56**
66	45	20.0	16	48	16th Ave/Moraga St	135	36%	45	20.0	15	45	Quintara St/26th Ave	135	33%	**66**
67	63	20.0	10	30	Folsom St/Bessie St	189	16%	63	20.0	31	93	Folsom St/25th St	189	49%	**67**
71/71L	63	11.0	24	131	Haight St/Fillmore St	344	38%	63	10.0	50	300	Page St/Octavia Blvd	378	79%	**71/71L**
80X								63	180.0	18	6	4th St/Townsend St	21	29%	**80X**
81X								69	20.0	48	144	4th St/Townsend St	208	69%	**81X**
82X								69	10.0	58	348	4th St/Townsend St	415	84%	**82X**
88								63	20.0	32	96	Geneva Ave/Cayuga Ave	189	51%	**88**
108	63	12.0	12	60	Beale/Howard St	315	19%	63	10.0	32	192	Treasure Island Main Gate	378	51%	**108**
NX								63	10.0	41	247	Judah St/19th Avenue	378	65%	**NX**
NOTE: RAIL DATA COLLECTED IN 2010															
F	70	6.7	18	162	Market St/5th St	627	26%	70	6.0	29	289	Embarcadero/Washington	700	41%	**F**
J	119	8.6	22	156	Civic Center Station	830	19%	119	10.0	96	573	Van Ness Station	714	80%	**J**
K	119	10.0	55	330	Embarcadero	714	46%	119	8.6	105	735	Church Street Station	833	**88%**	**K**
L	238	8.6	46	321	Civic Center Station	1,660	19%	238	7.5	202	1,616	Church Street Station	1,904	**85%**	**L**
M	238	8.6	40	279	Forest Hill Station	1,660	17%	238	8.6	182	1,274	Church Street Station	1,666	76%	**M**
N	238	7.5	68	544	Sunset Tunnel E	1,904	29%	238	7.5	224	1,792	Duboce/Church	1,904	**94%**	**N**
T	119	8.6	50	347	Embarcadero/Folsom	833	42%	119	10.0	71	428	Embarcadero/Brannan	714	60%	**T**

"Note: This seasonal automatic passenger count (APC) and load information may vary from the annualized transit ridership data provided to the Federal Transit Administration. This data is provided for planning purposes only."

*Spring 2012 ridership data was used due to errors in Fall 2011 ridership data.

Lines operating at capacity utilization of 85 percent or greater are highlighted in **bold**.

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FALL 2011 Route Load and Capacity by Time Period and Direction of Travel

	PM - Outbound							PM - Inbound							
Line	100% capacity per vehicle	Headway (Mins)	Average Max Load	Peak Hour Load	MLP	Peak Hour Capacity	Peak Hour Capacity Utilization	100% capacity per vehicle	Headway (Mins)	Average Max Load	Peak Hour Load	MLP	Peak Hour Capacity	Peak Hour Capacity Utilization	**Route**
1	63	3.5	53	909	California/Presidio	1,080	84%	63	3.5	35	600	California/Laurel	1,080	56%	**1**
1AX*	63	13.0	45	208	Pine St/Montgomery St.	291	71%								**1AX***
1BX*	63	12.0	50	250	Pine St/Montgomery St.	315	79%								**1BX***
2	63	12.0	52	260	Sutter/Mason	315	83%	63	12.0	34	170	Post/Larkin	315	54%	**2**
3	63	12.0	42	210	Sutter/Taylor	315	67%	63	12.0	25	125	Post/Leavenworth	315	40%	**3**
5	63	4.7	52	659	McAllister/Van Ness	798	83%	63	4.5	45	600	McAllister/Laguna	840	71%	**5**
6	63	10.0	42	252	Haight/Gough	378	67%	63	10.0	26	156	Haight/Buchanan	378	41%	**6**
8X	94	7.5	52	416	Stockton/Sacramento	752	55%	94	7.5	51	408	Kearny/Bush	752	54%	**8X**
8AX	94	7.5	59	472	Harrison/6th St	752	63%								**8AX**
8BX	94	7.5	71	568	Stockton St/Sacramento St.	752	76%								**8BX**
9	63	12.0	43	215	Potrero/25th St	315	68%	63	12.0	36	180	Potrero/18th St	315	57%	**9**
9L	63	12.0	40	200	11th St/Market	315	63%	63	12.0	28	140	11th St/Harrison	315	44%	**9L**
10	63	20.0	57	171	2nd/Howard	189	**90%**	63	20.0	62	186	Pacific/Powell St	189	**98%**	**10**
12	63	20.0	42	126	Sansome/California	189	67%	63	20.0	45	135	Pacific/Powell St	189	71%	**12**
14	94	7.5	45	360	Otis/12th St.	752	48%	94	7.5	29	232	Mission/20th St	752	31%	**14**
14L	94	9.0	64	427	Mission/24th St.	627	68%	94	9.0	44	293	Mission/30th St	627	47%	**14L**
14X	94	8.0	49	368	6th St/Harrison St	705	52%								**14X**
16X	78	9.0	38	253	Lincoln Way/9th Ave	517	49%								**16X**
17	63	30.0	21	42	19th Ave/Holloway	126	33%	63	30.0	16	32	West Portal/Sloat	126	25%	**17**
18	63	20.0	31	93	33rd Ave/Balboa St	189	49%	63	20.0	28	84	Lake Merced/Brotherhood Wy	189	44%	**18**
19	63	15.0	31	124	Polk/Sutter St	252	49%	63	15.0	43	172	Larkin/McAllister	252	68%	**19**
21	63	10.0	51	306	Hayes/Van Ness	378	81%	63	10.0	26	156	Grove/Gough	378	41%	**21**
22	63	8.0	41	308	Fillmore/O'Farrell	473	65%	63	8.0	43	323	Fillmore/Hermann	473	68%	**22**
23	63	20.0	29	87	Diamond/Bosworth	189	46%	63	20.0	31	93	Monterey Blvd/Faxon St	189	49%	**23**
24	63	10.0	46	276	Divisidero/Haight	378	73%	63	10.0	29	174	Castro/17th St	378	46%	**24**
27	63	15.0	29	116	5th St/Mission	252	46%	63	15.0	40	160	Ellis/Mason St.	252	63%	**27**
28	63	10.0	47	282	Park Presidio/Geary Blvd	378	75%	63	10.0	47	282	19th Ave/Quintara	378	75%	**28**
28L					19th Ave/Taraval										**28L**
29	63	10.0	49	294	19th Ave/Holloway	378	78%	63	10.0	44	264	19th Ave/Holloway	378	70%	**29**
30	83	4.0	44	660	Stockton/Sutter	1,248	53%	82	4.0	47	705	Chestnut/Octavia	1,224	58%	**30**
30X	63	7.5	54	432	Sansome/Washington St	504	**86%**								**30X**
31	63	14.0	52	223	Eddy St/Van Ness	270	83%	63	14.0	33	141	Eddy St/Larkin	270	52%	**31**
31AX	63	11.0	43	235	Pine St/Montgomery St.	344	68%								**31AX**
31BX	63	12.0	36	180	Pine St/Montgomery St.	315	57%								**31BX**
33	63	15.0	33	132	18th St/Church	252	52%	63	15.0	39	156	18th St/Church	252	62%	**33**

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FALL 2011 Route Load and Capacity by Time Period and Direction of Travel

	PM - Outbound							PM - Inbound							
Line	100% capacity per vehicle	Headway (Mins)	Average Max Load	Peak Hour Load	MLP	Peak Hour Capacity	Peak Hour Capacity Utilization	100% capacity per vehicle	Headway (Mins)	Average Max Load	Peak Hour Load	MLP	Peak Hour Capacity	Peak Hour Capacity Utilization	**Route**
35	45	20.0	24	72	Castro/19th St	135	53%	45	20.0	5	15	Eureka/20th St.	135	11%	**35**
36	45	30.0	15	30	Fowler Ave/Portola Dr	90	33%	45	30.0	31	62	Fowler Ave/Portola Dr	90	69%	**36**
37	45	20.0	37	111	17th St/Diamond St	135	82%	45	20.0	19	57	Corbett Ave/Douglass St	135	42%	**37**
38	94	8.0	60	450	Geary Blvd/Franklin St	705	64%	94	7.5	44	352	Geary Blvd/Laguna St	752	47%	**38**
38L	94	5.5	79	862	Geary Blvd/Van Ness Ave	1,025	84%	94	5.5	51	556	Geary Blvd/Divisidero	1,025	54%	**38L**
38AX	63	9.0	42	280	Pine St/Montgomery St.	420	67%								**38AX**
38BX	63	10.0	37	222	Pine St/Montgomery St.	378	59%								**38BX**
39	45	20.0	11	33	Powell/Filbert	135	24%	45	20.0	15	45	225 Telegraph Hill Blvd S.	135	33%	**39**
41	63	8.0	53	398	Union St/Columbus Ave	473	84%	63	8.0	18	135	Clay St/Montgomery St	473	29%	**41**
43	63	12.0	48	240	Masonic Ave/Golden Gave Ave	315	76%	63	12.0	32	160	7th Ave/Moraga St	315	51%	**43**
44	63	9.0	53	353	Silver Ave/Lisbon St	420	84%	63	9.0	27	180	Woodside Ave/Hernandez Ave	420	43%	**44**
45	63	12.0	52	260	Stockton/Sutter	315	83%	63	12.0	48	240	Stockton/Sacramento	315	76%	**45**
47	63	10.0	43	258	Van Ness/O'Farrell	378	68%	63	10.0	46	276	Van Ness/McAllister	378	73%	**47**
48	63	12.0	36	180	24th St/Folsom St	315	57%	63	12.0	35	175	24th St/Folsom St.	315	56%	**48**
49	94	8.0	50	375	Van Ness Ave/Eddy St	705	53%	94	8.0	47	353	Van Ness Ave/McAllister St	705	50%	**49**
52	63	20.0	27	81	Mission St/Silver Ave	189	43%	63	20.0	22	66	Woodside Ave/Hernandez Ave	189	35%	**52**
54	63	20.0	38	114	Balboa Park BART Station	189	60%	63	20.0	37	111	Balboa Park BART Station	189	59%	**54**
56	45	30.0	7	14	Blanken Ave/Peninsula Ave	90	16%	45	30.0	8	16	Wilde Ave/Girard St	90	18%	**56**
66	45	20.0	16	48	9th Ave/Lawton St	135	36%	45	20.0	6	18	Quintara St/17th Ave	135	13%	**66**
67	63	20.0	25	75	Folsom/Bessie St	189	40%	63	20.0	10	30	Folsom St/Cesar Chavez	189	16%	**67**
71/71L	63	10.0	54	324	Market St/Van Ness Ave	378	**86%**	63	10.0	43	258	Haight/Buena Vista	378	68%	**71/71L**
80X															**80X**
81X															**81X**
82X	63	12.0	29	145	Battery St/Jackson St	315	46%								**82X**
88	63	20.0	21	63	Geneva Ave/Cayuga Ave	189	33%								**88**
108	63	15.0	26	104	Treasure Island Rd/Macall	252	41%	63	15.0	28	112	Treasure Island Main Gate	252	44%	**108**
NX	63	10.0	46	275	Sutter St/Sansome St	378	73%								
NOTE: RAIL DATA COLLECTED IN 2010															
F	70	6.0	72	718	Embarcadero/Green	700	**103%**	70	6.0	25	249	Embarcadero/Broadway	700	36%	**F**
J	119	8.6	71	498	Van Ness Station	830	60%	119	7.5	24	189	Van Ness Station	952	20%	**J**
K	119	8.6	108	750	Van Ness Station	830	**90%**	119	10.0	85	508	Embarcadero	714	71%	**K**
L	238	7.5	170	1,360	Van Ness Station	1,904	71%	238	6.7	68	609	Van Ness Station	2,131	29%	**L**
M	238	10.0	144	864	Van Ness Station	1,428	61%	238	8.6	70	488	Castro Station	1,660	29%	**M**
N	238	6.7	198	1,773	Van Ness Station	2,131	83%	238	7.5	110	880	Carl/Cole	1,904	46%	**N**
T	119	10.0	92	550	Embarcadero/Folsom	714	77%	119	8.6	52	365	Embarcadero/Folsom	830	44%	**T**

"Note: This seasonal automatic passenger count (APC) and load information may vary from the annualized transit ridership data provided to the Federal Transit Administration. This data is provided for planning purposes only."

*Spring 2012 ridership data was used due to errors in Fall 2011 ridership data.

Lines operating at capacity utilization of 85 percent or greater are highlighted in **bold**.

Attachment D – Glossary of Terms

Average Max Load – The actual ridership (or load) number at the maximum load point for the worst half hour (doubled) during the peak period.

Headway – The scheduled peak period time between buses, streetcars, trains, or light rail vehicles on the same line.

Maximum Load Point – The transit stop on a given line with the estimated greatest demand.

Net Available Capacity – The estimated number of passengers that can be accommodated during the peak hour on a line without exceeding the line's capacity. Calculation is peak hour capacity multiplied by 85 percent minus the peak hour load.

Peak Hour – The one-hour during the peak period where ridership at a maximum load point is estimated to be at its highest.

Peak Hour Capacity – The estimated volume of ridership that can be accommodated per line during the peak hour. The calculation is equal to the peak hour (60 minutes) divided by the peak hour scheduled headway multiplied by the capacity of the line (provided by SFMTA).

Peak Hour Capacity Utilization – The estimated percent capacity of the line that is being used by riders during the peak hour. The calculation is equal to the peak hour load (ridership) divided by the peak hour capacity.

Peak Hour Load – The estimated ridership for a bus or rail route at the maximum load point during the peak hour. Calculation is sixty minutes divided by the headway multiplied by the average max load.

Peak Period – The time period during the day where crowding on the transit system is at its highest. During the AM, it is defined between 6 AM to 9 AM. During the PM, it is defined between 4 PM to 7 PM.

100 Percent Capacity per Vehicle – The capacity per SFMTA vehicle that includes both seated and standing capacity, where standing capacity, is somewhere between 30 to 80 percent seated capacity (depending upon the specific transit vehicle configuration). The capacity per regional transit vehicle is equal to the seated capacity. The following presents the 100 percent capacity of different SFMTA vehicles:[1]

- historic streetcar – 70 passengers (F Market & Wharves);
- light rail vehicle – 119 passengers (J Church, KT Ingleside);
- modified light rail – 238 passengers (L Taraval, M Ocean View, and N Judah);
- standard bus – 63 passengers (remaining lines not listed in modified bus); and
- modified bus:
  - 45 passengers (35 Eureka, 36 Teresita, 37 Corbett, 39 Coit, 56 Rutland, and 66 Quintara)
  - 69 passengers (81X Caltrain Express, 82X Levi Plaza Express[2])
  - 73 passengers (1AX California 'A' Express)[2]
  - 94 passengers (1BX California 'B' Express,[2] 8X Bayshore Express, 8AX Bayshore 'A' Express, 8BX Bayshore 'B' Express, 14 Mission, 14L Mission Limited, 14X Mission Express, 38 Geary, 38L Geary Limited, 41 Union,[3] 49 Van Ness-Mission)
  - Other (lines 16X Noriega Express and 30 Stockton)[4]

[1] Note that the different capacities for each line are provided by SFMTA and are subject to change.

[2] Only during AM inbound peak period.

[3] Only during AM peak period.

[4] These two lines have other modified buses specific to these lines that differ throughout the day (see Attachment C).

SAN FRANCISCO PLANNING DEPARTMENT

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TO: Planning Department Transportation Consultant List
FROM: Planning Department Transportation Team
DATE: Updated – March 10, 2014
SUBJECT: Regional & Local 2040 Cumulative Transit Screenlines for Transportation Impact Studies

Purpose

The purpose of this memorandum is to provide an update to the Cumulative screenline transit data provided in the *Transit Data for Transportation Impact Studies* memorandum dated June 21, 2013 which provided direction for the transportation analyses of transit impacts for the San Francisco Municipal Transportation Agency (SFMTA), including the use of local and regional transit screenlines.

Background

Typically, transit impacts are analyzed through a screenline analysis. A screenline analysis assumes that there are identifiable corridors or directions of travel which are served by a grouping of transit lines. Therefore, an individual line would be combined with other transit lines in a corridor and corridors combined into a screenline in determining significance. Four screenlines have been established in San Francisco to analyze potential impacts of projects on SFMTA service: the northeast screenline, the northwest screenline, the southeast screenline, and the southwest screenline, with corridors within each screenline.

The SFMTA and SF Planning Department have recently updated both the regional and local transit screenlines to address the City's current cumulative context horizon year, 2040. These updated screenlines are included in the updated and Table A-2 and Table B-2. For Muni, the Planning Department and SFMTA use 85 percent capacity utilization as the performance standard/threshold of significance for identifying transit crowding impacts. For regional providers, the Planning Department uses 100 percent capacity utilization as the threshold of significance for identifying regional transit crowding impacts.

Applicability

Generally, the updated SFMTA data should be used in any transportation impact study that has yet to reach the screencheck submittal phase and all future transportation impact study (!) cases. The transportation planner, in coordination with the environmental planner, will determine on a case-by-case basis whether a project is not subject to this general applicability requirement. Applicability questions should be directed to the ! case planner.

TABLE A-2
CUMULATIVE (2040) PEAK HOUR

Muni Screenline Sub-corridor	AM Peak Hour (Inbound)			PM Peak Hour (Outbound)		
	Ridership	Capacity	Utilization	Ridership	Capacity	Utilization
Northeast						
Kearny/Stockton[1]	7,394	9,473	78.1%	6,295	8,329	75.6%
Other Lines[2]	758	1,785	42.5%	1,229	2,065	59.5%
Screenline Total	*8,152*	*11,258*	*72.4%*	*7,524*	*10,394*	*72.4%*
Northwest						
Geary[3]	2,673	3,763	71.0%	2,996	3,621	82.7%
California[4]	1,989	2,306	**86.3%**	1,766	2,021	**87.4%**
Sutter/Clement[5]	581	756	76.9%	749	756	**99.1%**
Fulton/Hayes[6]	1,962	1,977	**99.2%**	1,762	1,878	**93.8%**
Balboa[7]	690	1,008	68.5%	776	974	79.7%
Screenline Total	*7,895*	*9,810*	*80.5%*	*8,049*	*9,250*	***87.0%***
Southeast						
Third Street[8]	2,422	5,712	42.4%	2,300	5,712	40.3%
Mission[9]	3,117	3,008	**103.6%**	2,673	3,008	**88.9%**
San Bruno/Bayshore[10]	1,952	2,197	**88.8%**	1,817	2,134	**85.1%**
Other Lines[11]	1,795	2,027	**88.6%**	1,582	1,927	82.1%
Screenline Total	*9,286*	*12,944*	*71.7%*	*8,372*	*12,781*	*65.5%*
Southwest						
Subway lines[12]	6,314	7,020	**89.9%**	5,692	6,804	83.7%
Haight/Noriega[13]	1,415	1,596	**88.7%**	1,265	1,596	79.3%
Other lines[14]	175	560	31.3%	380	840	45.2%
Screenline Total	*7,904*	*9,176*	*86.1%*	*7,337*	*9,240*	*79.4%*
Muni Screenlines Total	*33,237*	*43,188*	*77.0%*	*31,282*	*41,665*	*75.1%*

Screenlines and corridors operating at capacity utilization of **85 percent or greater are highlighted in bold**. Some of the individual lines within certain corridors have been adjusted to be in the appropriate city "quadrant" per the screenline. Thus, for some sub-corridors (e.g., Kearny/Stockton AM Peak Hour), the total does not match the individual lines' maximum load point ridership and capacity .

1. 8X Bayshore Express, 30 Stockton, 30X Marina Express, 41 Union, 45 Union-Stockton, T-Third
2. E Embarcadero, F Market & Wharves, 10 Townsend, 12 Folsom-Pacific
3. 38 Geary, 38L Geary Limited, 38X Geary Express
4. 1 California, 1 California Short, 1AX California 'A' Express, 1BX California 'B' Express
5. 2 Clement, 2 Clement Short
6. 5 Fulton, 5L Fulton Limited, 21 Hayes
7. 31 Balboa, 31AX Balboa 'A' Express, 31BX Balboa 'B' Express
8. T Third Street
9. 14 Mission, 14 Mission Short, 14L Mission Limited, 14X Mission Express, 49L Van Ness-Mission Limited
10. 8AX Bayshore Express, 8BX Bayshore Express, 9 San Bruno, 9L San Bruno Limited
11. J Church, 10 Townsend, 19 Polk, 27 Bryant
12. K Ingleside, L Taraval, M Ocean View, N Judah
13. 6 Parnassus, 71L Haight-Noriega Limited, 16X Noriega Express, NX Judah Express
14. F Market & Wharves

Source: SFMTA March 2014.

TABLE B-2
CUMULATIVE (2040) PEAK HOUR

Regional Screenline Transit Provider/Service	**AM Peak Hour (Inbound)**			**PM Peak Hour (Outbound)**		
	Ridership	**Capacity**	**Utilization**	**Ridership**	**Capacity**	**Utilization**
East Bay						
BART	32,608	33,170	98.3%	30,383	33,170	91.6%
AC Transit	7,000	12,000	58.3%	7,000	12,000	58.3%
Ferries	4,682	5,940	78.8%	5,319	5,940	89.5%
Screenline Total	*44,290*	*51,110*	*86.7%*	*42,702*	*51,110*	*83.5%*
North Bay						
Golden Gate Transit Bus	1,990	2,543	78.3%	2,070	2,817	73.5%
Ferries	1,619	1,959	82.6%	1,619	1,959	82.6%
Screenline Total	*3,609*	*4,502*	*80.2%*	*3,689*	*4,776*	*77.2%*
South Bay						
BART	13,942	24,182	57.7%	13,971	24,182	57.8%
Caltrain	2,310	3,600	64.2%	2,529	3,600	70.3%
SamTrans	271	520	52.1%	150	320	46.9%
Ferries	59	200	29.5%	59	200	29.5%
Screenline Total	*16,582*	*28,502*	*58.2%*	*16,709*	*28,302*	*59.0%*
Regional Screenlines Total	*64,481*	*84,114*	*76.7%*	*63,100*	*84,188*	*75.0%*

Screenlines and transit providers/services operating at capacity utilization of 100 percent or greater are highlighted in **bold**.

Source: SFMTA, March 2014

APPENDIX TR-8

PROPOSED PROJECT PEDESTRIAN CROSSWALK AND SIDEWALK LEVEL OF SERVICE ANALYSIS

ANALYSIS ASSUMPTIONS

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32
Person Trips

Proposed Project	Auto Person Trips			Transit Trips			Walk/Other			Project Person Trips			Persons
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	Assigned
No Event - Wkday PM	548	796	1,344	157	724	881	233	337	570	938	1,858	2,796	1,452
No Event - Sat. Evening	820	887	1,707	261	413	673	361	389	750	1,442	1,688	3,130	1,423
Convention - Wkday PM	415	1,133	1,547	212	1,312	1,524	322	1,777	2,098	948	4,221	5,169	4,396
Basketball - Wkday PM	1,054	590	1,645	944	681	1,625	339	251	590	2,337	1,522	3,859	3,530
Basketball - Wkday Evening	6,396	150	6,546	4,138	232	4,371	1,304	64	1,368	11,839	446	12,285	10,975
Basketball - Wkday Late Evening	0	7,280	7,280	0	4,680	4,680	0	1,258	1,258	0	13,218	13,218	11,762
Basketball - Sat. Evening	7,120	141	7,261	4,134	176	4,310	620	61	681	11,874	378	12,251	10,799

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32
Pedestrian Volumes at Crosswalks and Sidewalks - Without Giants Game at AT&T Park
Revised April 2015

0.258

#	Analysis Location	Weekday PM					Weekday Evening					Weekday Late Evening					Saturday Evening				
		North	South	East	West	Total	North	South	East	West	Total	North	South	East	West	Total	North	South	East	West	Total
2015 Existing Conditions																					
1	Third St/South St	42	91	66	88	287	25	63	31	54	173	15	15	15	15	59	17	25	10	14	67
2	Third St/16th St	30	60	31	89	210	23	42	19	67	151	15	15	15	15	59	11	25	8	17	62
3	Terry A. Francois Blvd/South St	15	15	0	15	45	13	13	0	13	40	3	3	0	3	10	11	11	0	11	34
4	Third St between South St and 16th St			56	70	126			41	52	93			19	15	34			19	17	36
5	South St between Third and TFB 16th		30			30		23			23		15			15		15			15
6	St between Third and TFB	30				30	23				23	15				15	15				15

#	Analysis Location	Weekday PM					Weekday Evening					Weekday Late Evening					Saturday Evening				
		North	South	East	West	Total	North	South	East	West	Total	North	South	East	West	Total	North	South	East	West	Total
Existing plus Project - No Event																					
1	Third St/South St	99	408	696	174	1,376											92	334	582	127	1,134
2	Third St/16th St	304	120	181	149	755											240	115	209	107	670
3	Terry A. Francois Blvd/South St	26	21	0	26	74											26	19	0	26	71
4	Third St between South St and 16th St			279	116	395													261	68	329
5	South St between Third and TFB 16th		217			217												236			236
6	St between Third and TFB	217				217											236				236

#	Analysis Location	Weekday PM					Weekday Evening					Weekday Late Evening					Saturday Evening				
		North	South	East	West	Total	North	South	East	West	Total	North	South	East	West	Total	North	South	East	West	Total
Existing plus Project - Convention Event																					
1	Third St/South St	252	735	2,078	403	3,468															
2	Third St/16th St	683	207	566	236	1,693															
3	Terry A. Francois Blvd/South St	134	113	0	289	537															
4	Third St between South St and 16th St			722	205	928															
5	South St between Third and TFB 16th		631			631															
6	St between Third and TFB	707				707															

#	Analysis Location	Weekday PM					Weekday Evening					Weekday Late Evening					Saturday Evening				
		North	South	East	West	Total	North	South	East	West	Total	North	South	East	West	Total	North	South	East	West	Total
Existing plus Project - Basketball Game																					
1	Third St/South St	101	1,039	1,207	423	2,770	1,294	3,297	3,020	1,241	8,853	2,855	2,169	4,922	1,296	11,242	1,183	3,284	2,832	1,205	8,505
2	Third St/16th St	451	393	341	422	1,607	733	610	1,274	594	3,211	807	587	1,073	587	3,054	657	609	1,141	559	2,966
3	Terry A. Francois Blvd/South St	109	185	0	191	486	368	682	0	695	1,745	392	744	0	756	1,893	388	744	0	751	1,883
4	Third St between South St and 16th St			319	132	451			613	208	821			802	312	1,114			414	137	551
5	South St between Third and TFB 16th		259			259		584			584		797			797		401			401
6	St between Third and TFB	340				340	802				802	797				797	616				616

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32
Pedestrian Volumes at Crosswalks and Sidewalks - Without Giants Game at AT&T Park
Revised April 2015

#	Analysis Location	Weekday PM					Weekday Evening					Weekday Late Evening					Saturday Evening				
		North	South	East	West	Total	North	South	East	West	Total	North	South	East	West	Total	North	South	East	West	Total
2040 Cumulative - No Event																					
1	Third St/South St	141	499	762	262	1,663											109	359	592	141	1,201
2	Third St/16th St	334	180	212	238	965											251	140	217	124	732
3	Terry A. Francois Blvd/South St	41	36	0	41	119											37	58	16	49	161
4	Third St between South St and 16th St			335	186	521													280	85	366
5	South St between Third and TFB 16th		247			247												251			251
6	St between Third and TFB	247				247											251				251

#	Intersection Name	Weekday PM					Weekday Evening					Weekday Late Evening					Saturday Evening				
		North	South	East	West	Total	North	South	East	West	Total	North	South	East	West	Total	North	South	East	West	Total
2040 Cumulative - Convention Event																					
1	Third St/South St	294	826	2,144	491	3,755															0
2	Third St/16th St	713	267	597	325	1,903															0
3	Terry A. Francois Blvd/South St	149	128	0	304	582															0
4	Third St between South St and 16th St			778	275	1,054															0
5	South St between Third and TFB 16th		661			661															0
6	St between Third and TFB	737				737															0

2040 Cumulative - Basketball Game

#	Intersection Name	Weekday PM					Weekday Evening					Weekday Late Evening					Saturday Evening				
		North	South	East	West	Total	North	South	East	West	Total	North	South	East	West	Total	North	South	East	West	Total
2040 Cumulative - Basketball Game																					
1	Third St/South St	143	1,130	1,273	423	2,969											1,200	3,310	2,843	1,220	8,572
2	Third St/16th St	481	453	372	511	1,817											668	634	1,150	577	3,028
3	Terry A. Francois Blvd/South St	124	200	0	206	531											399	755	0	762	1,917
4	Third St between South St and 16th St			375	202	577													433	155	588
5	South St between Third and TFB 16th		289			289												416			416
6	St between Third and TFB	370				370											632				632

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32 Pedestrian Volumes at Crosswalks and Sidewalks - With Giants Game at AT&T Park Revised
April 2015

#	Analysis Location	Weekday PM					Weekday Evening					Weekday Late Evening					Saturday Evening				
		North	South	East	West	Total	North	South	East	West	Total	North	South	East	West	Total	North	South	East	West	Total
2015 Existing Conditions																					
1	Third St/South St	67	135	69	112	383	41	108	66	130	345	15	15	15	15	59	23	39	55	27	145
2	Third St/16th St	32	70	32	107	241	34	44	28	120	226	15	15	15	15	59	14	23	10	22	70
3	Terry A. Francois Blvd/South St	15	15	0	15	45	13	13	0	13	40	11	11	0	11	34	11	11	0	11	34
4	Third St between South St and 16th St			42	103	145			30	111	141			19	15	34			29	19	48
5	South St between Third and TFB 16th		30			30		23			23		15			15		15			15
6	St between Third and TFB	30				30	23				23	15				15	15				15

#	Analysis Location	Weekday PM					Weekday Evening					Weekday Late Evening					Saturday Evening				
		North	South	East	West	Total	North	South	East	West	Total	North	South	East	West	Total	North	South	East	West	Total
Existing plus Project - Basketball Game - with Giants																					
1	Third St/South St	126	1,083	1,210	447	2,866	1,310	3,342	3,055	1,317	9,025	2,855	2,169	4,922	1,296	11,242	1,189	3,298	2,877	1,218	8,583
2	Third St/16th St	453	403	342	440	1,638	744	612	1,283	647	3,286	807	587	1,073	587	3,054	660	607	1,143	564	2,974
3	Terry A. Francois Blvd/South St	109	185	0	191	486	368	682	0	695	1,745	400	752	0	764	1,917	388	744	0	751	1,883
4	Third St between South St and 16th St			305	165	470			602	267	869			802	312	1,114			424	139	563
5	South St between Third and TFB 16th		259			259		584			584		797			797		401			401
6	St between Third and TFB	340				340	802				802	797				797	616				616

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32 Transportation Analysis
Pedestrian Crosswalk + Sidewalk Analysis - Dimensions
All scenarios and time periods

		2015 Existing		Plus Project & 2040 Cumulative	
		Length	Width	Length	Width
		L	W	L	W
Location ID	**Crosswalk Location**	(feet)	(feet)	(feet)	(feet)
1	**Third/South**				
	North	86	12	86	12
	South	86	12	86	12.5
	East	45	20	45	20
	West				
2	**Third/16th**				
	North	92	12	92	15
	South	92	12	92	12
	East	66	15	66	16
	West	70	15	70	15
3	**Terry Francois/South**				
	North	68	12	68	12.5
	South			68	12.5
	East				
	West	45	14	45	14

		2015 Existing		Plus Project & 2040 Cumulative	
		Actual Width	Effective Width	Actual Width	Effective Width
		Wa	We	Wa	We
Location ID	**Sidewalk Location**	(feet)	(feet)	(feet)	(feet)
4	Third Street - South to 16th - East	12	6	16	8
4	Third Street - South to 16th - West	12	6	16	8
5	South Street - Third to Terry Francois - South			12.5	6.25
6	16th Street - Third to Terry Francois - North			15	7.5

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32 Transportation Analysis
Pedestrian Crosswalk + Sidewalk Analysis - Signal Timing
All scenarios and time periods

2015 EXISTING

		Weekday PM (4-6) no Giants		Weekday Evening (6-8) no Giants		Weekday Late PM (9-11) no Giants		Saturday Evening (7-9) no Giants	
Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)
1	Third/South	313		313		FREE		FREE	
	North	100	28.7	100	28.7	90.3	28.7	90.3	28.7
	South	100	28.7	100	28.7	90.3	28.7	90.3	28.7
	East	100	46.1	100	46.1	90.3	16	90.3	16
	West								
2	Third/16th	313		313		FREE		FREE	
	North	100	34.5	100	34.5	96.7	31	96.7	31
	South	100	34.5	100	34.5	96.7	31	96.7	31
	East	100	37.8	100	37.8	96.7	26	96.7	26
	West	100	35.8	100	35.8	96.7	26	96.7	26
3	Terry Francois/South								
	North	Side street stop controlled							
	South								
	East								
	West								

		Weekday PM (4-6) with Giants		Weekday Evening (6-8) with Giants		Weekday Late PM (9-11) with Giants		Saturday Evening (7-9) with Giants	
Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)
1	Third/South	313		411		811		411	
	North	100	28.7	120	28.7	120	28.7	120	28.7
	South	100	28.7	120	28.7	120	28.7	120	28.7
	East	100	46.1	120	61.1	120	66.1	120	61.1
	West								
2	Third/16th	313		313		811		FREE	
	North	100	34.5	100	34.5	120	34.5	96.7	31
	South	100	34.5	100	34.5	120	34.5	96.7	31
	East	100	37.8	100	37.8	120	57.8	96.7	26
	West	100	35.8	100	35.8	120	49.8	96.7	26
3	Terry Francois/South								
	North	Side street stop controlled							
	South								
	East								
	West								

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32 Transportation Analysis
Pedestrian Crosswalk + Sidewalk Analysis - Signal Timing
All scenarios and time periods

PLUS PROJECT

		Weekday PM (4-6) no event		Weekday Evening (6-8) no event		Weekday Late PM (9-11) no event		Saturday Evening (7-9) no event	
Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)
1	Third/South	313						FREE	
	North	100	28.7					90.3	28.7
	South	100	28.7					90.3	28.7
	East	100	46.1					90.3	26
	West								
2	Third/16th	313						FREE	
	North	100	34.5					96.7	31
	South	100	34.5					96.7	31
	East	100	37.8					96.7	26
	West	100	35.8					96.7	26
3	Terry Francois/South	new signal						new signal	
	North	90	20					90	20
	South	90	20					90	20
	East								
	West	90	20					90	20

		Weekday PM (4-6) with Convention		Weekday Evening (6-8) with Convention		Weekday Late PM (9-11) with Convention		Saturday Evening (7-9) with Convention	
Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)
1	Third/South	313							
	North	100	28.7						
	South	100	28.7						
	East	100	46.1						
	West								
2	Third/16th	313							
	North	100	34.5						
	South	100	34.5						
	East	100	37.8						
	West	100	35.8						
3	Terry Francois/South	new signal							
	North	90	20						
	South	90	20						
	East								
	West	90	20						

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32 Transportation Analysis
Pedestrian Crosswalk + Sidewalk Analysis - Signal Timing
All scenarios and time periods

		Weekday PM (4-6) with Basketball		Weekday Evening (6-8) with Basketball		Weekday Late PM (9-11) with Basketball		Saturday Evening (7-9) with Basketball	
Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)
1	**Third/South**	313		411		811		411	
	North	100	28.7	120	28.7	120	28.7	120	28.7
	South	100	28.7	120	28.7	120	28.7	120	28.7
	East	100	46.1	120	61.1	120	66.1	120	61.1
	West								
2	**Third/16th**	313		313		811		FREE	
	North	100	34.5	100	34.5	120	34.5	96.7	31
	South	100	34.5	100	34.5	120	34.5	96.7	31
	East	100	37.8	100	37.8	120	57.8	96.7	26
	West	100	35.8	100	35.8	120	49.8	96.7	26
3	**Terry Francois/South**	new signal		new signal		new signal		new signal	
	North	90	20	90	20	90	20	90	20
	South	90	20	90	20	90	20	90	20
	East								
	West	90	20	90	20	90	20	90	20

		Weekday PM (4-6) with Basketball + Giants		Weekday Evening (6-8) with Basketball + Giants		Weekday Late PM (9-11) with Basketball + Giants		Saturday Evening (7-9) with Basketball + Giants	
Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)
1	**Third/South**	313		411		811		411	
	North	100	28.7	120	28.7	120	28.7	120	28.7
	South	100	28.7	120	28.7	120	28.7	120	28.7
	East	100	46.1	120	61.1	120	66.1	120	61.1
	West								
2	**Third/16th**	313		313		811		FREE	
	North	100	34.5	100	34.5	120	34.5	96.7	31
	South	100	34.5	100	34.5	120	34.5	96.7	31
	East	100	37.8	100	37.8	120	57.8	96.7	26
	West	100	35.8	100	35.8	120	49.8	96.7	26
3	**Terry Francois/South**	new signal		new signal		new signal		new signal	
	North	90	20	90	20	90	20	90	20
	South	90	20	90	20	90	20	90	20
	East								
	West	90	20	90	20	90	20	90	20

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32 Transportation Analysis
Pedestrian Crosswalk + Sidewalk Analysis - Signal Timing
All scenarios and time periods

2040 CUMULATIVE

		Weekday PM (4-6) no event		Weekday Evening (6-8) no event		Weekday Late PM (9-11) no event		Saturday Evening (7-9) no event	
		Cycle Length	Pedestrian Green Time	Cycle Length	Pedestrian Green Time	Cycle Length	Pedestrian Green Time	Cycle Length	Pedestrian Green Time
		C	WALK+FDW	C	WALK+FDW	C	WALK+FDW	C	WALK+FDW
Location ID	**Crosswalk Location**	(sec)	(sec)	(sec)	(sec)	(sec)	(sec)	(sec)	(sec)
1	**Third/South**	313						FREE	
	North	100	28.7					90.3	28.7
	South	100	28.7					90.3	28.7
	East	100	46.1					90.3	26
	West								
2	**Third/16th**	313						FREE	
	North	100	34.5					96.7	31
	South	100	34.5					96.7	31
	East	100	37.8					96.7	26
	West	100	35.8					96.7	26
3	**Terry Francois/South**	new signal						new signal	
	North	90	20					90	20
	South	90	20					90	20
	East								
	West	90	20					90	20

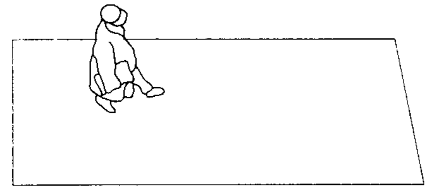
		Weekday PM (4-6) with Convention		Weekday Evening (6-8) with Convention		Weekday Late PM (9-11) with Convention		Saturday Evening (7-9) with Convention	
		Cycle Length	Pedestrian Green Time	Cycle Length	Pedestrian Green Time	Cycle Length	Pedestrian Green Time	Cycle Length	Pedestrian Green Time
		C	WALK+FDW	C	WALK+FDW	C	WALK+FDW	C	WALK+FDW
Location ID	**Crosswalk Location**	(sec)	(sec)	(sec)	(sec)	(sec)	(sec)	(sec)	(sec)
1	**Third/South**	313							
	North	100	28.7						
	South	100	28.7						
	East	100	46.1						
	West								
2	**Third/16th**	313							
	North	100	34.5						
	South	100	34.5						
	East	100	37.8						
	West	100	35.8						
3	**Terry Francois/South**	new signal							
	North	90	20						
	South	90	20						
	East								
	West	90	20						

		Weekday PM (4-6) with Basketball		Weekday Evening (6-8) with Basketball		Weekday Late PM (9-11) with Basketball		Saturday Evening (7-9) with Basketball	
		Cycle Length	Pedestrian Green Time	Cycle Length	Pedestrian Green Time	Cycle Length	Pedestrian Green Time	Cycle Length	Pedestrian Green Time
		C	WALK+FDW	C	WALK+FDW	C	WALK+FDW	C	WALK+FDW
Location ID	**Crosswalk Location**	(sec)	(sec)	(sec)	(sec)	(sec)	(sec)	(sec)	(sec)
1	**Third/South**	313						411	
	North	100	28.7					120	28.7
	South	100	28.7					120	28.7
	East	100	46.1					120	61.1
	West								
2	**Third/16th**	313						FREE	
	North	100	34.5					96.7	31
	South	100	34.5					96.7	31
	East	100	37.8					96.7	26
	West	100	35.8					96.7	26
3	**Terry Francois/South**	new signal						new signal	
	North	90	20					90	20
	South	90	20					90	20
	East								
	West	90	20					90	20

LOS A

Pedestrian Space > 60 ft^2/p *Flow Rate* $\leq$ 5 p/min/ft

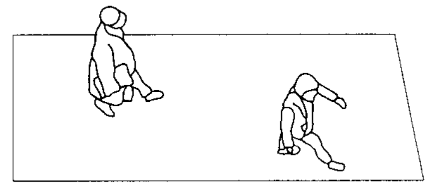
At a walkway LOS A, pedestrians move in desired paths without altering their movements in response to other pedestrians. Walking speeds are freely selected, and conflicts between pedestrians are unlikely.



LOS B

Pedestrian Space > 40–60 ft^2/p *Flow Rate* > 5–7 p/min/ft

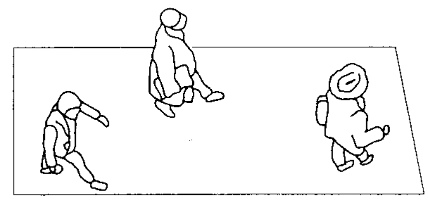
At LOS B, there is sufficient area for pedestrians to select walking speeds freely, to bypass other pedestrians, and to avoid crossing conflicts. At this level, pedestrians begin to be aware of other pedestrians, and to respond to their presence when selecting a walking path.



LOS C

Pedestrian Space > 24–40 ft^2/p *Flow Rate* > 7–10 p/min/ft

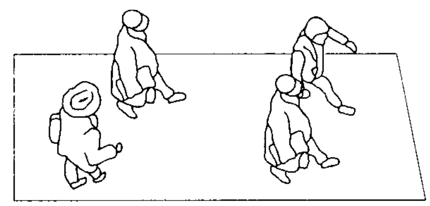
At LOS C, space is sufficient for normal walking speeds, and for bypassing other pedestrians in primarily unidirectional streams. Reverse-direction or crossing movements can cause minor conflicts, and speeds and flow rate are somewhat lower.



LOS D

Pedestrian Space > 15–24 ft^2/p *Flow Rate* > 10–15 p/min/ft

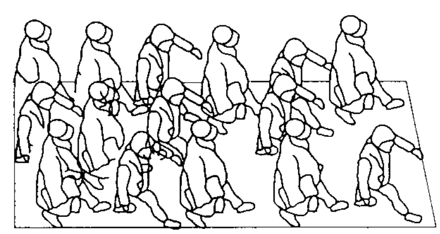
At LOS D, freedom to select individual walking speed and to bypass other pedestrians is restricted. Crossing or reverse-flow movements face a high probability of conflict, requiring frequent changes in speed and position. The LOS provides reasonably fluid flow, but friction and interaction between pedestrians is likely.



LOS E

Pedestrian Space > 8–15 ft^2/p *Flow Rate* > 15–23 p/min/ft

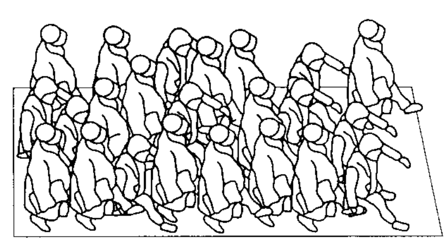
At LOS E, virtually all pedestrians restrict their normal walking speed, frequently adjusting their gait. At the lower range, forward movement is possible only by shuffling. Space is not sufficient for passing slower pedestrians. Cross- or reverse-flow movements are possible only with extreme difficulties. Design volumes approach the limit of walkway capacity, with stoppages and interruptions to flow.



LOS F

Pedestrian Space $\leq$ 8 ft^2/p *Flow Rate* varies p/min/ft

At LOS F, all walking speeds are severely restricted, and forward progress is made only by shuffling. There is frequent, unavoidable contact with other pedestrians. Cross- and reverse-flow movements are virtually impossible. Flow is sporadic and unstable. Space is more characteristic of queued pedestrians than of moving pedestrian streams.



Pedestrian Walkway LOS

Source: Highway Capacity Manual (HCM 2000), Transportation Research Board, Washington DC, 2000

CROSSWALK ANALYSIS

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32 Transportation Analysis
Pedestrian Crosswalk Analysis
All scenarios and time periods

2015 EXISTING

Crosswalk Location	Weekday PM (4-6) no Giants		Weekday Evening (6-8) no Giants		Weekday Late PM (9-11) no Giants		Saturday Evening (7-9) no Giants	
	(sq.ft./ped)	LOS	(sq.ft./ped)	LOS	(sq.ft./ped)	LOS	(sq.ft./ped)	LOS
Third/South								
North	472	A	793	A	1496	A	1285	A
South	216	A	313	A	1496	A	875	A
East	1093	A	2333	A	1315	A	1909	A
West	-	-	-	-	-	-	-	-
Third/16th								
North	868	A	1131	A	1531	A	2024	A
South	432	A	618	A	1531	A	896	A
East	1338	A	2180	A	1702	A	3079	A
West	424	A	564	A	1658	A	1424	A
Terry Francois/South								
North	-	-	-	-	-	-	-	-
South	-	-	-	-	-	-	-	-
East	-	-	-	-	-	-	-	-
West	-	-	-	-	-	-	-	-

Crosswalk Location	Weekday PM (4-6) with Giants		Weekday Evening (6-8) with Giants		Weekday late (9-11) with Giants		Weekend late (7-9) with Giants	
	(sq.ft./ped)	LOS	(sq.ft./ped)	LOS	(sq.ft./ped)	LOS	(sq.ft./ped)	LOS
Third/South								
North	294	A	401	A	1124	A	714	A
South	144	A	150	A	1124	A	421	A
East	1045	A	1253	A	6172	A	1502	A
West	-	-	-	-	-	-	-	-
Third/16th								
North	814	A	764	A	1474	A	1594	A
South	370	A	590	A	1474	A	973	A
East	1296	A	1479	A	4006	A	2472	A
West	351	A	313	A	3323	A	1102	A
Terry Francois/South								
North	-	-	-	-	-	-	-	-
South	-	-	-	-	-	-	-	-
East	-	-	-	-	-	-	-	-
West	-	-	-	-	-	-	-	-

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32 Transportation Analysis
Pedestrian Crosswalk Analysis
All scenarios and time periods

PLUS PROJECT

Crosswalk Location	Weekday PM (4-6) no event (sq.ft./ped)	LOS	Weekday Evening (6-8) no event (sq.ft./ped)	LOS	Weekday Late PM (9-11) no event (sq.ft./ped)	LOS	Saturday Evening (7-9) no event (sq.ft./ped)	LOS
Third/South								
North	198	A	-	-	-	-	237	A
South	48	B	-	-	-	-	66	A
East	95	A	-	-	-	-	62	A
West	-	-	-	-	-	-	-	-
Third/16th								
North	104	A	-	-	-	-	115	A
South	214	A	-	-	-	-	194	A
East	239	A	-	-	-	-	124	A
West	251	A	-	-	-	-	225	A
Terry Francois/South								
North	529	A	-	-	-	-	532	A
South	676	A	-	-	-	-	745	A
East	-	-	-	-	-	-	-	-
West	728	A	-	-	-	-	732	A

Crosswalk Location	Weekday PM (4-6) with Convention (sq.ft./ped)	LOS	Weekday Evening (6-8) with Convention (sq.ft./ped)	LOS	Weekday Late PM (9-11) with Convention (sq.ft./ped)	LOS	Saturday Evening (7-9) with Convention (sq.ft./ped)	LOS
Third/South								
North	76	A	-	-	-	-	-	-
South	25	C	-	-	-	-	-	-
East	27	C	-	-	-	-	-	-
West	-	-	-	-	-	-	-	-
Third/16th								
North	44	B	-	-	-	-	-	-
South	122	A	-	-	-	-	-	-
East	73	A	-	-	-	-	-	-
West	156	A	-	-	-	-	-	-
Terry Francois/South								
North	102	A	-	-	-	-	-	-
South	121	A	-	-	-	-	-	-
East	-	-	-	-	-	-	-	-
West	62	A	-	-	-	-	-	-

Crosswalk Location	Weekday PM (4-6) with Basketball (sq.ft./ped)	LOS	Weekday Evening (6-8) with Basketball (sq.ft./ped)	LOS	Weekday Late PM (9-11) with Basketball (sq.ft./ped)	LOS	Saturday Evening (7-9) with Basketball (sq.ft./ped)	LOS
Third/South								
North	194	A	10	E	4	F	11	E
South	17	D	3	F	5	F	3	F
East	52	B	19	D	11	E	21	D
West	-	-	-	-	-	-	-	-
Third/16th								
North	69	A	41	B	30	C	40	C
South	63	A	39	C	33	C	34	C
East	124	A	29	C	51	B	20	D
West	85	A	59	B	76	A	40	B
Terry Francois/South								
North	126	A	36	C	33	C	34	C
South	73	A	18	D	16	D	16	D
East	-	-	-	-	-	-	-	-
West	96	A	24	D	21	D	22	D

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32 Transportation Analysis
Pedestrian Crosswalk Analysis
All scenarios and time periods

Crosswalk Location	Weekday PM (4-6) with Basketball + Giants		Weekday Evening (6-8) with Basketball + Giants		Weekday Late PM (9-11) with Basketball + Giants		Saturday Evening (7-9) with Basketball + Giants	
	(sq.ft./ped)	LOS	(sq.ft./ped)	LOS	(sq.ft./ped)	LOS	(sq.ft./ped)	LOS
Third/South								
North	155	A	10	E	4	F	11	E
South	16	D	3	F	5	F	3	F
East	52	B	19	D	11	E	20	D
West	-	-	-	-	-	-	-	-
Third/16th								
North	68	A	40	B	30	C	40	C
South	61	A	39	C	33	C	34	C
East	124	A	29	C	51	B	20	D
West	81	A	54	B	76	A	40	C
Terry Francois/South								
North	126	A	36	C	32	C	34	C
South	73	A	18	D	16	D	16	D
East	-	-	-	-	-	-	-	-
West	96	A	24	D	21	D	22	D

2040 CUMULATIVE

Crosswalk Location	Weekday PM (4-6) no event		Weekday Evening (6-8) no event		Weekday Late PM (9-11) no event		Saturday Evening (7-9) no event	
	(sq.ft./ped)	LOS	(sq.ft./ped)	LOS	(sq.ft./ped)	LOS	(sq.ft./ped)	LOS
Third/South								
North	138	A	-	-	-	-	199	A
South	38	C	-	-	-	-	61	A
East	86	A	-	-	-	-	61	A
West	-	-	-	-	-	-	-	-
Third/16th								
North	94	A	-	-	-	-	109	A
South	142	A	-	-	-	-	158	A
East	203	A	-	-	-	-	120	A
West	155	A	-	-	-	-	194	A
Terry Francois/South								
North	336	A	-	-	-	-	374	A
South	391	A	-	-	-	-	240	A
East	-	-	-	-	-	-	-	-
West	463	A	-	-	-	-	388	A

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32 Transportation Analysis
Pedestrian Crosswalk Analysis
All scenarios and time periods

Crosswalk Location	Weekday PM (4-6) with Convention (sq.ft./ped)	LOS	Weekday Evening (6-8) with Convention (sq.ft./ped)	LOS	Weekday Late PM (9-11) with Convention (sq.ft./ped)	LOS	Saturday Evening (7-9) with Convention (sq.ft./ped)	LOS
Third/South								
North	65	A	-	-	-	-	-	-
South	22	D	-	-	-	-	-	-
East	26	C	-	-	-	-	-	-
West	-	-	-	-	-	-	-	-
Third/16th								
North	42	B	-	-	-	-	-	-
South	94	A	-	-	-	-	-	-
East	68	A	-	-	-	-	-	-
West	112	A	-	-	-	-	-	-
Terry Francois/South								
North	91	A	-	-	-	-	-	-
South	107	A	-	-	-	-	-	-
East	-	-	-	-	-	-	-	-
West	59	B	-	-	-	-	-	-

Crosswalk Location	Weekday PM (4-6) with Basketball (sq.ft./ped)	LOS	Weekday Evening (6-8) with Basketball (sq.ft./ped)	LOS	Weekday Late PM (9-11) with Basketball (sq.ft./ped)	LOS	Saturday Evening (7-9) with Basketball (sq.ft./ped)	LOS
Third/South								
North	136	A	-	-	-	-	11	E
South	15	D	-	-	-	-	3	F
East	49	B	-	-	-	-	21	D
West	-	-	-	-	-	-	-	-
Third/16th								
North	64	A	-	-	-	-	39	C
South	54	B	-	-	-	-	33	C
East	113	A	-	-	-	-	20	D
West	69	A	-	-	-	-	39	C
Terry Francois/South								
North	110	A	-	-	-	-	33	C
South	67	A	-	-	-	-	16	D
East	-	-	-	-	-	-	-	-
West	89	A	-	-	-	-	21	D

LOS	Space per Ped Xing (sq.ft./ped)
A	> 60
B	> 40 - 60
C	> 24 - 40
D	> 15 - 24
E	> 8 - 15
F	≤ 8

Source: Highway Capacity Manual, 2000, Ch 18, p.12

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32 Transportation Analysis
Pedestrian Crosswalk Analysis - Level of Service Calculations
All scenarios and time periods

Pedestrian walking speed, Sp:
3.5 ft/sec

2015 EXISTING

Weekday PM (4-6) no Giants

Location ID	Crosswalk Location	Length L (feet)	Width W (feet)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**			313			199	55	27	27								
1	North	86	12	100	28.7	5	42	12	6	6	16940	1	1	1	28	36	472	A
1	South	86	12	100	28.7	6	91	25	13	13	16940	1	1	2	28	78	216	A
1	East	45	20	100	46.1	7	66	18	9	9	35704	1	1	1	16	33	1093	A
1	West																	
2	**Third/16th**			313			210	58	29	29								
2	North	92	12	100	34.5	5	30	8	4	4	23578	0	0	1	30	27	868	A
2	South	92	12	100	34.5	6	60	17	8	8	23578	1	1	1	30	55	432	A
2	East	66	15	100	37.8	7	31	9	4	4	28088	0	0	1	22	21	1338	A
2	West	70	15	100	35.8	8	89	24	12	12	27090	1	1	2	24	64	424	A
3	**Terry Francois/South**																	
3	North																	
3	South																	
3	East																	
3	West																	

Weekday PM (4-6) with Giants

Location ID	Crosswalk Location	Length L (feet)	Width W (feet)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**			313			271	75	37	37								
1	North	86	12	100	28.7	5	67	18	9	9	16940	1	1	1	28	58	294	A
1	South	86	12	100	28.7	6	135	37	19	19	16940	2	2	3	28	117	144	A
1	East	45	20	100	46.1	7	69	19	9	9	35704	1	1	1	16	34	1045	A
1	West																	
2	**Third/16th**			313			241	66	33	33								
2	North	92	12	100	34.5	5	32	9	4	4	23578	0	0	1	30	29	814	A
2	South	92	12	100	34.5	6	70	19	10	10	23578	1	1	1	30	64	370	A
2	East	66	15	100	37.8	7	32	9	4	4	28088	0	0	1	22	22	1296	A
2	West	70	15	100	35.8	8	107	29	15	15	27090	2	2	2	24	77	351	A
3	**Terry Francois/South**																	
3	North																	
3	South																	
3	East																	
3	West																	

PLUS PROJECT

Weekday PM (4-6) no event

Location ID	Crosswalk Location	Length L (feet)	Width W (feet)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**						1202	331	165	165								
1	North	86	12	100	28.7	5	99	27	14	14	16940	2	2	2	28	85	198	A
1	South	86	12.5	100	28.7	6	408	112	56	56	17645	6	6	9	30	370	48	B
1	East	45	20	100	46.1	7	696	191	96	96	35704	11	11	11	18	374	95	A
1	West																	
2	**Third/16th**						755	208	104	104								
2	North	92	15	100	34.5	5	304	84	42	42	29473	5	5	6	31	285	104	A
2	South	92	12	100	34.5	6	120	33	16	16	23578	2	2	2	30	110	214	A
2	East	66	16	100	37.8	7	181	50	25	25	29960	3	3	3	23	125	239	A
2	West	70	15	100	35.8	8	149	41	20	20	27090	2	2	3	24	108	251	A
3	**Terry Francois/South**						74	20	10	10								
3	North	68	12.5	90	20	5	26	7	4	4	8743	0	0	1	23	17	529	A
3	South	68	12.5	90	20	6	21	6	3	3	8743	0	0	0	23	13	676	A
3	East	0	0	0	0	7	0	0	0									
3	West	45	14	90	20	8	26	7	4	4	8550	0	0	1	16	12	728	A

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32 Transportation Analysis
Pedestrian Crosswalk Analysis - Level of Service Calculations
All scenarios and time periods

Pedestrian walking speed, Sp:
3.5 ft/sec

Weekday PM (4-6) with Convention

Location ID	Crosswalk Location	Length L (feet)	Width W (feet)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**						3065	843	421	421								
1	North	86	12	100	28.7	5	252	69	35	35	16940	4	4	5	29	223	76	A
1	South	86	12.5	100	28.7	6	735	202	101	101	17645	11	11	16	31	701	25	C
1	East	45	20	100	46.1	7	2078	572	286	286	35704	32	32	34	21	1313	27	C
1	West																	
2	**Third/16th**						1693	466	233	233								
2	North	92	15	100	34.5	5	683	188	94	94	29473	10	10	14	32	667	44	B
2	South	92	12	100	34.5	6	207	57	28	28	23578	3	3	4	30	193	122	A
2	East	66	16	100	37.8	7	566	156	78	78	29960	9	9	11	24	413	73	A
2	West	70	15	100	35.8	8	236	65	32	32	27090	4	4	5	24	173	156	A
3	**Terry Francois/South**						537	148	74	74								
3	North	68	12.5	90	20	5	134	37	18	18	8743	2	2	3	23	86	102	A
3	South	68	12.5	90	20	6	113	31	16	16	8743	2	2	2	23	72	121	A
3	East																	
3	West	45	14	90	20	8	289	79	40	40	8550	4	4	6	17	137	62	A

Weekday PM (4-6) with Basketball

Location ID	Crosswalk Location	Length L (feet)	Width W (feet)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**						2347	645	323	323								
1	North	86	12	100	28.7	5	101	28	14	14	16940	2	2	2	28	87	194	A
1	South	86	12.5	100	28.7	6	1039	286	143	143	17645	16	16	23	33	1037	17	D
1	East	45	20	100	46.1	7	1207	332	166	166	35704	18	18	20	19	691	52	B
1	West																	
2	**Third/16th**						1607	442	221	221								
2	North	92	15	100	34.5	5	451	124	62	62	29473	7	7	9	31	429	69	A
2	South	92	12	100	34.5	6	393	108	54	54	23578	6	6	8	31	376	63	A
2	East	66	16	100	37.8	7	341	94	47	47	29960	5	5	6	23	241	124	A
2	West	70	15	100	35.8	8	422	116	58	58	27090	6	6	8	25	319	85	A
3	**Terry Francois/South**						486	134	67	67								
3	North	68	12.5	90	20	5	109	30	15	15	8743	1	1	2	23	69	126	A
3	South	68	12.5	90	20	6	185	51	25	25	8743	3	3	4	23	120	73	A
3	East																	
3	West	45	14	90	20	8	191	53	26	26	8550	3	3	4	17	89	96	A

Weekday PM (4-6) with Basketball + Giants

Location ID	Crosswalk Location	Length L (feet)	Width W (feet)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**						2419	665	333	333								
1	North	86	12	100	28.7	5	126	35	17	17	16940	2	2	3	28	109	155	A
1	South	86	12.5	100	28.7	6	1083	298	149	149	17645	17	17	24	33	1087	16	D
1	East	45	20	100	46.1	7	1210	333	166	166	35704	18	18	20	19	693	52	B
1	West																	
2	**Third/16th**						1638	451	225	225								
2	North	92	15	100	34.5	5	453	125	62	62	29473	7	7	9	31	431	68	A
2	South	92	12	100	34.5	6	403	111	55	55	23578	6	6	8	31	386	61	A
2	East	66	16	100	37.8	7	342	94	47	47	29960	5	5	6	23	242	124	A
2	West	70	15	100	35.8	8	440	121	61	61	27090	7	7	9	25	333	81	A
3	**Terry Francois/South**						486	134	67	67								
3	North	68	12.5	90	20	5	109	30	15	15	8743	1	1	2	23	69	126	A
3	South	68	12.5	90	20	6	185	51	25	25	8743	3	3	4	23	120	73	A
3	East																	
3	West	45	14	90	20	8	191	53	26	26	8550	3	3	4	17	89	96	A

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32 Transportation Analysis
Pedestrian Crosswalk Analysis - Level of Service Calculations
All scenarios and time periods

Pedestrian walking speed, Sp:
3.5 ft/sec

2040 CUMULATIVE

Weekday PM (4-6) no event

Location ID	Crosswalk Location	Length L (feet)	Width W (feet)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**						1401	385	193	193								
1	North	86	12	100	28.7	5	141	39	19	19	16940	2	2	3	28	123	138	A
1	South	86	12.5	100	28.7	6	499	137	69	69	17645	8	8	11	30	459	38	C
1	East	45	20	100	46.1	7	762	209	105	105	35704	12	12	13	18	413	86	A
1	West																	
2	**Third/16th**						965	265	133	133								
2	North	92	15	100	34.5	5	334	92	46	46	29473	5	5	7	31	314	94	A
2	South	92	12	100	34.5	6	180	49	25	25	23578	3	3	4	30	167	142	A
2	East	66	16	100	37.8	7	212	58	29	29	29960	3	3	4	23	148	203	A
2	West	70	15	100	35.8	8	238	65	33	33	27090	4	4	5	24	175	155	A
3	**Terry Francois/South**						119	33	16	16								
3	North	68	12.5	90	20	5	41	11	6	6	8743	1	1	1	23	26	336	A
3	South	68	12.5	90	20	6	36	10	5	5	8743	0	0	1	23	22	391	A
3	East																	
3	West	45	14	90	20	8	41	11	6	6	8550	1	1	1	16	18	463	A

Weekday PM (4-6) with Convention

Location ID	Crosswalk Location	Length L (feet)	Width W (feet)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**						3264	898	449	449								
1	North	86	12	100	28.7	5	294	81	40	40	16940	4	4	6	29	262	65	A
1	South	86	12.5	100	28.7	6	826	227	114	114	17645	13	13	18	32	799	22	D
1	East	45	20	100	46.1	7	2144	590	295	295	35704	33	33	35	21	1365	26	C
1	West																	
2	**Third/16th**						1903	523	262	262								
2	North	92	15	100	34.5	5	713	196	98	98	29473	11	11	14	32	699	42	B
2	South	92	12	100	34.5	6	267	73	37	37	23578	4	4	5	31	251	94	A
2	East	66	16	100	37.8	7	597	164	82	82	29960	9	9	11	24	437	68	A
2	West	70	15	100	35.8	8	325	89	45	45	27090	5	5	6	24	242	112	A
3	**Terry Francois/South**						582	160	80	80								
3	North	68	12.5	90	20	5	149	41	21	21	8743	2	2	3	23	96	91	A
3	South	68	12.5	90	20	6	128	35	18	18	8743	2	2	3	23	82	107	A
3	East																	
3	West	45	14	90	20	8	304	84	42	42	8550	4	4	7	17	145	59	B

Weekday PM (4-6) with Basketball

Location ID	Crosswalk Location	Length L (feet)	Width W (feet)	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**						2546	700	350	350								
1	North	86	12	100	28.7	5	143	39	20	20	16940	2	2	3	28	124	136	A
1	South	86	12.5	100	28.7	6	1130	311	155	155	17645	17	17	25	33	1142	15	D
1	East	45	20	100	46.1	7	1273	350	175	175	35704	19	19	21	19	735	49	B
1	West																	
2	**Third/16th**						1817	500	250	250								
2	North	92	15	100	34.5	5	481	132	66	66	29473	7	7	10	31	459	64	A
2	South	92	12	100	34.5	6	453	125	62	62	23578	7	7	9	32	437	54	B
2	East	66	16	100	37.8	7	372	102	51	51	29960	6	6	7	23	264	113	A
2	West	70	15	100	35.8	8	511	141	70	70	27090	8	8	10	25	391	69	A
3	**Terry Francois/South**						531	146	73	73								
3	North	68	12.5	90	20	5	124	34	17	17	8743	2	2	3	23	79	110	A
3	South	68	12.5	90	20	6	200	55	28	28	8743	3	3	4	24	130	67	A
3	East																	
3	West	45	14	90	20	8	206	57	28	28	8550	3	3	4	17	96	89	A

Event Center and Mixed-Use Development a
Pedestrian Crosswalk Analysis - Level of Se
All scenarios and time periods

2015 EXISTING

Location ID	Crosswalk Location	Weekday Evening (6-8) no Giants Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**	313			119	33	16	16								
1	North	100	28.7	12	25	7	3	3	16940	0	0	1	28	21	793	A
1	South	100	28.7	13	63	17	9	9	16940	1	1	1	28	54	313	A
1	East	100	46.1	14	31	9	4	4	35704	0	0	1	16	15	2333	A
1	West															
2	**Third/16th**	313			151	42	21	21								
2	North	100	34.5	12	23	6	3	3	23578	0	0	0	30	21	1131	A
2	South	100	34.5	13	42	12	6	6	23578	1	1	1	30	38	618	A
2	East	100	37.8	14	19	5	3	3	28088	0	0	0	22	13	2180	A
2	West	100	35.8	15	67	18	9	9	27090	1	1	1	23	48	564	A
3	**Terry Francois/South**															
3	North															
3	South															
3	East															
3	West															

Location ID	Crosswalk Location	Weekday Evening (6-8) with Giants Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**	411			215	59	30	30								
1	North	120	28.7	12	41	11	6	6	16940	1	1	1	28	42	401	A
1	South	120	28.7	13	108	30	15	15	16940	2	2	3	28	113	150	A
1	East	120	61.1	14	66	18	9	9	49204	1	1	1	16	39	1253	A
1	West															
2	**Third/16th**	313			226	62	31	31								
2	North	100	34.5	12	34	9	5	5	23578	1	1	1	30	31	764	A
2	South	100	34.5	13	44	12	6	6	23578	1	1	1	30	40	590	A
2	East	100	37.8	14	28	8	4	4	28088	0	0	1	22	19	1479	A
2	West	100	35.8	15	120	33	17	17	27090	2	2	2	24	87	313	A
3	**Terry Francois/South**															
3	North															
3	South															
3	East															
3	West															

PLUS PROJECT

Location ID	Crosswalk Location	Weekday Evening (6-8) no event Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**															
1	North															
1	South															
1	East															
1	West															
2	**Third/16th**															
2	North															
2	South															
2	East															
2	West															
3	**Terry Francois/South**															
3	North															
3	South															
3	East															
3	West															

Event Center and Mixed-Use Development a
Pedestrian Crosswalk Analysis - Level of Se
All scenarios and time periods

Weekday Evening (6-8) with Convention

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**															
1	North															
1	South															
1	East															
1	West															
2	**Third/16th**															
2	North															
2	South															
2	East															
2	West															
3	**Terry Francois/South**															
3	North															
3	South															
3	East															
3	West															

Weekday Evening (6-8) with Basketball

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**				7612	2093	1047	1047								
1	North	120	28.7	12	1294	356	178	178	16940	24	24	36	36	1704	10	E
1	South	120	28.7	13	3297	907	453	453	17645	60	60	92	48	5760	3	F
1	East	120	61.1	14	3020	830	415	415	49204	55	55	54	23	2590	19	D
1	West															
2	**Third/16th**				3211	883	442	442								
2	North	100	34.5	12	733	202	101	101	29473	11	11	15	32	719	41	B
2	South	100	34.5	13	610	168	84	84	23578	9	9	12	32	601	39	C
2	East	100	37.8	14	1274	350	175	175	29960	19	19	24	26	1018	29	C
2	West	100	35.8	15	594	163	82	82	27090	9	9	12	25	459	59	B
3	**Terry Francois/South**				1745	480	240	240								
3	North	90	20	12	368	101	51	51	8743	5	5	8	24	246	36	C
3	South	90	20	13	682	187	94	94	8743	9	9	15	26	483	18	D
3	East															
3	West	90	20	15	695	191	96	96	8550	10	10	15	19	362	24	D

Weekday Evening (6-8) with Basketball + Giants

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**				7708	2120	1060	1060								
1	North	120	28.7	12	1310	360	180	180	16940	24	24	37	36	1730	10	E
1	South	120	28.7	13	3342	919	460	460	17645	61	61	93	48	5872	3	F
1	East	120	61.1	14	3055	840	420	420	49204	56	56	55	23	2630	19	D
1	West															
2	**Third/16th**				3286	904	452	452								
2	North	100	34.5	12	744	205	102	102	29473	11	11	15	32	731	40	B
2	South	100	34.5	13	612	168	84	84	23578	9	9	12	32	603	39	C
2	East	100	37.8	14	1283	353	176	176	29960	20	20	24	26	1026	29	C
2	West	100	35.8	15	647	178	89	89	27090	10	10	13	25	504	54	B
3	**Terry Francois/South**				1745	480	240	240								
3	North	90	20	12	368	101	51	51	8743	5	5	8	24	246	36	C
3	South	90	20	13	682	187	94	94	8743	9	9	15	26	483	18	D
3	East															
3	West	90	20	15	695	191	96	96	8550	10	10	15	19	362	24	D

Event Center and Mixed-Use Development a
Pedestrian Crosswalk Analysis - Level of Se
All scenarios and time periods

2040 CUMULATIVE

Weekday Evening (6-8) no event

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**														
1	North														
1	South														
1	East														
1	West														
2	**Third/16th**														
2	North														
2	South														
2	East														
2	West														
3	**Terry Francois/South**														
3	North														
3	South														
3	East														
3	West														

Weekday Evening (6-8) with Convention

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**														
1	North														
1	South														
1	East														
1	West														
2	**Third/16th**														
2	North														
2	South														
2	East														
2	West														
3	**Terry Francois/South**														
3	North														
3	South														
3	East														
3	West														

Weekday Evening (6-8) with Basketball

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**														
1	North														
1	South														
1	East														
1	West														
2	**Third/16th**														
2	North														
2	South														
2	East														
2	West														
3	**Terry Francois/South**														
3	North														
3	South														
3	East														
3	West														

Event Center and Mixed-Use Development a
Pedestrian Crosswalk Analysis - Level of Se
All scenarios and time periods

2015 EXISTING

Weekday PM Late (9-11) no Giants

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**	FREE			44	12	6	6								
1	North	90.3	28.7	18	15	4	2	2	16940	0	0	0	28	11	1496	A
1	South	90.3	28.7	19	15	4	2	2	16940	0	0	0	28	11	1496	A
1	East	90.3	16	20	15	4	2	2	8614	0	0	0	16	7	1315	A
1	West															
2	**Third/16th**	FREE			59	16	8	8								
2	North	96.7	31	18	15	4	2	2	19714	0	0	0	30	13	1531	A
2	South	96.7	31	19	15	4	2	2	19714	0	0	0	30	13	1531	A
2	East	96.7	26	20	15	4	2	2	16406	0	0	0	22	10	1702	A
2	West	96.7	26	21	15	4	2	2	16800	0	0	0	23	10	1658	A
3	**Terry Francois/South**															
3	North															
3	South															
3	East															
3	West															

Weekday PM Late (9-11) with Giants

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**	811			44	12	6	6								
1	North	120	28.7	18	15	4	2	2	16940	0	0	0	28	15	1124	A
1	South	120	28.7	19	15	4	2	2	16940	0	0	0	28	15	1124	A
1	East	120	66.1	20	15	4	2	2	53704	0	0	0	16	9	6172	A
1	West															
2	**Third/16th**	811			59	16	8	8								
2	North	120	34.5	18	15	4	2	2	23578	0	0	0	30	16	1474	A
2	South	120	34.5	19	15	4	2	2	23578	0	0	0	30	16	1474	A
2	East	120	57.8	20	15	4	2	2	47888	0	0	0	22	12	4006	A
2	West	120	49.8	21	15	4	2	2	41790	0	0	0	23	13	3323	A
3	**Terry Francois/South**															
3	North															
3	South															
3	East															
3	West															

PLUS PROJECT

Weekday PM Late (9-11) no event

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**															
1	North															
1	South															
1	East															
1	West															
2	**Third/16th**															
2	North															
2	South															
2	East															
2	West															
3	**Terry Francois/South**															
3	North															
3	South															
3	East															
3	West															

Event Center and Mixed-Use Development a
Pedestrian Crosswalk Analysis - Level of Se
All scenarios and time periods

Weekday PM Late (9-11) with Convention

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**															
1	North															
1	South															
1	East															
1	West															
2	**Third/16th**															
2	North															
2	South															
2	East															
2	West															
3	**Terry Francois/South**															
3	North															
3	South															
3	East															
3	West															

Weekday PM Late (9-11) with Basketball

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**				9946	2735	1368	1368								
1	North	120	28.7	18	2855	785	393	393	16940	52	52	80	46	4783	4	F
1	South	120	28.7	19	2169	596	298	298	17645	40	40	60	41	3247	5	F
1	East	120	66.1	20	4922	1354	677	677	53704	90	90	81	27	4873	11	E
1	West															
2	**Third/16th**				3054	840	420	420								
2	North	120	34.5	18	807	222	111	111	29473	15	15	21	33	984	30	C
2	South	120	34.5	19	587	162	81	81	23578	11	11	15	33	709	33	C
2	East	120	57.8	20	1073	295	148	148	51080	20	20	20	25	1003	51	B
2	West	120	49.8	21	587	162	81	81	41790	11	11	13	25	548	76	A
3	**Terry Francois/South**				1893	520	260	260								
3	North	90	20	18	392	108	54	54	8743	5	5	8	24	264	33	C
3	South	90	20	19	744	205	102	102	8743	10	10	16	26	533	16	D
3	East															
3	West	90	20	21	756	208	104	104	8550	10	10	16	19	399	21	D

Weekday PM Late (9-11) with Basketball + Giants

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**				9946	2735	1368	1368								
1	North	120	28.7	18	2855	785	393	393	16940	52	52	80	46	4783	4	F
1	South	120	28.7	19	2169	596	298	298	17645	40	40	60	41	3247	5	F
1	East	120	66.1	20	4922	1354	677	677	53704	90	90	81	27	4873	11	E
1	West															
2	**Third/16th**				3054	840	420	420								
2	North	120	34.5	18	807	222	111	111	29473	15	15	21	33	984	30	C
2	South	120	34.5	19	587	162	81	81	23578	11	11	15	33	709	33	C
2	East	120	57.8	20	1073	295	148	148	51080	20	20	20	25	1003	51	B
2	West	120	49.8	21	587	162	81	81	41790	11	11	13	25	548	76	A
3	**Terry Francois/South**				1917	527	264	264								
3	North	90	20	18	400	110	55	55	8743	6	6	9	24	270	32	C
3	South	90	20	19	752	207	103	103	8743	10	10	16	26	540	16	D
3	East															
3	West	90	20	21	764	210	105	105	8550	11	11	16	19	404	21	D

Event Center and Mixed-Use Development a
Pedestrian Crosswalk Analysis - Level of Se
All scenarios and time periods

2040 CUMULATIVE

Weekday PM Late (9-11) no event

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**														
1	North														
1	South														
1	East														
1	West														
2	**Third/16th**														
2	North														
2	South														
2	East														
2	West														
3	**Terry Francois/South**														
3	North														
3	South														
3	East														
3	West														

Weekday PM Late (9-11) with Convention

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**														
1	North														
1	South														
1	East														
1	West														
2	**Third/16th**														
2	North														
2	South														
2	East														
2	West														
3	**Terry Francois/South**														
3	North														
3	South														
3	East														
3	West														

Weekday PM Late (9-11) with Basketball

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)	Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**														
1	North														
1	South														
1	East														
1	West														
2	**Third/16th**														
2	North														
2	South														
2	East														
2	West														
3	**Terry Francois/South**														
3	North														
3	South														
3	East														
3	West														

Event Center and Mixed-Use Development a
Pedestrian Crosswalk Analysis - Level of Se
All scenarios and time periods

2015 EXISTING

Saturday Evening (7-9) no Giants

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**	FREE			52	14	7	7								
1	North	90.3	28.7	25	17	5	2	2	16940	0	0	0	28	13	1285	A
1	South	90.3	28.7	26	25	7	3	3	16940	0	0	0	28	19	875	A
1	East	90.3	16	27	10	3	1	1	8614	0	0	0	16	5	1909	A
1	West															
2	**Third/16th**	FREE			62	17	8	8								
2	North	96.7	31	25	11	3	2	2	19714	0	0	0	30	10	2024	A
2	South	96.7	31	26	25	7	3	3	19714	0	0	1	30	22	896	A
2	East	96.7	26	27	8	2	1	1	16406	0	0	0	22	5	3079	A
2	West	96.7	26	28	17	5	2	2	16800	0	0	0	23	12	1424	A
3	**Terry Francois/South**															
3	North															
3	South															
3	East															
3	West															

Saturday Evening (7-9) with Giants

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**	411			117	32	16	16								
1	North	120	28.7	25	23	6	3	3	16940	0	0	1	28	24	714	A
1	South	120	28.7	26	39	11	5	5	16940	1	1	1	28	40	421	A
1	East	120	61.1	27	55	15	8	8	49204	1	1	1	16	33	1502	A
1	West															
2	**Third/16th**	FREE			70	19	10	10								
2	North	96.7	31	25	14	4	2	2	19714	0	0	0	30	12	1594	A
2	South	96.7	31	26	23	6	3	3	19714	0	0	0	30	20	973	A
2	East	96.7	26	27	10	3	1	1	16406	0	0	0	22	7	2472	A
2	West	96.7	26	28	22	6	3	3	16800	0	0	0	23	15	1102	A
3	**Terry Francois/South**															
3	North															
3	South															
3	East															
3	West															

PLUS PROJECT

Saturday Evening (7-9) no event

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**				1007	277	139	139								
1	North	90.3	28.7	25	92	25	13	13	16940	1	1	2	28	72	237	A
1	South	90.3	28.7	26	334	92	46	46	17645	5	5	6	29	268	66	A
1	East	90.3	26	27	582	160	80	80	17614	8	8	11	18	282	62	A
1	West															
2	**Third/16th**				670	184	92	92								
2	North	96.7	31	25	240	66	33	33	24643	4	4	5	30	215	115	A
2	South	96.7	31	26	115	32	16	16	19714	2	2	2	30	102	194	A
2	East	96.7	26	27	209	57	29	29	17499	3	3	5	23	141	124	A
2	West	96.7	26	28	107	29	15	15	16800	2	2	2	24	75	225	A
3	**Terry Francois/South**				71	20	10	10								
3	North	90	20	25	26	7	4	4	8743	0	0	1	23	16	532	A
3	South	90	20	26	19	5	3	3	8743	0	0	0	23	12	745	A
3	East															
3	West	90	20	28	26	7	4	4	8550	0	0	1	16	12	732	A

Event Center and Mixed-Use Development a
Pedestrian Crosswalk Analysis - Level of Se
All scenarios and time periods

Saturday Evening (7-9) with Convention

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**															
1	North															
1	South															
1	East															
1	West															
2	**Third/16th**															
2	North															
2	South															
2	East															
2	West															
3	**Terry Francois/South**															
3	North															
3	South															
3	East															
3	West															

Saturday Evening (7-9) with Basketball

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**				7300	2007	1004	1004								
1	North	120	28.7	25	1183	325	163	163	16940	22	22	33	35	1527	11	E
1	South	120	28.7	26	3284	903	452	452	17645	60	60	92	48	5728	3	F
1	East	120	61.1	27	2832	779	389	389	49204	52	52	51	23	2382	21	D
1	West															
2	**Third/16th**				2966	816	408	408								
2	North	96.7	31	25	657	181	90	90	24643	10	10	13	32	618	40	C
2	South	96.7	31	26	609	167	84	84	19714	9	9	12	32	580	34	C
2	East	96.7	26	27	1141	314	157	157	17499	17	17	25	26	884	20	D
2	West	96.7	26	28	559	154	77	77	16800	8	8	12	25	419	40	B
3	**Terry Francois/South**				1883	518	259	259								
3	North	90	20	25	388	107	53	53	8743	5	5	8	24	261	34	C
3	South	90	20	26	744	205	102	102	8743	10	10	16	26	533	16	D
3	East															
3	West	90	20	28	751	207	103	103	8550	10	10	16	19	396	22	D

Saturday Evening (7-9) with Basketball + Giants

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**				7365	2025	1013	1013								
1	North	120	28.7	25	1189	327	163	163	16940	22	22	33	35	1536	11	E
1	South	120	28.7	26	3298	907	454	454	17645	60	60	92	48	5762	3	F
1	East	120	61.1	27	2877	791	396	396	49204	53	53	52	23	2432	20	D
1	West															
2	**Third/16th**				2974	818	409	409								
2	North	96.7	31	25	660	181	91	91	24643	10	10	13	32	621	40	C
2	South	96.7	31	26	607	167	83	83	19714	9	9	12	32	578	34	C
2	East	96.7	26	27	1143	314	157	157	17499	17	17	25	26	886	20	D
2	West	96.7	26	28	564	155	78	78	16800	8	8	12	25	424	40	C
3	**Terry Francois/South**				1883	518	259	259								
3	North	90	20	25	388	107	53	53	8743	5	5	8	24	261	34	C
3	South	90	20	26	744	205	102	102	8743	10	10	16	26	533	16	D
3	East															
3	West	90	20	28	751	207	103	103	8550	10	10	16	19	396	22	D

Event Center and Mixed-Use Development a
Pedestrian Crosswalk Analysis - Level of Se
All scenarios and time periods

2040 CUMULATIVE

Saturday Evening (7-9) no event

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**				1060	291	146	146								
1	North	90.3	28.7	25	109	30	15	15	16940	2	2	2	28	85	199	A
1	South	90.3	28.7	26	359	99	49	49	17645	5	5	7	29	289	61	A
1	East	90.3	26	27	592	163	81	81	17614	8	8	12	18	288	61	A
1	West															
2	**Third/16th**				732	201	101	101								
2	North	96.7	31	25	251	69	35	35	24643	4	4	5	30	225	109	A
2	South	96.7	31	26	140	38	19	19	19714	2	2	3	30	125	158	A
2	East	96.7	26	27	217	60	30	30	17499	3	3	5	23	146	120	A
2	West	96.7	26	28	124	34	17	17	16800	2	2	3	24	87	194	A
3	**Terry Francois/South**				161	44	22	22								
3	North	90	20	25	37	10	5	5	8743	1	1	1	23	23	374	A
3	South	90	20	26	58	16	8	8	8743	1	1	1	23	36	240	A
3	East															
3	West	90	20	28	49	14	7	7	8550	1	1	1	16	22	388	A

Saturday Evening (7-9) with Convention

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**															
1	North															
1	South															
1	East															
1	West															
2	**Third/16th**															
2	North															
2	South															
2	East															
2	West															
3	**Terry Francois/South**															
3	North															
3	South															
3	East															
3	West															

Saturday Evening (7-9) with Basketball

Location ID	Crosswalk Location	Cycle Length C (sec)	Pedestrian Green Time WALK+FDW (sec)		Pedestrians Hourly	Max Ped per 15 min	Max Ped per 15 min NB or EB	Max Ped per 15 min SB or WB	Time-space TS (sq.ft.-sec)	Pedestrian Flow NB or EB Vi (ped/cycle)	Pedestrian Flow SB or WB Vo (ped/cycle)	Max # ped accumulated N (ped/cycle)	Xing Time t (sec)	Occupancy Time T (ped-sec)	Space per Ped Xing M (sq.ft./ped)	LOS
1	**Third/South**				7352	2022	1011	1011								
1	North	120	28.7	25	1200	330	165	165	16940	22	22	33	35	1554	11	E
1	South	120	28.7	26	3310	910	455	455	17645	61	61	92	48	5790	3	F
1	East	120	61.1	27	2843	782	391	391	49204	52	52	51	23	2393	21	D
1	West															
2	**Third/16th**				3028	833	416	416								
2	North	96.7	31	25	668	184	92	92	24643	10	10	13	32	630	39	C
2	South	96.7	31	26	634	174	87	87	19714	9	9	13	32	606	33	C
2	East	96.7	26	27	1150	316	158	158	17499	17	17	25	26	891	20	D
2	West	96.7	26	28	577	159	79	79	16800	9	9	12	25	433	39	C
3	**Terry Francois/South**				1917	527	264	264								
3	North	90	20	25	399	110	55	55	8743	5	5	9	24	269	33	C
3	South	90	20	26	755	208	104	104	8743	10	10	16	26	543	16	D
3	East															
3	West	90	20	28	762	210	105	105	8550	10	10	16	19	403	21	D

SIDEWALK ANALYSIS

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32 Transportation Analysis
Pedestrian Sidewalk Analysis
All scenarios and time periods

2015 EXISTING

	Weekday PM (4-6) no Giants		Weekday Evening (6-8) no Giants		Weekday Late PM (9-11) no Giants		Saturday Evening (7-9) no Giants	
Sidewalk Location	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS
Third Street - South to 16th - East	0.2	A	0.1	A	0.1	A	0.1	A
Third Street - South to 16th - West	0.2	A	0.2	A	0.0	A	0.1	A
South Street - Third to Terry Francois - South								
16th Street - Third to Terry Francois - North								

	Weekday PM (4-6) with Giants		Weekday Evening (6-8) with Giants		Weekday Late PM (9-11) with Giants		Saturday Evening (7-9) with Giants	
Sidewalk Location	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS
Third Street - South to 16th - East	0.1	A	0.1	A	0.1	A	0.1	A
Third Street - South to 16th - West	0.3	A	0.3	A	0.0	A	0.1	A
South Street - Third to Terry Francois - South								
16th Street - Third to Terry Francois - North								

PLUS PROJECT

	Weekday PM (4-6) no event		Weekday Evening (6-8) no event		Weekday Late PM (9-11) no event		Saturday Evening (7-9) no event	
Sidewalk Location	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS
Third Street - South to 16th - East	0.6	B					0.6	B
Third Street - South to 16th - West	0.3	A					0.2	A
South Street - Third to Terry Francois - South	0.6	B					0.7	B
16th Street - Third to Terry Francois - North	0.5	B					0.6	B

	Weekday PM (4-6) with Convention		Weekday Evening (6-8) with Convention		Weekday Late PM (9-11) with Convention		Saturday Evening (7-9) with Convention	
Sidewalk Location	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS
Third Street - South to 16th - East	1.7	B						
Third Street - South to 16th - West	0.5	A						
South Street - Third to Terry Francois - South	1.9	B						
16th Street - Third to Terry Francois - North	1.7	B						

	Weekday PM (4-6) with Basketball		Weekday Evening (6-8) with Basketball		Weekday Late PM (9-11) with Basketball		Saturday Evening (7-9) with Basketball	
Sidewalk Location	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS
Third Street - South to 16th - East	0.7	B	1.4	B	1.8	B	0.9	B
Third Street - South to 16th - West	0.3	A	0.5	A	0.7	B	0.3	A
South Street - Third to Terry Francois - South	0.8	B	1.7	B	2.3	B	1.2	B
16th Street - Third to Terry Francois - North	0.8	B	2.0	B	1.9	B	1.5	B

	Weekday PM (4-6) with Basketball + Giants		Weekday Evening (6-8) with Basketball + Giants		Weekday Late PM (9-11) with Basketball + Giants		Saturday Evening (7-9) with Basketball + Giants	
Sidewalk Location	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS
Third Street - South to 16th - East	0.7	B	1.4	B	1.8	B	1.0	B
Third Street - South to 16th - West	0.4	A	0.6	B	0.7	B	0.3	A
South Street - Third to Terry Francois - South	0.8	B	1.7	B	2.3	B	1.2	B
16th Street - Third to Terry Francois - North	0.8	B	2.0	B	1.9	B	1.5	B

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32 Transportation Analysis
Pedestrian Sidewalk Analysis
All scenarios and time periods

2040 CUMULATIVE

	Weekday PM (4-6) no event		Weekday Evening (6-8) no event		Weekday Late PM (9-11) no event		Saturday Evening (7-9) no event	
Sidewalk Location	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS
Third Street - South to 16th - East	0.8	B					0.6	B
Third Street - South to 16th - West	0.4	A					0.2	A
South Street - Third to Terry Francois - South	0.7	B					0.7	B
16th Street - Third to Terry Francois - North	0.6	B					0.6	B

	Weekday PM (4-6) with Convention		Weekday Evening (6-8) with Convention		Weekday Late PM (9-11) with Convention		Saturday Evening (7-9) with Convention	
Sidewalk Location	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS
Third Street - South to 16th - East	1.8	B						
Third Street - South to 16th - West	0.6	B						
South Street - Third to Terry Francois - South	1.9	B						
16th Street - Third to Terry Francois - North	1.8	B						

	Weekday PM (4-6) with Basketball		Weekday Evening (6-8) with Basketball		Weekday Late PM (9-11) with Basketball		Saturday Evening (7-9) with Basketball	
Sidewalk Location	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS	(p/min/ft)	Platoon LOS
Third Street - South to 16th - East	0.9	B					1.0	B
Third Street - South to 16th - West	0.5	A					0.4	A
South Street - Third to Terry Francois - South	0.8	B					1.2	B
16th Street - Third to Terry Francois - North	0.9	B					1.5	B

	flow rate (p/min/ft)	
LOS	**Average**	**Platoon**
A	≤ 5	≤ 0.5
B	> 5 - 7	> 0.5 - 3
C	> 7 - 10	> 3 - 6
D	> 10 - 15	> 6 - 11
E	> 15 - 23	> 11 - 18
F	variable	> 18

Source: Highway Capacity Manual, 2000, Ch 18, p.3

Event Center and Mixed-Use Development at Mission Bay Blocks 29-32 Transportation Analysis
Pedestrian Sidewalk Analysis - Level of Service Calculations
All scenarios and time periods

2015 EXISTING

		Sidewalk Width		Weekday PM (4-6) no Giants						Weekday Evening (6-8) no Giants						Weekday Late PM (9-11) no Giants						Saturday Evening (7-9) no Giants					
Location ID	Sidewalk Location	Actual Wa	Effective We		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS
4	Third Street - South to 16th - East	12	6	7	56	15	0.2	A	A	14	41	11	0.1	A	A	20	19	5	0.1	A	A	27	19	5	0.1	A	A
4	Third Street - South to 16th - West	12	6	8	70	19	0.2	A	A	15	52	14	0.2	A	A	21	15	4	0.0	A	A	28	17	5	0.1	A	A
5	16th Street - Third to Terry Francois - North																										
6	South Street - Third to Terry Francois - South																										

		Sidewalk Width		Weekday PM (4-6) with Giants						Weekday Evening (6-8) with Giants						Weekday Late PM (9-11) with Giants						Saturday Evening (7-9) with Giants					
Location ID	Sidewalk Location	Actual Wa	Effective We		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS
4	Third Street - South to 16th - East	12	6	7	42	12	0.1	A	A	14	30	8	0.1	A	A	20	19	5	0.1	A	A	27	29	8	0.1	A	A
4	Third Street - South to 16th - West	12	6	8	103	28	0.3	A	A	15	111	31	0.3	A	A	21	15	4	0.0	A	A	28	19	5	0.1	A	A
5	South Street - Third to Terry Francois - South																										
6	16th Street - Third to Terry Francois - North																										

PLUS PROJECT

		Sidewalk Width		Weekday PM (4-6) no event						Weekday Evening (6-8) no event						Weekday Late PM (9-11) no event						Saturday Evening (7-9) no event					
Location ID	Sidewalk Location	Actual Wa	Effective We		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS
4	Third Street - South to 16th - East	16	8	7	279	77	0.6	A	B													27	261	72	0.6	A	B
4	Third Street - South to 16th - West	16	8	8	116	32	0.3	A	A													28	68	19	0.2	A	A
5	16th Street - Third to Terry Francois - North	12.5	6.25	6	217	60	0.6	A	B													26	236	65	0.7	A	B
6	South Street - Third to Terry Francois - South	15	7.5	5	217	60	0.5	A	B													25	236	65	0.6	A	B

		Sidewalk Width		Weekday PM (4-6) with Convention						Weekday Evening (6-8) with Convention						Weekday Late PM (9-11) with Convention						Saturday Evening (7-9) with Convention					
Location ID	Sidewalk Location	Actual Wa	Effective We		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS
4	Third Street - South to 16th - East	16	8	7	722	199	1.7	A	B																		
4	Third Street - South to 16th - West	16	8	8	205	56	0.5	A	A																		
5	South Street - Third to Terry Francois - South	12.5	6.25	6	631	173	1.9	A	B																		
6	16th Street - Third to Terry Francois - North	15	7.5	5	707	194	1.7	A	B																		

		Sidewalk Width		Weekday PM (4-6) with Basketball						Weekday Evening (6-8) with Basketball						Weekday Late PM (9-11) with Basketball						Saturday Evening (7-9) with Basketball					
Location ID	Sidewalk Location	Actual Wa	Effective We		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS
4	Third Street - South to 16th - East	16	8	7	319	88	0.7	A	B	14	613	169	1.4	A	B	20	802	221	1.8	A	B	27	414	114	0.9	A	B
4	Third Street - South to 16th - West	16	8	8	132	36	0.3	A	A	15	208	57	0.5	A	A	21	312	86	0.7	A	B	28	137	38	0.3	A	A
5	South Street - Third to Terry Francois - South	12.5	6.25	6	259	71	0.8	A	B	13	584	160	1.7	A	B	19	797	219	2.3	A	B	26	401	110	1.2	A	B
6	16th Street - Third to Terry Francois - North	15	7.5	5	340	93	0.8	A	B	12	802	221	2.0	A	B	18	797	219	1.9	A	B	25	616	169	1.5	A	B

		Sidewalk Width		Weekday PM (4-6) with Basketball + Giants						Weekday Evening (6-8) with Basketball + Giants						Weekday Late PM (9-11) with Basketball + Giants						Saturday Evening (7-9) with Basketball + Giants					
Location ID	Sidewalk Location	Actual Wa	Effective We		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS
4	Third Street - South to 16th - East	16	8	7	305	84	0.7	A	B	14	602	166	1.4	A	B	20	802	221	1.8	A	B	27	424	117	1.0	A	B
4	Third Street - South to 16th - West	16	8	8	165	45	0.4	A	A	15	267	73	0.6	A	B	21	312	86	0.7	A	B	28	139	38	0.3	A	A
5	South Street - Third to Terry Francois - South	12.5	6.25	6	259	71	0.8	A	B	13	584	160	1.7	A	B	19	797	219	2.3	A	B	26	401	110	1.2	A	B
6	16th Street - Third to Terry Francois - North	15	7.5	5	340	93	0.8	A	B	12	802	221	2.0	A	B	18	797	219	1.9	A	B	25	616	169	1.5	A	B

2040 CUMULATIVE

		Sidewalk Width		Weekday PM (4-6) no event						Weekday Evening (6-8) no event						Weekday Late PM (9-11) no event						Saturday Evening (7-9) no event					
Location ID	Sidewalk Location	Actual Wa	Effective We		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS
4	Third Street - South to 16th - East	16	8	7	335	92	0.8	A	B													27	280	77	0.6	A	B
4	Third Street - South to 16th - West	16	8	8	186	51	0.4	A	A													28	85	23	0.2	A	A
5	16th Street - Third to Terry Francois - North	12.5	6.25	6	247	68	0.7	A	B													26	251	69	0.7	A	B
6	South Street - Third to Terry Francois - South	15	7.5	5	247	68	0.6	A	B													25	251	69	0.6	A	B

		Sidewalk Width		Weekday PM (4-6) with Convention						Weekday Evening (6-8) with Convention						Weekday Late PM (9-11) with Convention						Saturday Evening (7-9) with Convention					
Location ID	Sidewalk Location	Actual Wa	Effective We		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS
4	Third Street - South to 16th - East	16	8	7	778	214	1.8	A	B																		
4	Third Street - South to 16th - West	16	8	8	275	76	0.6	A	B																		
5	South Street - Third to Terry Francois - South	12.5	6.25	6	661	182	1.9	A	B																		
6	16th Street - Third to Terry Francois - North	15	7.5	5	737	203	1.8	A	B																		

		Sidewalk Width		Weekday PM (4-6) with Basketball						Weekday Evening (6-8) with Basketball						Weekday Late PM (9-11) with Basketball						Saturday Evening (7-9) with Basketball					
Location ID	Sidewalk Location	Actual Wa	Effective We		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS		Pedestrians Hourly	Max Ped per 15 Min V15	Flow Rate (p/min/ft) Vp	Avg LOS	Platoon LOS
4	Third Street - South to 16th - East	16	8	7	375	103	0.9	A	B													27	433	119	1.0	A	B
4	Third Street - South to 16th - West	16	8	8	202	56	0.5	A	A													28	155	43	0.4	A	A
5	South Street - Third to Terry Francois - South	12.5	6.25	6	289	79	0.8	A	B													26	416	114	1.2	A	B
6	16th Street - Third to Terry Francois - North	15	7.5	5	370	102	0.9	A	B													25	632	174	1.5	A	B

APPENDIX TR-9

PROPOSED PROJECT PARKING DEMAND AND SUPPLY INFORMATION

TABLE A - PARKING SUPPLY BY SCENARIO IN THE VICINITY OF BLOCKS 29-32		No Game at AT&T Park								With Game at AT&T Park							
		No Event and Convention Event				Basketball Game				No Event and Convention Event				Basketball Game			
		Weekday		Saturday		Weekday		Saturday		Weekday		Saturday		Weekday		Saturday	
	Location	Midday	Evening	Midday	Evening	Midday	Evening	Midday	Evening	Midday	Evening	Midday	Evening	Midday	Evening	Midday	Evening
1	185 Berry Street	300	closed	closed	closed	300	closed	closed	closed	300	270	closed	closed	300	270	closed	*300*
2	Pier 48 Sheds A & B	closed	closed	closed	closed	closed	closed	closed	closed	closed	500	closed	500	closed	500	closed	500
3	West side of Terry François Blvd along Lot A	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
4	Mission Rock St - Lot A	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400
5	Lot C (Blocks 3E & 4E)	closed	closed	closed	closed	closed	closed	closed	closed	closed	320	closed	320	closed	320	closed	320
6	601 Terry A Francois Blvd (Pier 52 Boat Launch)	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57
7	East Side Terry A. François Blvd	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78
8	450 South Street	1,400	closed	closed	closed	1,400	*1,400*	closed	*1,400*	1,400	closed	closed	closed	1,400	*1,400*	closed	*1,400*
9	1670 Owens Street	780	closed	closed	closed	780	closed	closed	closed	780	closed	closed	closed	780	*780*	closed	*780*
11	1650 Third Street	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730	730
12	UCSF Block 23	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220	220
13	1625 Owens Street (Rutter Community Center)	590	590	590	590	590	590	590	590	590	590	590	590	590	590	590	590
14	UCSF Medical Center Garage and Lot - Phase 1	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050	1,050
15	GSW Proposed Project Site (Blocks 29-32)	950	950	950	950	950	950	950	950	950	950	950	950	950	950	950	950
	Total	**8,685**	**6,205**	**6,205**	**6,205**	**8,685**	**7,605**	**6,205**	**7,605**	**8,685**	**7,295**	**6,205**	**7,025**	**8,685**	**9,475**	**6,205**	**9,505**
	GSW Proposed Project Site (Blocks 29-32)	950	950	950	950	950	950	950	950	950	950	950	950	950	950	950	950
	SF Giants	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	2,530	3,350	2,530	3,350	2,530	3,350	2,530	3,350
	UCSF	2,590	2,590	2,590	2,590	2,590	2,590	2,590	2,590	2,590	2,590	2,590	2,590	2,590	2,590	2,590	2,590
	Alexandria (includes 122 spaces allocated to GSW)	2,180	-	-	-	2,180	1,400	-	1,400	2,180	-	-	-	2,180	2,180	-	2,180
	Other	435	135	135	135	435	135	135	135	435	405	135	135	435	405	135	435
	Total	**8,685**	**6,205**	**6,205**	**6,205**	**8,685**	**7,605**	**6,205**	**7,605**	**8,685**	**7,295**	**6,205**	**7,025**	**8,685**	**9,475**	**6,205**	**9,505**

Facilities currently closed but assumed to be open for project event parking are shown in ***bold italics*** .

TABLE 2 - PARKING SUPPLY AND DEMAND IN THE VICINITY OF BLOCKS 29-32
Existing 2015

	NUMBER OF SPACES OCCUPIED																							
	Without Game at AT&T Park												With Game at AT&T Park											
	Weekday						Saturday						Weekday						Saturday					
	11:30 am - 3:30 pm			7 pm - 8:30 pm			11:30 am - 1:30 pm			7 pm - 8:30 pm			11:30 am - 1:30 pm			7 pm - 8:30 pm			11:30 am - 1:30 pm			7 pm - 8:30 pm		
Location	**Supply**	**Demand**	**% Util.**	**Supply**	**Demand**	**% Util.**	**Supply**	**Demand**	**% Util.**	**Supply**	**Demand**	**% Util.**	**Supply**	**Demand**	**% Util.**	**Supply**	**Demand**	**% Util.**	**Supply**	**Demand**	**% Util.**	**Supply**	**Demand**	**% Util.**
1 185 Berry Street	300	300	100%	closed	N.A.		closed	N.A.		closed	N.A.		300	300	100%	270	240	89%	closed	40		closed	N.A.	
2 Pier 48 Sheds A & B	closed	N.A.		closed	N.A.		closed	N.A.		closed	N.A.		closed	N.A.		500	310	62%	closed	N.A.		500	490	98%
3 West side of Terry François Blvd along Lot A	130	0	0%	130	10	8%	130	10	8%	130	10	8%	130	20	15%	130	120	92%	130	10	8%	130	120	92%
4 Mission Rock St - Lot A	2,400	980	41%	2,400	640	27%	2,400	120	5%	2,400	110	5%	2,400	670	28%	2,400	2,400	100%	2,400	120	5%	2,400	2,280	95%
X1 Lot D (Block 1) - Third St at Channel St																								
5 **Lot C (Blocks 3E & 4E) - Long Bridge to China Basin**	closed	N.A.		closed	N.A.		closed	N.A.		closed	N.A.		closed	N.A.		320	314	98%	closed	0		320	304	95%
X2 Lot C (Block 7) - China Basin to Mission Bay Blvd																								
6 601 Terry A Francois Blvd (Pier 52 Boat Launch) (Metered)	57	50	88%	57	50	88%	57	20	35%	57	10	18%	57	40	70%	57	10	18%	57	30	53%	57	20	35%
7 East Side Terry A. François Blvd (Metered)	78	30	38%	78	10	13%	78	0	0%	78	0	0%	78	20	26%	78	0	0%	78	10	13%	78	10	13%
8 450 South Street	1,400	1,080	77%	closed	90		closed	80		closed	40		1,400	998	71%	closed	260		closed	50		closed	40	
9 1670 Owens Street	780	320	41%	closed	40		closed	N.A.		closed	N.A.		780	340	44%	closed	50		closed	N.A.		closed	N.A.	
10 1650 Third Street	730	710	97%	730	350	48%	730	150	21%	730	140	19%	730	678	93%	730	580	79%	730	150	21%	730	480	66%
11 UCSF Block 23	220	210	95%	220	150	68%	220	210	95%	220	150	68%	220	210	95%	220	110	50%	220	200	91%	220	190	86%
12 1625 Owens Street (Rutter Community Center)	590	549	93%	590	180	30%	590	240	41%	590	80	14%	590	469	79%	590	170	29%	590	380	64%	590	120	20%
13 **UCSF Medical Center Garage and Lot - Phase 1**	1,050	940	90%	1,050	570	54%	1,050	320	30%	1,050	370	35%	1,050	940	90%	1,050	570	54%	1,050	320	30%	1,050	370	35%
14 455 South St Lot B & 1725 Third St Lot E - GSW Project Site	610	240	39%	610	20	3%	closed	10		closed	10		610	180	30%	610	210	34%	610	10	2%	610	580	95%
Total	**8,345**	**5,409**	**65%**	**5,865**	**2,110**	**36%**	**5,255**	**1,160**	**22%**	**5,255**	**920**	**18%**	**8,345**	**4,865**	**58%**	**6,955**	**5,344**	**77%**	**5,865**	**1,320**	**23%**	**6,685**	**5,004**	**75%**
SF Giants	3,140	1,220	39%	3,140	670	21%	2,530	140	6%	2,530	130	5%	3,140	870	28%	3,960	3,354	85%	3,140	140	4%	3,960	3,774	95%
UCSF	2,590	2,409	93%	2,590	1,250	48%	2,590	920	36%	2,590	740	29%	2,590	2,297	89%	2,590	1,430	55%	2,590	1,050	41%	2,590	1,160	45%
Alexandria	2,180	1,400	64%	0	130	0%	0	80	0%	0	40	0%	2,180	1,338	61%	0	310	0%	0	50	0%	0	40	0%
Other	435	380	87%	135	60	44%	135	20	15%	135	10	7%	435	360	83%	405	250	62%	135	80	59%	135	30	22%
Total	**8,345**	**5,409**	**65%**	**5,865**	**2,110**	**36%**	**5,255**	**1,160**	**22%**	**5,255**	**920**	**18%**	**8,345**	**4,865**	**58%**	**6,955**	**5,344**	**77%**	**5,865**	**1,320**	**23%**	**6,685**	**5,004**	**75%**

TABLE 3a - PARKING SUPPLY AND DEMAND
IN THE VICINITY OF BLOCKS 29-32
Existing 2015 plus Project - No Event

	NUMBER OF SPACES OCCUPIED																			
	Without Game at AT&T Park																			
	Weekday										Saturday									
	11:30 am - 3:30 pm					7 pm - 8:30 pm					11:30 am - 1:30 pm					7 pm - 8:30 pm				
Location	**Supply**	**Existing**	**Project**	**Total**	**% Util.**	**Supply**	**Existing**	**Project**	**Total**	**% Util.**	**Supply**	**Existing**	**Project**	**Total**	**% Util.**	**Supply**	**Existing**	**Project**	**Total**	**% Util.**
1 185 Berry Street	300	300	0	300	100%	closed	N.A.	0	0		closed	N.A.	0	0		closed	N.A.	0	0	
2 Pier 48 Sheds A & B	closed	N.A.	0	0		closed	N.A.	0	0		closed	N.A.	0	0		closed	N.A.	0	0	
3 West side of Terry François Blvd along Lot A	130	0		0	0%	130	10		10	8%	130	10		10	8%	130	10		10	8%
4 Mission Rock St - Lot A	2,400	980	52	1,032	43%	2,400	640	0	640	27%	2,400	120	0	120	5%	2,400	110	0	110	5%
5 Lot C (Blocks 3E & 4E) - Long Bridge to China Basin	closed	N.A.		0		closed	N.A.		0		closed	N.A.		0		closed	N.A.		0	
6 601 Terry A Francois Blvd (Pier 52 Boat Launch) (Metered)	57	50		50	88%	57	50		50	88%	57	20		20	35%	57	10		10	18%
7 East Side Terry A. François Blvd (Metered)	78	30	0	30	38%	78	10	0	10	13%	78	0	0	0	0%	78	0	0	0	0%
8 450 South Street	1,400	1,320	63	1,383	99%	closed	90	49	139		closed	80	29	109		closed	40	23	63	
9 1670 Owens Street	780	320	0	320	41%	closed	40	0	40		closed	N.A.	0	0		closed	N.A.	0	0	
10 1650 Third Street	730	710	10	720	99%	730	357	0	357	49%	730	153	0	153	21%	730	143	0	143	20%
11 UCSF Block 23	220	210	0	210	95%	220	150	0	150	68%	220	210	0	210	95%	220	150	0	150	68%
12 1625 Owens Street (Rutter Community Center)	590	549	0	549	93%	590	187	0	187	32%	590	243	0	243	41%	590	83	0	83	14%
13 UCSF Medical Center Garage and Lot - Phase 1	1,050	940	1	941	90%	1,050	577	0	577	55%	1,050	323	0	323	31%	1,050	373	0	373	36%
15 GSW Proposed Project Site (Blocks 29-32)	950		923	923	97%	950		440	440	46%	950		560	560	59%	950		439	439	46%
Total	**8,685**	**5,409**	**1,049**	**6,458**	**74%**	**6,205**	**2,111**	**489**	**2,600**	**42%**	**6,205**	**1,159**	**589**	**1,748**	**28%**	**6,205**	**919**	**462**	**1,381**	**22%**
GSW Proposed Project Site (Blocks 29-32)	950	0	923	923	97%	950	0	440	440	46%	950	0	560	560	59%	950	0	439	439	46%
SF Giants	2,530	980	52	1,032	41%	2,530	650	0	650	26%	2,530	130	0	130	5%	2,530	120	0	120	5%
UCSF	2,590	2,409	11	2,420	93%	2,590	1,271	0	1,271	49%	2,590	929	0	929	36%	2,590	749	0	749	29%
Alexandria	2,180	1,640	63	1,703	78%	0	130	49	179	0%	0	80	29	109	0%	0	40	23	63	0%
Other	435	380	0	380	87%	135	60	0	60	44%	135	20	0	20	15%	135	10	0	10	7%
Total	**8,685**	**5,409**	**1,049**	**6,458**	**74%**	**6,205**	**2,111**	**489**	**2,600**	**42%**	**6,205**	**1,159**	**589**	**1,748**	**28%**	**6,205**	**919**	**462**	**1,381**	**22%**

TABLE 3a - PARKING SUPPLY AND DEMAND IN THE VICINITY OF BLOCKS 29-32
Existing 2015 plus Project - No Event

	NUMBER OF SPACES OCCUPIED																			
	With Game at AT&T Park																			
	Weekday										Saturday									
	11:30 am - 1:30 pm					7 pm - 8:30 pm					11:30 am - 1:30 pm					7 pm - 8:30 pm				
Location	**Supply**	**Existing**	**Project**	**Total**	**% Util.**	**Supply**	**Existing**	**Project**	**Total**	**% Util.**	**Supply**	**Existing**	**Project**	**Total**	**% Util.**	**Supply**	**Existing**	**Project**	**Total**	**% Util.**
1 185 Berry Street	300	300	0	300	100%	270	240	0	240	89%	closed	40	0	40		closed	N.A.	0	0	
2 Pier 48 Sheds A & B	closed	N.A.	0	0		500	310	0	310	62%	closed	N.A.	0	0		500	490	0	490	98%
3 West side of Terry François Blvd along Lot A	130	20		20	15%	130	120		120	92%	130	10		10	8%	130	120		120	92%
4 Mission Rock St - Lot A	2,400	670	0	670	28%	2,400	2,400	0	2,400	100%	2,400	120	0	120	5%	2,400	2,280	0	2,280	95%
5 Lot C (Blocks 3E & 4E) - Long Bridge to China Basin	closed	N.A.		0		320	314		314	98%	closed	0		0		320	304		304	95%
6 601 Terry A Francois Blvd (Pier 52 Boat Launch) (Metered)	57	40		40	70%	57	10		10	18%	57	30		30	53%	57	20		20	35%
7 East Side Terry A. François Blvd (Metered)	78	20	0	20	26%	78	0	0	0	0%	78	10	0	10	13%	78	10	0	10	13%
8 450 South Street	1,400	998	105	1,103	79%	closed	260	49	309		closed	50	29	79		closed	40	23	63	
9 1670 Owens Street	780	520	0	520	67%	closed	50	0	50		closed	N.A.	0	0		closed	N.A.	0	0	
10 1650 Third Street	730	678	0	678	93%	730	650	0	650	89%	730	153	0	153	21%	730	673	0	673	92%
11 UCSF Block 23	220	210	0	210	95%	220	110	0	110	50%	220	200	0	200	91%	220	190	0	190	86%
12 1625 Owens Street (Rutter Community Center)	590	469	0	469	79%	590	240	0	240	41%	590	383	0	383	65%	590	313	0	313	53%
13 UCSF Medical Center Garage and Lot - Phase 1	1,050	940	0	940	90%	1,050	640	0	640	61%	1,050	323	0	323	31%	1,050	563	0	563	54%
15 GSW Proposed Project Site (Blocks 29-32)	950		944	944	99%	950		440	440	46%	950		560	560	59%	950		439	439	46%
Total	**8,685**	**4,865**	**1,049**	**5,914**	**68%**	**7,295**	**5,344**	**489**	**5,833**	**80%**	**6,205**	**1,319**	**589**	**1,908**	**31%**	**7,025**	**5,003**	**462**	**5,465**	**78%**
GSW Proposed Project Site (Blocks 29-32)	950	0	944	944	99%	950	0	440	440	46%	950	0	560	560	59%	950	0	439	439	46%
SF Giants	2,530	690	0	690	27%	3,350	3,144	0	3,144	94%	2,530	130	0	130	5%	3,350	3,194	0	3,194	95%
UCSF	2,590	2,297	0	2,297	89%	2,590	1,640	0	1,640	63%	2,590	1,059	0	1,059	41%	2,590	1,739	0	1,739	67%
Alexandria	2,180	1,518	105	1,623	74%	0	310	49	359	0%	0	50	29	79	0%	0	40	23	63	0%
Other	435	360	0	360	83%	405	250	0	250	62%	135	80	0	80	59%	135	30	0	30	22%
Total	**8,685**	**4,865**	**1,049**	**5,914**	**68%**	**7,295**	**5,344**	**489**	**5,833**	**80%**	**6,205**	**1,319**	**589**	**1,908**	**31%**	**7,025**	**5,003**	**462**	**5,465**	**78%**

TABLE 3b - PARKING SUPPLY AND DEMAND IN THE VICINITY OF BLOCKS 29-32
Existing 2015 plus Project - Convention Event

	NUMBER OF SPACES OCCUPIED																			
	Without Game at AT&T Park										With Game at AT&T Park									
	Weekday										Weekday									
	11:30 am - 3:30 pm					7 pm - 8:30 pm					11:30 am - 1:30 pm					7 pm - 8:30 pm				
Location	**Supply**	**Existing**	**Project**	**Total**	**% Util.**	**Supply**	**Existing**	**Project**	**Total**	**% Util.**	**Supply**	**Existing**	**Project**	**Total**	**% Util.**	**Supply**	**Existing**	**Project**	**Total**	**% Util.**
1 185 Berry Street	300	300	0	300	100%	closed	N.A.	0	0		300	300	0	300	100%	270	240	0	240	89%
2 Pier 48 Sheds A & B	closed	N.A.	0	0		closed	N.A.	0	0		closed	N.A.	0	0		500	310	0	310	62%
3 West side of Terry François Blvd along Lot A	130	0		0	0%	130	10		10	8%	130	20		20	15%	130	120		120	92%
4 Mission Rock St - Lot A	2,400	980	896	1,876	78%	2,400	640	0	640	27%	2,400	670	896	1,566	65%	2,400	2,400	0	2,400	100%
5 Lot C (Blocks 3E & 4E) - Long Bridge to China Basin	closed	N.A.		0		closed	N.A.		0		closed	N.A.		0		320	314		314	98%
6 601 Terry A Francois Blvd (Pier 52 Boat Launch) (Metered)	57	50		50	88%	57	50		50	88%	57	40		40	70%	57	10		10	18%
7 East Side Terry A. François Blvd (Metered)	78	30	0	30	38%	78	10	0	10	13%	78	20	0	20	26%	78	0	0	0	0%
8 450 South Street	1,400	1,320	67	1,387	99%	closed	90	67	157		1,400	998	67	1,065	76%	closed	260	67	327	
9 1670 Owens Street	780	320	0	320	41%	closed	40	0	40		780	520	0	520	67%	closed	50	0	50	
10 1650 Third Street	730	710	5	715	98%	730	357	0	357	49%	730	678	5	683	94%	730	650	0	650	89%
11 UCSF Block 23	220	210	0	210	95%	220	150	0	150	68%	220	210	0	210	95%	220	110	0	110	50%
12 1625 Owens Street (Rutter Community Center)	590	549	0	549	93%	590	187	0	187	32%	590	469	0	469	79%	590	240	0	240	41%
13 UCSF Medical Center Garage and Lot - Phase 1	1,050	940	4	944	90%	1,050	577	0	577	55%	1,050	940	4	944	90%	1,050	640	0	640	61%
15 GSW Proposed Project Site (Blocks 29-32)	950		934	934	98%	950		602	602	63%	950		934	934	98%	950		602	602	63%
Total	**8,685**	**5,409**	**1,906**	**7,315**	**84%**	**6,205**	**2,111**	**669**	**2,780**	**45%**	**8,685**	**4,865**	**1,906**	**6,771**	**78%**	**7,295**	**5,344**	**669**	**6,013**	**82%**
GSW Proposed Project Site (Blocks 29-32)	950	0	934	934	98%	950	0	602	602	63%	950	0	934	934	98%	950	0	602	602	63%
SF Giants	2,530	980	896	1,876	74%	2,530	650	0	650	26%	2,530	690	896	1,586	63%	3,350	3,144	0	3,144	94%
UCSF	2,590	2,409	9	2,418	93%	2,590	1,271	0	1,271	49%	2,590	2,297	9	2,306	89%	2,590	1,640	0	1,640	63%
Alexandria	2,180	1,640	67	1,707	78%	0	130	67	197	0%	2,180	1,518	67	1,585	73%	0	310	67	377	0%
Other	435	380	0	380	87%	135	60	0	60	44%	435	360	0	360	83%	405	250	0	250	62%
Total	**8,685**	**5,409**	**1,906**	**7,315**	**84%**	**6,205**	**2,111**	**669**	**2,780**	**45%**	**8,685**	**4,865**	**1,906**	**6,771**	**78%**	**7,295**	**5,344**	**669**	**6,013**	**82%**

TABLE 3c - PARKING SUPPLY AND DEMAND
IN THE VICINITY OF BLOCKS 29-32
Existing 2015 plus Project - Basketball Game

		NUMBER OF SPACES OCCUPIED																			
		Without Game at AT&T Park																			
		Weekday										Saturday									
		11:30 am - 3:30 pm					7 pm - 8:30 pm					11:30 am - 1:30 pm					7 pm - 8:30 pm				
	Location	**Supply**	**Existing**	**Project**	**Total**	**% Util.**	**Supply**	**Existing**	**Project**	**Total**	**% Util.**	**Supply**	**Existing**	**Project**	**Total**	**% Util.**	**Supply**	**Existing**	**Project**	**Total**	**% Util.**
1	185 Berry Street	300	300	0	300	100%	closed	N.A.	0	0		closed	N.A.	0	0		closed	N.A.	0	0	
2	Pier 48 Sheds A & B	closed	N.A.	0	0		closed	N.A.	0	0		closed	N.A.	0	0		closed	N.A.	0	0	
3	West side of Terry François Blvd along Lot A	130	0		0	0%	130	10		10	8%	130	10		10	8%	130	10		10	8%
4	Mission Rock St - Lot A	2,400	980	54	1,034	43%	2,400	640	1,537	2,177	91%	2,400	120	0	120	5%	2,400	110	2,058	2,168	90%
5	Lot C (Blocks 3E & 4E) - Long Bridge to China Basin	closed	N.A.		0		closed	N.A.		0		closed	N.A.		0		closed	N.A.		0	
6	601 Terry A Francois Blvd (Pier 52 Boat Launch) (Metered)	57	50		50	88%	57	50		50	88%	57	20		20	35%	57	10		10	18%
7	East Side Terry A. François Blvd (Metered)	78	30	0	30	38%	78	10	0	10	13%	78	0	0	0	0%	78	0	0	0	0%
8	450 South Street	1,400	1,320	64	1,384	99%	**1,400**	90	1,196	1,286	92%	closed	80	30	110		**1,400**	40	1,102	1,142	82%
9	1670 Owens Street	780	320	0	320	41%	closed	40	0	40		closed	N.A.	0	0		closed	N.A.	0	0	
10	1650 Third Street	730	710	11	721	99%	730	357	214	571	78%	730	153	0	153	21%	730	143	434	577	79%
11	UCSF Block 23	220	210	0	210	95%	220	150	0	150	68%	220	210	0	210	95%	220	150	0	150	68%
12	1625 Owens Street (Rutter Community Center)	590	549	0	549	93%	590	187	214	401	68%	590	243	0	243	41%	590	83	46	129	22%
13	UCSF Medical Center Garage and Lot - Phase 1	1,050	940	0	940	90%	1,050	577	170	747	71%	1,050	323	0	323	31%	1,050	373	0	373	36%
15	GSW Proposed Project Site (Blocks 29-32)	950		943	943	99%	950		939	939	99%	950		568	568	60%	950		933	933	98%
	Total	**8,685**	**5,409**	**1,072**	**6,481**	**75%**	**7,605**	**2,111**	**4,270**	**6,381**	**84%**	**6,205**	**1,159**	**598**	**1,757**	**28%**	**7,605**	**919**	**4,573**	**5,492**	**72%**
	GSW Proposed Project Site (Blocks 29-32)	950	0	943	943	99%	950	0	939	939	99%	950	0	568	568	60%	950	0	933	933	98%
	SF Giants	2,530	980	54	1,034	41%	2,530	650	1,537	2,187	86%	2,530	130	0	130	5%	2,530	120	2,058	2,178	86%
	UCSF	2,590	2,409	11	2,420	93%	2,590	1,271	598	1,869	72%	2,590	929	0	929	36%	2,590	749	480	1,229	47%
	Alexandria	2,180	1,640	64	1,704	78%	1,400	130	1,196	1,326	95%	0	80	30	110	0%	1,400	40	1,102	1,142	82%
	Other	435	380	0	380	87%	135	60	0	60	44%	135	20	0	20	15%	135	10	0	10	7%
	Total	**8,685**	**5,409**	**1,072**	**6,481**	**75%**	**7,605**	**2,111**	**4,270**	**6,381**	**84%**	**6,205**	**1,159**	**598**	**1,757**	**28%**	**7,605**	**919**	**4,573**	**5,492**	**72%**

TABLE 3c - PARKING SUPPLY AND DEMAND IN THE VICINITY OF BLOCKS 29-32
Existing 2015 plus Project - Basketball Game

	Location	NUMBER OF SPACES OCCUPIED — With Game at AT&T Park																			
		Weekday										Saturday									
		11:30 am - 1:30 pm					7 pm - 8:30 pm					11:30 am - 1:30 pm					7 pm - 8:30 pm				
		Supply	Existing	Project	Total	% Util.	Supply	Existing	Project	Total	% Util.	Supply	Existing	Project	Total	% Util.	Supply	Existing	Project	Total	% Util.
1	185 Berry Street	300	300	0	300	100%	270	240	53	293	109%	closed	40	0	40		**300**	N.A.	297	297	99%
2	Pier 48 Sheds A & B	closed	N.A.	0	0		500	310	0	310	62%	closed	N.A.	0	0		500	490	0	490	98%
3	West side of Terry François Blvd along Lot A	130	20		20	15%	130	120		120	92%	130	10		10	8%	130	120		120	92%
4	Mission Rock St - Lot A	2,400	670	0	670	28%	2,400	2,400	0	2,400	100%	2,400	120	0	120	5%	2,400	2,280	0	2,280	95%
5	Lot C (Blocks 3E & 4E) - Long Bridge to China Basin	closed	N.A.		0		320	314		314	98%	closed	0		0		320	304		304	95%
6	601 Terry A Francois Blvd (Pier 52 Boat Launch) (Metered)	57	40		40	70%	57	10		10	18%	57	30		30	53%	57	20		20	35%
7	East Side Terry A. François Blvd (Metered)	78	20	0	20	26%	78	0	64	64	82%	78	10	0	10	13%	78	10	64	74	95%
8	450 South Street	1,400	998	64	1,062	76%	**1,400**	260	1,131	1,391	99%	closed	50	30	80		**1,400**	40	1,347	1,387	99%
9	1670 Owens Street	780	520	0	520	67%	**780**	50	726	776	99%	closed	N.A.	0	0		**780**		773	773	99%
10	1650 Third Street	730	678	65	743	102%	730	650	75	725	99%	730	153	0	153	21%	730	673	59	732	100%
11	UCSF Block 23	220	210	0	210	95%	220	110	107	217	99%	220	200	0	200	91%	220	190	69	259	118%
12	1625 Owens Street (Rutter Community Center)	590	469	0	469	79%	590	240	342	582	99%	590	383	0	383	65%	590	313	293	606	103%
13	UCSF Medical Center Garage and Lot - Phase 1	1,050	940	0	940	90%	1,050	640	402	1042	99%	1,050	323	0	323	31%	1,050	563	477	1040	99%
15	GSW Proposed Project Site (Blocks 29-32)	950		943	943	99%	950		950	950	100%	950		568	568	60%	950		937	937	99%
	Total	**8,685**	**4,865**	**1,072**	**5,937**	**68%**	**9,475**	**5,344**	**3,850**	**9,194**	**97%**	**6,205**	**1,319**	**598**	**1,917**	**31%**	**9,505**	**5,003**	**4,316**	**9,319**	**98%**
	GSW Proposed Project Site (Blocks 29-32)	950	0	943	943	99%	950	0	950	950	100%	950	0	568	568	60%	950	0	937	937	99%
	SF Giants	2,530	690	0	690	27%	3,350	3,144	0	3,144	94%	2,530	130	0	130	5%	3,350	3,194	0	3,194	95%
	UCSF	2,590	2,297	65	2,362	91%	2,590	1,640	926	2,566	99%	2,590	1,059	0	1,059	41%	2,590	1,739	898	2,637	102%
	Alexandria	2,180	1,518	64	1,582	73%	2,180	310	1,857	2,167	99%	0	50	30	80	0%	2,180	40	2,120	2,160	99%
	Other	435	360	0	360	83%	405	250	117	367	91%	135	80	0	80	59%	435	30	361	391	90%
	Total	**8,685**	**4,865**	**1,072**	**5,937**	**68%**	**9,475**	**5,344**	**3,850**	**9,194**	**97%**	**6,205**	**1,319**	**598**	**1,917**	**31%**	**9,505**	**5,003**	**4,316**	**9,319**	**98%**

	Future Non-residential Parking Supply	Additional Spaces No Giants	w/ Giants
1	Mission Rock St - Parcel D Garage	2,300	2,300
2	Mission Rock St - Mission Rock Square Garage	700	700
3	Lot A (eliminated)	-2,400	-2,400
4	Pier 48 (eliminated)		-500
5	West side of TFB along Lot A (eliminated)		-130
6	Lot C (eliminated)		-320
7	Block 1 (hotel+retail only)	65	65
8	Block 40	660	660
9	East side of TFB lot (eliminated)	-78	-78
10	1550 Owens Street - Parcel 6 Garage	320	320
11	Parcel 6 Surface Lot (eliminated)	-92	-92
12	UCSF Blocks 33 & 34	500	500
13	UCSF Medical Center Garage - Phase 2	1,300	1,300
14	Surface Spaces in North Campus (eliminate)	-160	-160
15	UCSF Medical Center Lot - Phase 1 (eliminate)	-430	-430
16	UCSF Block 18	1,540	1,540
	TOTAL	**4,225**	**3,275**

Remaining Mission Bay Office/R&D	
Block 26 - Parcel 1	200,000 gsf
Block 27 - Parcel 1	300,000 gsf
Block 40	660,000 gsf
Blocks 41-43 Parcel 7	60,000 gsf
Total	**1,220,000 gsf**

	Additional Spaces No Giants	w/ Giants
Mission Rock	600	-350
Missio Bay Plan	875	875
UCSF	2,750	2,750
TOTAL	**4,225**	**3,275**
Supply available 24 hours (1 thru 7,9,13,14,15,16)	2,837	1,887
Supply closed after 7 PM & Sat (8,10,11,12)	1,388	1,388
TOTAL	**4,225**	**3,275**

Future Non-residential Parking Demand	Weekday Midday	Weekday Evening	Saturday Midday	Saturday Evening
Mission Rock Project	2,600	2,350	1,560	1,500
Block 1 (hotel+retail only)	210	275	230	260
1600 Owens St - Kaiser MOB	360	90	140	20
Remaining Mission Bay Office/R&D (1.22 Mgsf)	1,240	110	170	10
UCSF LRDP to 2040	3,410	1,800	1,320	1,060

Appendix TR-10

Proposed Project Off-street Spaces Supply versus Mission Bay South Design for Development Requirements

Table T-2

Summary of Proposed and D4D Required Transportation-related Facilities
Updated April 2015

ITEM	Proposed by the Project	Mission Bay South D4D Requirement (3,4,5)
Vehicle Parking Spaces (On-site and 450 South Street)		
Event center (1)	415	563
Office	537	537
Retail/Restaurant	130	172
Total	**1,082**	1,272
ADA Parking Spaces (part of total above)	22	24
Class 1 Bicycle Parking Spaces		
Event center (2)	400	400
Office	104	104
Retail/restaurant	7	7
Total	511	511
Class 2 Bicycle Parking Spaces		
Event Center/Office/Retail/Restaurant	75	0
Loading Spaces (on-site)		
Event center	7	7
Office	3	3
Retail/Restaurant	3	3
Total	**13**	10

Notes:

1. 283 spaces within the project site + 132 spaces within 450 South Street.

2. Class 1 bicycle parking for event center would be provided via a permanent bicycle valet (during events) of 300 spaces, and 100 temporary staffed bicycle corrals.

3. The D4D does not contemplate an off-street parking standard for a multipurpose event center, therefore, the proposed changes to the D4D include a new parking standard for the event center that promotes sharing parking with the retail and office uses, as well as limits parking to promote the use of transit. Also, as part of the standard, allow off-site parking for the event center to be further than the 600 feet from the entrance of the event center. (Mission Bay Blocks 29-32 Major Phase Application, Appendix A)

4. The existing D4D does not contemplate a loading standard for a multi-purpose event center, therefore the proposed changes to the D4D include a standard for the event center loading area that reflects the increased intensity of demand from standard commercial buildings. (Mission Bay Blocks 29-32 Major Phase Application, Appendix A)

5. The existing D4D does not require provision of Class 2 bicycle parking spaces, car share spaces, or shower and locker facilities.

APPENDIX TR-11
MISSION BAY FSEIR MITIGATION MEASURES

Summary of Transportation Mitigation Measures in 1998 Mission Bay FSEIR				
#	**Measure Name**	**Area Applicability**	**Status**	**GSW?**
MEASURES INCLUDED AS PART OF PROJECT				
Intersections				
E.1	Third/King	Mission Bay North and South	completed	No
E.2	Third/Berry	Mission Bay North and South	completed	No
E.3	Third/Owens (Third/Channel)	Mission Bay South	completed	No
E.4	Third/The Commons (Third/Mission Bay Drive)	Mission Bay South	completed	No
E.5	Third/South	Mission Bay South	completed	No
E.6	Third/16th	Mission Bay South	completed	No
E.7	Third/Mariposa	Mission Bay South	completed	No
E.8	Fourth/King	Mission Bay North	completed	No
E.9	Fourth/Berry	Mission Bay North	completed	No
E.10	Fourth/Owens (Fourth/Channel)	Mission Bay South	completed	No
E.11	Fourth/UCSF (Fourth/Gene Friend Way)	Mission Bay South	completed	No
E.12	Fourth/16th	Mission Bay South	completed	No
E.13	Fourth/Mariposa	Mission Bay South	completed	No
E.14	Seventh/16th	Mission Bay South	completed	No
E.15	Owens/16th	Mission Bay South	completed	No
E.16	Owens/Mariposa/I-280	Mission Bay South	completed	No
E.17	I-280 On-ramp/Mariposa	Mission Bay South	completed	No
E.18	Seventh/The Commons (Seventh/Mission Bay Drive)	Mission Bay South	completed	No
E.19	Fifth/King	Mission Bay North	pending, in design, Caltrans approval required	Np
Street Segments				
E.21	Third Street	Mission Bay North and South	completed	No
E.22	Mariposa Street	Mission Bay South	completed	No
E.23	Fourth Street	Mission Bay North and South	completed	No
E.24	King Street	Mission Bay North	completed	No
E.25	Owens Street (Channel Street)	Mission Bay South	partial buildout, not adjacent to site	No
E.26	N. Commons/S. Commons/Seventh (N. & S. MB Blvd/MB Drive)	Mission Bay South	partial buildout, not adjacent to site	No
Transit				
E.27	22 Fillmore	Mission Bay South	SFMTA, completed 55 16th route, 22 Fillmore by 2018	No
E.28	30/45 Union-Stockton	Mission Bay South	revised to 10 Townsend in TEP	No
MEASURES IDENTIFIED IN THE FSEIR				
Intersections				
E.29	Seventh/Brannan	Mission Bay South	pending with UCSF	No
E.30	Seventh/Townsend	Mission Bay North	completed	No
E.31	Seventh/Berry	Mission Bay North	street network revised, no longer exists	NA
E.32	Seventh/N. Commons/S. Commons	Mission Bay South	completed	No
E.33	16th/Potrero	Mission Bay South	Superceded by TEP	No

E.34	16th/Vermont	Mission Bay South	completed	No
E.35	Eighth/Townsend	Mission Bay North	Modern Roundabout Instead of Signal	No
E.36	Third/Townsend	Mission Bay North	completed	No
E.38	Fourth/King	Mission Bay North	completed	No
Street Segments				
E.41	Fourth Street (for E.38)	Mission Bay North	completed	No
E.42	Seventh Street (for E.29 through 32)	Mission Bay North and South	may not be possible or required	No
Regional				
E.43	Increase Bay Bridge tolls for SOV trips during commute hours.	Mission Bay North and South	MTC/BATA implemented this	No
Transit				
E.44	Encourage AC Transit to expand service	Mission Bay North and South	No AC Transit shortfall	No
E.45	Extend & operate T Third to Mariposa St	Mission Bay North and South	to be implemented with Central Subway	No
Transportation System Management				
E.46	Transportation Management Org (46.a - 46.b)	Mission Bay North and South		
46.a	Transportation Management Association		completed, ongoing	No
46.b	Transportation Coordinating Committee		completed, ongoing	No
E.47	Transportation System Management Plan (47.a - 47.h)		completed, implemented by Mission Bay TMA	
47.a	Shuttle Bus	Mission Bay North and South	completed, ongoing, part of OPA	OPA
47.b	Transit Pass Sales	Mission Bay North and South	completed, ongoing, part of OPA	OPA
47.c	Employee transit subsidies	Mission Bay North and South	completed, ongoing, part of OPA	OPA
47.d	Ped signal at Owens St near ped bridge at Fifth Street	Mission Bay South	Not adjacent to project site	No
47.e	Secure bicycle parking	Mission Bay North and South	completed, ongoing, part of OPA	OPA
47.f	Appropriate street lighting	Mission Bay North and South	completed, ongoing, part of OPA	OPA
47.g	Transit and ped & bike route information	Mission Bay North and South	completed, ongoing, part of OPA	OPA
47.h	Parking management guidelines	Mission Bay North and South	completed, ongoing, part of OPA	OPA
47.i	Flexible Work Times/Telecommuting	Mission Bay South	completed, ongoing, part of OPA	OPA
E.49	Ferry Service	Mission Bay North and South	being implemented by WETA	No
E.20	Seventh/Berry	Mission Bay North	Rejected by SF BOS, Not part of 1998 MB MMRP	
E.37	Third/King	Mission Bay North	Rejected by SF BOS, Not part of 1998 MB MMRP	
E.39	King Street (for E.37)	Mission Bay North	Rejected by SF BOS, Not part of 1998 MB MMRP	
E.40	Third Street (for E.37)	Mission Bay North	Rejected by SF BOS, Not part of 1998 MB MMRP	
E.48	Constrain parking supply within UCSF	Mission Bay South	Rejected by SF BOS, Not part of 1998 MB MMRP	
OPA = Owners Participation Agreement. These measures assumed to be part of the proposed project.				
WETA = Water Emergency Transportation Authority. WETA is a regional public transit agency tasked with operating and expanding ferry service on the San Francisco Bay and with coordinating the water transit response to regional emergencies. Under the San Francisco Bay Ferry brand, WETA carries over 1.8 million passengers annually utilizing a fleet of 12 high speed passenger-only ferry vessels. San Francisco Bay Ferry currently serves the cities of Alameda, Oakland, San Francisco, South San Francisco and Vallejo.				

APPENDIX TR-12

PROJECT ALTERNATIVES INFORMATION

NO PROJECT ALTERNATIVE
TRAVEL DEMAND ANALYSIS

No Project at Mission Bay Blocks 29-32 (1,056 ksf office + 31.7 kgsf retail)

PROJECT TRIP GENERATION - WEEKDAY DAILY AND PM PEAK HOUR BETWEEN 4 AND 6 PM
SUMMARY OF TRIPS WITH NO EVENT

Land Use	Intensity
Arena	0 attendees
	0 employees
Retail	31,700 gsf
Quick Service Rest.	0 gsf
Sit-down Restaurant	0 gsf
XXX	0 xxx
XXX	0 xxx
Office	1,056,000 gsf

Daily Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	0	2,011	0	0	0	0	8,723	10,734	48%
Transit	0	475	0	0	0	0	6,542	7,016	31%
Taxi/Coach (Event)								0	0%
Bike (Event)								0	0%
Walk	0	700	0	0	0	0	2,579	3,279	15%
Other	0	63	0	0	0	0	1,271	1,334	6%
Total	**0**	**3,249**	**0**	**0**	**0**	**0**	**19,114**	**22,362**	**100%**
	0%	**15%**	**0%**	**0%**	**0%**	**0%**	**85%**	**100%**	
Vehicle Trips	0	1,073	0	0	0	0	4,436	5,510	
	0%	19%	0%	0%	0%	0%	81%	100%	
Avg. veh. occupancy	*0.00*	*1.87*	*0.00*	*0.00*	*0.00*	*0.00*	*1.97*	*1.95*	

PM Peak Hour Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	0	181	0	0	0	0	519	700	37%
Transit	0	43	0	0	0	0	884	927	48%
Taxi/Coach (Event)								0	0%
Bike (Event)								0	0%
Walk	0	63	0	0	0	0	152	215	11%
Other	0	6	0	0	0	0	69	75	4%
Total	**0**	**292**	**0**	**0**	**0**	**0**	**1,625**	**1,917**	**100%**
	0%	**15%**	**0%**	**0%**	**0%**	**0%**	**85%**	**100%**	
Vehicle Trips	0	97	0	0	0	0	349	445	
	0%	22%	0%	0%	0%	0%	78%	100%	
Avg. veh. occupancy	*0.00*	*1.87*	*0.00*	*0.00*	*0.00*	*0.00*	*1.49*	*1.57*	

Percent of Daily during PM Peak Hour

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Auto	0.0%	9.0%	0.0%	0.0%	0.0%	0.0%	6.0%	6.5%
Transit	0.0%	9.0%	0.0%	0.0%	0.0%	0.0%	13.5%	13.2%
Taxi/Coach (Event)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bike (Event)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Walk	0.0%	9.0%	0.0%	0.0%	0.0%	0.0%	5.9%	6.6%
Other	0.0%	9.0%	0.0%	0.0%	0.0%	0.0%	5.5%	5.6%
Total	**0.0%**	**9.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**8.5%**	**8.6%**
Vehicle Trips	0.0%	9.0%	0.0%	0.0%	0.0%	0.0%	7.9%	8.1%

PM Peak Hour Person-Trips

Weekday Distribution	Total Daily Person-trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	2,321	0	18	0	0	0	0	140	158
Superdistrict 2	2,687	0	26	0	0	0	0	172	198
Superdistrict 3	8,825	0	172	0	0	0	0	422	594
Superdistrict 4	1,530	0	15	0	0	0	0	119	134
East Bay	3,153	0	13	0	0	0	0	399	412
North Bay	433	0	6	0	0	0	0	50	56
South Bay	2,716	0	28	0	0	0	0	280	308
Out of Region	697	0	14	0	0	0	0	42	56
Total	**22,362**	**0**	**292**	**0**	**0**	**0**	**0**	**1,625**	**1,917**

PM Peak Hour Transit-Trips

Weekday Distribution	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	6	0	0	0	0	73	78
Superdistrict 2	0	5	0	0	0	0	92	97
Superdistrict 3	0	18	0	0	0	0	177	195
Superdistrict 4	0	2	0	0	0	0	67	69
East Bay	0	5	0	0	0	0	299	304
North Bay	0	1	0	0	0	0	24	25
South Bay	0	4	0	0	0	0	127	130
Out of Region	0	3	0	0	0	0	26	29
Total	**0**	**43**	**0**	**0**	**0**	**0**	**884**	**927**

PM Peak Hour Vehicle-Trips

Weekday Distribution	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total		Avg. Veh. Occ.
Superdistrict 1	0	4	0	0	0	0	16	21	5%	1.62
Superdistrict 2	0	10	0	0	0	0	36	47	11%	1.52
Superdistrict 3	0	50	0	0	0	0	70	120	27%	1.79
Superdistrict 4	0	7	0	0	0	0	26	33	7%	1.70
East Bay	0	4	0	0	0	0	53	57	13%	1.73
North Bay	0	4	0	0	0	0	15	19	4%	1.56
South Bay	0	12	0	0	0	0	123	136	30%	1.29
Out of Region	0	5	0	0	0	0	8	13	3%	1.64
Total	**0**	**97**	**0**	**0**	**0**	**0**	**349**	**445**	**100%**	**1.57**

Assumptions for PM Peak Hour bet. 4 PM & 6 PM	Arena		Retail		Q.S. Rest.		Sit-down Rest.		XXX		XXX		Office	
	Empl.	Attend.	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work
Inbound	0%	50%	0%	50%	0%	50%	0%	50%	100%	100%	100%	55%	0%	50%
Outbound	100%	50%	100%	50%	100%	50%	100%	50%	0%	0%	0%	45%	100%	50%

Inbound

PM Peak Hour bet. 4 PM & 6 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	0	138	0	0	0	0	138	276
	0%	47%	0%	0%	0%	0%	9%	14%
Transit Trips	0	16	0	0	0	0	26	42
	0%	38%	0%	0%	0%	0%	3%	5%
Vehicle Trips	0	47	0	0	0	0	34	80
	0%	48%	0%	0%	0%	0%	10%	18%

Outbound

PM Peak Hour bet. 4 PM & 6 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	0	155	0	0	0	0	1,487	1,641
	0%	53%	0%	0%	0%	0%	92%	86%
Transit Trips	0	27	0	0	0	0	858	885
	0%	62%	0%	0%	0%	0%	97%	95%
Vehicle Trips	0	50	0	0	0	0	315	365
	0%	52%	0%	0%	0%	0%	90%	82%

Total

PM Peak Hour bet. 4 PM & 6 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	0	292	0	0	0	0	1,625	1,917
Transit Trips	0	43	0	0	0	0	884	927
Vehicle Trips	0	97	0	0	0	0	349	445

Inbound

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	4	0	0	0	0	6	10
Superdistrict 2	0	8	0	0	0	0	13	21
Superdistrict 3	0	51	0	0	0	0	27	77
Superdistrict 4	0	6	0	0	0	0	7	12
East Bay	0	3	0	0	0	0	9	12
North Bay	0	2	0	0	0	0	1	4
South Bay	0	11	0	0	0	0	12	22
Out of Region	0	4	0	0	0	0	3	7
Total	**0**	**88**	**0**	**0**	**0**	**0**	**77**	**166**

Outbound

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	4	0	0	0	0	19	23
Superdistrict 2	0	8	0	0	0	0	42	50
Superdistrict 3	0	51	0	0	0	0	87	138
Superdistrict 4	0	6	0	0	0	0	37	44
East Bay	0	4	0	0	0	0	83	88
North Bay	0	3	0	0	0	0	23	25
South Bay	0	12	0	0	0	0	140	152
Out of Region	0	4	0	0	0	0	10	15
Total	**0**	**93**	**0**	**0**	**0**	**0**	**442**	**535**

Total

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	8	0	0	0	0	26	34
Superdistrict 2	0	16	0	0	0	0	56	71
Superdistrict 3	0	102	0	0	0	0	113	215
Superdistrict 4	0	12	0	0	0	0	44	56
East Bay	0	7	0	0	0	0	92	99
North Bay	0	5	0	0	0	0	24	29
South Bay	0	23	0	0	0	0	151	174
Out of Region	0	8	0	0	0	0	13	22
Total	**0**	**181**	**0**	**0**	**0**	**0**	**519**	**700**

No Project at Mission Bay Blocks 29-32 (1,056 ksf office + 31.7 kgsf retail)

PROJECT TRIP GENERATION - WEEKDAY DAILY AND PM PEAK HOUR BETWEEN 4 AND 6 PM

SUMMARY OF TRIPS WITH NO EVENT

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Transit Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	2	0	0	0	0	3	6	0	3	0	0	0	0	69	72	0	6	0	0	0	0	73	78
Superdistrict 2	0	2	0	0	0	0	3	5	0	3	0	0	0	0	89	92	0	5	0	0	0	0	92	97
Superdistrict 3	0	8	0	0	0	0	13	21	0	10	0	0	0	0	164	174	0	18	0	0	0	0	177	195
Superdistrict 4	0	1	0	0	0	0	2	2	0	1	0	0	0	0	65	67	0	2	0	0	0	0	67	69
East Bay	0	1	0	0	0	0	4	4	0	4	0	0	0	0	295	299	0	5	0	0	0	0	299	304
North Bay	0	0	0	0	0	0	0	0	0	1	0	0	0	0	24	25	0	1	0	0	0	0	24	25
South Bay	0	1	0	0	0	0	0	2	0	3	0	0	0	0	126	129	0	4	0	0	0	0	127	130
Out of Region	0	1	0	0	0	0	1	2	0	1	0	0	0	0	25	27	0	3	0	0	0	0	26	29
Total	**0**	**16**	**0**	**0**	**0**	**0**	**26**	**42**	**0**	**27**	**0**	**0**	**0**	**0**	**858**	**885**	**0**	**43**	**0**	**0**	**0**	**0**	**884**	**927**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Bike (Event)	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1								0								0	0	0	0	0	0	0	0	0
Superdistrict 2								0								0	0	0	0	0	0	0	0	0
Superdistrict 3								0								0	0	0	0	0	0	0	0	0
Superdistrict 4								0								0	0	0	0	0	0	0	0	0
East Bay								0								0	0	0	0	0	0	0	0	0
North Bay								0								0	0	0	0	0	0	0	0	0
South Bay								0								0	0	0	0	0	0	0	0	0
Out of Region								0								0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Taxi/Walk/Other	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	2	0	0	0	0	8	10	0	2	0	0	0	0	34	36	0	5	0	0	0	0	42	46
Superdistrict 2	0	3	0	0	0	0	3	6	0	3	0	0	0	0	21	25	0	6	0	0	0	0	25	31
Superdistrict 3	0	25	0	0	0	0	21	46	0	26	0	0	0	0	111	137	0	52	0	0	0	0	132	184
Superdistrict 4	0	0	0	0	0	0	2	2	0	0	0	0	0	0	7	7	0	1	0	0	0	0	8	9
East Bay	0	1	0	0	0	0	0	1	0	1	0	0	0	0	8	8	0	1	0	0	0	0	8	9
North Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	2	2
South Bay	0	1	0	0	0	0	0	1	0	1	0	0	0	0	2	3	0	1	0	0	0	0	3	4
Out of Region	0	2	0	0	0	0	0	2	0	2	0	0	0	0	2	4	0	3	0	0	0	0	3	6
Total	**0**	**33**	**0**	**0**	**0**	**0**	**35**	**68**	**0**	**35**	**0**	**0**	**0**	**0**	**187**	**222**	**0**	**69**	**0**	**0**	**0**	**0**	**221**	**290**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Total Person Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	8	0	0	0	0	18	26	0	10	0	0	0	0	122	132	0	18	0	0	0	0	140	158
Superdistrict 2	0	12	0	0	0	0	19	32	0	14	0	0	0	0	153	167	0	26	0	0	0	0	172	198
Superdistrict 3	0	84	0	0	0	0	61	145	0	88	0	0	0	0	361	449	0	172	0	0	0	0	422	594
Superdistrict 4	0	7	0	0	0	0	10	17	0	8	0	0	0	0	109	117	0	15	0	0	0	0	119	134
East Bay	0	4	0	0	0	0	12	17	0	9	0	0	0	0	386	395	0	13	0	0	0	0	399	412
North Bay	0	3	0	0	0	0	1	4	0	3	0	0	0	0	49	52	0	6	0	0	0	0	50	56
South Bay	0	12	0	0	0	0	12	25	0	16	0	0	0	0	268	284	0	28	0	0	0	0	280	308
Out of Region	0	7	0	0	0	0	4	11	0	7	0	0	0	0	38	45	0	14	0	0	0	0	42	56
Total	**0**	**138**	**0**	**0**	**0**	**0**	**138**	**276**	**0**	**155**	**0**	**0**	**0**	**0**	**1,487**	**1,641**	**0**	**292**	**0**	**0**	**0**	**0**	**1,625**	**1,917**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Vehicle-Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	2	0	0	0	0	3	5	0	2	0	0	0	0	13	15	0	4	0	0	0	0	16	21
Superdistrict 2	0	5	0	0	0	0	7	12	0	5	0	0	0	0	30	35	0	10	0	0	0	0	36	47
Superdistrict 3	0	25	0	0	0	0	11	36	0	25	0	0	0	0	59	85	0	50	0	0	0	0	70	120
Superdistrict 4	0	3	0	0	0	0	3	6	0	4	0	0	0	0	23	27	0	7	0	0	0	0	26	33
East Bay	0	2	0	0	0	0	3	5	0	2	0	0	0	0	50	52	0	4	0	0	0	0	53	57
North Bay	0	2	0	0	0	0	0	2	0	2	0	0	0	0	15	17	0	4	0	0	0	0	15	19
South Bay	0	5	0	0	0	0	5	11	0	7	0	0	0	0	118	125	0	12	0	0	0	0	123	136
Out of Region	0	2	0	0	0	0	2	4	0	2	0	0	0	0	7	9	0	5	0	0	0	0	8	13
Total	**0**	**47**	**0**	**0**	**0**	**0**	**34**	**80**	**0**	**50**	**0**	**0**	**0**	**0**	**315**	**365**	**0**	**97**	**0**	**0**	**0**	**0**	**349**	**445**

No Project at Mission Bay Blocks 29-32 (1,056 ksf office + 31.7 kgsf retail)

PROJECT TRIP GENERATION - SATURDAY DAILY AND EVENING PEAK HOUR BETWEEN 7 AND 9 PM
SUMMARY OF TRIPS WITH NO EVENT

Land Use	Intensity	
Arena	0	attendees
	0	employees
Retail	31,700	gsf
Quick Service Rest.	0	gsf
Sit-down Restaurant	0	gsf
XXX	0	xxx
XXX	0	xxx
Office	1,056,000	gsf

Daily Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	0	2,354	0	0	0	0	1,152	3,505	43%
Transit	0	556	0	0	0	0	2,630	3,186	40%
Taxi/Coach (Event)								0	0%
Bike (Event)								0	0%
Walk	0	819	0	0	0	0	335	1,154	14%
Other	0	73	0	0	0	0	145	219	3%
Total	**0**	**3,802**	**0**	**0**	**0**	**0**	**4,263**	**8,065**	**100%**
	0%	**47%**	**0%**	**0%**	**0%**	**0%**	**53%**	**100%**	
Vehicle Trips	0	1,256	0	0	0	0	889	2,145	
	0%	59%	0%	0%	0%	0%	41%	100%	
Avg. veh. occupancy	*0.00*	*1.87*	*0.00*	*0.00*	*0.00*	*0.00*	*1.30*	*1.63*	

Evening Peak Hour Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	0	94	0	0	0	0	13	107	54%
Transit	0	22	0	0	0	0	29	51	26%
Taxi/Coach (Event)								0	0%
Bike (Event)								0	0%
Walk	0	33	0	0	0	0	4	36	18%
Other	0	3	0	0	0	0	2	5	2%
Total	**0**	**152**	**0**	**0**	**0**	**0**	**47**	**199**	**100%**
	0%	**76%**	**0%**	**0%**	**0%**	**0%**	**24%**	**100%**	
Vehicle Trips	0	50	0	0	0	0	10	60	
	0%	84%	0%	0%	0%	0%	16%	100%	
Avg. veh. occupancy	*0.00*	*1.87*	*0.00*	*0.00*	*0.00*	*0.00*	*1.30*	*1.78*	

Percent of Daily during Late PM Peak Hour

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Auto	0.0%	4.0%	0.0%	0.0%	0.0%	0.0%	1.1%	3.0%
Transit	0.0%	4.0%	0.0%	0.0%	0.0%	0.0%	1.1%	1.6%
Taxi/Coach (Event)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bike (Event)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Walk	0.0%	4.0%	0.0%	0.0%	0.0%	0.0%	1.1%	3.2%
Other	0.0%	4.0%	0.0%	0.0%	0.0%	0.0%	1.1%	2.1%
Total	**0.0%**	**4.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**1.1%**	**2.5%**
Vehicle Trips	0.0%	4.0%	0.0%	0.0%	0.0%	0.0%	1.1%	2.8%

Evening Peak Hour Person-Trips

Saturday Distribution	Total Daily Person-trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	562	0	9	0	0	0	0	4	13
Superdistrict 2	766	0	14	0	0	0	0	5	18
Superdistrict 3	3,183	0	89	0	0	0	0	10	100
Superdistrict 4	510	0	8	0	0	0	0	3	11
East Bay	1,351	0	7	0	0	0	0	13	20
North Bay	230	0	3	0	0	0	0	2	5
South Bay	1,172	0	15	0	0	0	0	9	23
Out of Region	291	0	7	0	0	0	0	1	9
Total	**8,065**	**0**	**152**	**0**	**0**	**0**	**0**	**47**	**199**

Evening Peak Hour Transit-Trips

Saturday Distribution	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	3	0	0	0	0	2	5
Superdistrict 2	0	3	0	0	0	0	3	6
Superdistrict 3	0	9	0	0	0	0	5	15
Superdistrict 4	0	1	0	0	0	0	2	3
East Bay	0	2	0	0	0	0	10	13
North Bay	0	1	0	0	0	0	1	1
South Bay	0	2	0	0	0	0	4	6
Out of Region	0	1	0	0	0	0	1	2
Total	**0**	**22**	**0**	**0**	**0**	**0**	**29**	**51**

Evening Peak Hour Vehicle-Trips

Saturday Distribution	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total		Avg. Veh. Occ.
Superdistrict 1	0	2	0	0	0	0	0	3	4%	1.69
Superdistrict 2	0	5	0	0	0	0	1	6	10%	1.48
Superdistrict 3	0	26	0	0	0	0	2	28	46%	1.98
Superdistrict 4	0	4	0	0	0	0	1	4	7%	1.72
East Bay	0	2	0	0	0	0	2	4	6%	1.69
North Bay	0	2	0	0	0	0	1	2	4%	1.44
South Bay	0	6	0	0	0	0	4	10	17%	1.59
Out of Region	0	3	0	0	0	0	0	3	5%	1.68
Total	**0**	**50**	**0**	**0**	**0**	**0**	**10**	**60**	**100%**	**1.78**

Assumptions for Evening Peak Hour bet. 7 PM & 9 PM	Arena		Retail		Q.S. Rest.		Sit-down Rest.		XXX		XXX		Office	
	Empl.	Attend.	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work
Inbound	0%	50%	0%	50%	0%	50%	0%	50%	100%	100%	100%	50%	0%	50%
Outbound	100%	50%	100%	50%	100%	50%	100%	50%	0%	0%	0%	50%	100%	50%

Inbound

Evening Peak Hour bet. 7 PM & 9 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	0	72	0	0	0	0	0	72
	0%	47%	0%	0%	0%	0%	0%	36%
Transit Trips	0	8	0	0	0	0	0	8
	0%	38%	0%	0%	0%	0%	0%	16%
Vehicle Trips	0	24	0	0	0	0	0	24
	0%	48%	0%	0%	0%	0%	0%	40%

Outbound

Evening Peak Hour bet. 7 PM & 9 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	0	80	0	0	0	0	47	127
	0%	53%	0%	0%	0%	0%	100%	64%
Transit Trips	0	14	0	0	0	0	29	43
	0%	62%	0%	0%	0%	0%	100%	84%
Vehicle Trips	0	26	0	0	0	0	10	36
	0%	52%	0%	0%	0%	0%	100%	60%

Total

Evening Peak Hour bet. 7 PM & 9 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	0	152	0	0	0	0	47	199
Transit Trips	0	22	0	0	0	0	29	51
Vehicle Trips	0	50	0	0	0	0	10	60

Inbound

Evening Peak Hour bet. 7 PM & 9 PM Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	2	0	0	0	0	0	2
Superdistrict 2	0	4	0	0	0	0	0	4
Superdistrict 3	0	26	0	0	0	0	0	26
Superdistrict 4	0	3	0	0	0	0	0	3
East Bay	0	2	0	0	0	0	0	2
North Bay	0	1	0	0	0	0	0	1
South Bay	0	6	0	0	0	0	0	6
Out of Region	0	2	0	0	0	0	0	2
Total	**0**	**46**	**0**	**0**	**0**	**0**	**0**	**46**

Outbound

Evening Peak Hour bet. 7 PM & 9 PM Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	2	0	0	0	0	0	2
Superdistrict 2	0	4	0	0	0	0	1	5
Superdistrict 3	0	27	0	0	0	0	2	29
Superdistrict 4	0	3	0	0	0	0	1	4
East Bay	0	2	0	0	0	0	3	5
North Bay	0	1	0	0	0	0	1	2
South Bay	0	6	0	0	0	0	4	11
Out of Region	0	2	0	0	0	0	0	2
Total	**0**	**48**	**0**	**0**	**0**	**0**	**13**	**61**

Total

Evening Peak Hour bet. 7 PM & 9 PM Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	4	0	0	0	0	0	4
Superdistrict 2	0	8	0	0	0	0	1	9
Superdistrict 3	0	53	0	0	0	0	2	55
Superdistrict 4	0	6	0	0	0	0	1	7
East Bay	0	4	0	0	0	0	3	6
North Bay	0	3	0	0	0	0	1	3
South Bay	0	12	0	0	0	0	4	16
Out of Region	0	4	0	0	0	0	0	5
Total	**0**	**94**	**0**	**0**	**0**	**0**	**13**	**107**

No Project at Mission Bay Blocks 29-32 (1,056 ksf office + 31.7 kgsf retail)

PROJECT TRIP GENERATION - SATURDAY DAILY AND EVENING PEAK HOUR BETWEEN 7 AND 9 PM

SUMMARY OF TRIPS WITH NO EVENT

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Transit Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	1	0	0	0	0	0	1	0	2	0	0	0	0	2	4	0	3	0	0	0	0	2	5
Superdistrict 2	0	1	0	0	0	0	0	1	0	2	0	0	0	0	3	5	0	3	0	0	0	0	3	6
Superdistrict 3	0	4	0	0	0	0	0	4	0	5	0	0	0	0	5	10	0	9	0	0	0	0	5	15
Superdistrict 4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	3	0	1	0	0	0	0	2	3
East Bay	0	0	0	0	0	0	0	0	0	2	0	0	0	0	10	12	0	2	0	0	0	0	10	13
North Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	1	1
South Bay	0	1	0	0	0	0	0	1	0	1	0	0	0	0	4	6	0	2	0	0	0	0	4	6
Out of Region	0	1	0	0	0	0	0	1	0	1	0	0	0	0	1	2	0	1	0	0	0	0	1	2
Total	**0**	**8**	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**14**	**0**	**0**	**0**	**0**	**29**	**43**	**0**	**22**	**0**	**0**	**0**	**0**	**29**	**51**

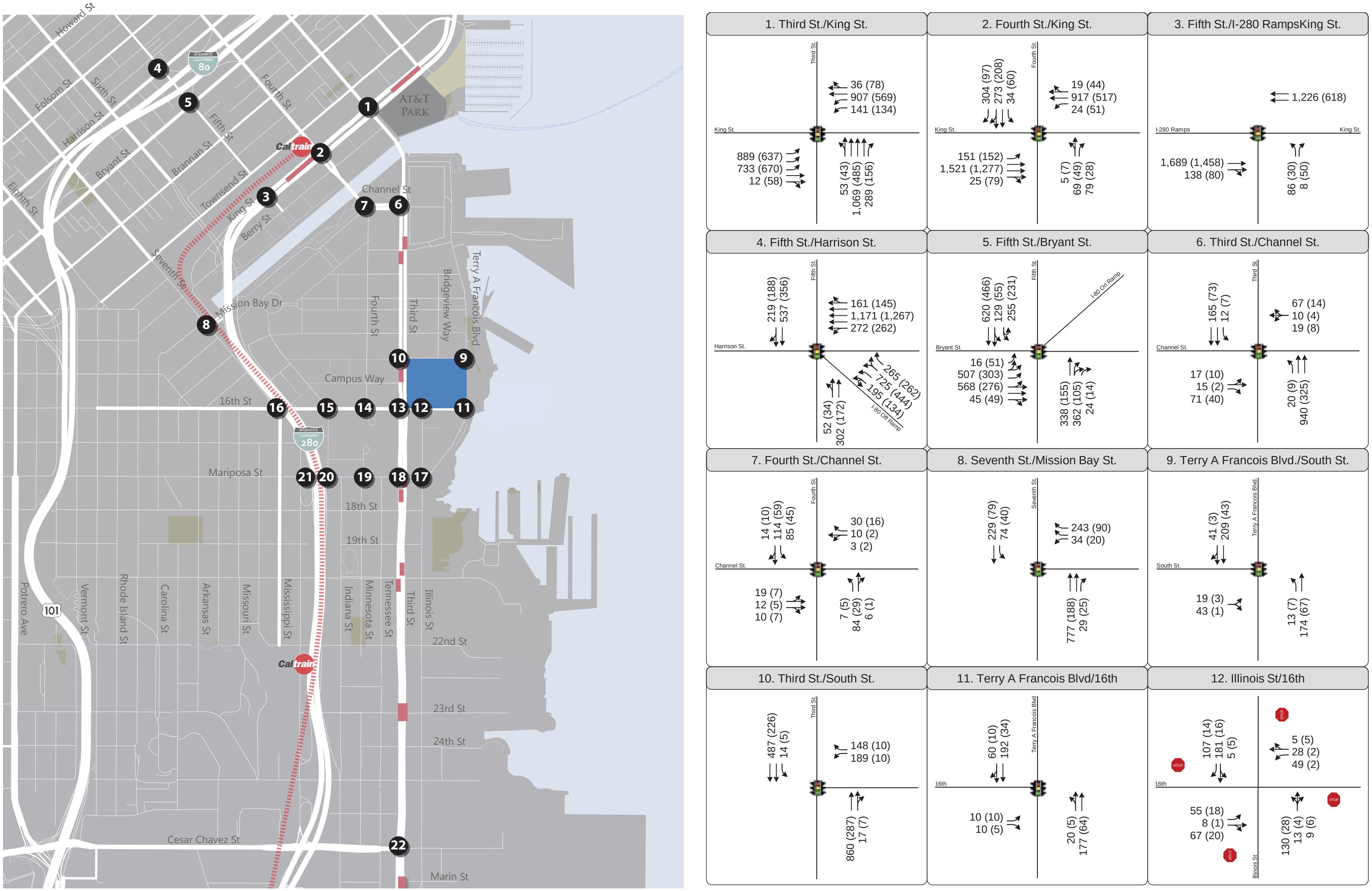
Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Bike (Event)	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1								0								0	0	0	0	0	0	0	0	0
Superdistrict 2								0								0	0	0	0	0	0	0	0	0
Superdistrict 3								0								0	0	0	0	0	0	0	0	0
Superdistrict 4								0								0	0	0	0	0	0	0	0	0
East Bay								0								0	0	0	0	0	0	0	0	0
North Bay								0								0	0	0	0	0	0	0	0	0
South Bay								0								0	0	0	0	0	0	0	0	0
Out of Region								0								0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Taxi/Walk/Other	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	1	2	0	2	0	0	0	0	1	3
Superdistrict 2	0	1	0	0	0	0	0	1	0	2	0	0	0	0	1	2	0	3	0	0	0	0	1	4
Superdistrict 3	0	13	0	0	0	0	0	13	0	14	0	0	0	0	3	17	0	27	0	0	0	0	3	30
Superdistrict 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
East Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
North Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Out of Region	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	2	0	0	0	0	0	2
Total	**0**	**17**	**0**	**0**	**0**	**0**	**0**	**17**	**0**	**18**	**0**	**0**	**0**	**0**	**5**	**24**	**0**	**36**	**0**	**0**	**0**	**0**	**5**	**41**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Total Person Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	4	0	0	0	0	0	4	0	5	0	0	0	0	4	9	0	9	0	0	0	0	4	13
Superdistrict 2	0	6	0	0	0	0	0	6	0	7	0	0	0	0	5	12	0	14	0	0	0	0	5	18
Superdistrict 3	0	44	0	0	0	0	0	44	0	46	0	0	0	0	10	56	0	89	0	0	0	0	10	100
Superdistrict 4	0	4	0	0	0	0	0	4	0	4	0	0	0	0	3	8	0	8	0	0	0	0	3	11
East Bay	0	2	0	0	0	0	0	2	0	5	0	0	0	0	13	18	0	7	0	0	0	0	13	20
North Bay	0	1	0	0	0	0	0	1	0	2	0	0	0	0	2	3	0	3	0	0	0	0	2	5
South Bay	0	6	0	0	0	0	0	6	0	8	0	0	0	0	9	17	0	15	0	0	0	0	9	23
Out of Region	0	4	0	0	0	0	0	4	0	4	0	0	0	0	1	5	0	7	0	0	0	0	1	9
Total	**0**	**72**	**0**	**0**	**0**	**0**	**0**	**72**	**0**	**80**	**0**	**0**	**0**	**0**	**47**	**127**	**0**	**152**	**0**	**0**	**0**	**0**	**47**	**199**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Vehicle-Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	2	0	2	0	0	0	0	0	3
Superdistrict 2	0	3	0	0	0	0	0	3	0	3	0	0	0	0	1	4	0	5	0	0	0	0	1	6
Superdistrict 3	0	13	0	0	0	0	0	13	0	13	0	0	0	0	2	15	0	26	0	0	0	0	2	28
Superdistrict 4	0	2	0	0	0	0	0	2	0	2	0	0	0	0	1	3	0	4	0	0	0	0	1	4
East Bay	0	1	0	0	0	0	0	1	0	1	0	0	0	0	2	3	0	2	0	0	0	0	2	4
North Bay	0	1	0	0	0	0	0	1	0	1	0	0	0	0	1	1	0	2	0	0	0	0	1	2
South Bay	0	3	0	0	0	0	0	3	0	4	0	0	0	0	4	7	0	6	0	0	0	0	4	10
Out of Region	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	3	0	0	0	0	0	3
Total	**0**	**24**	**0**	**0**	**0**	**0**	**0**	**24**	**0**	**26**	**0**	**0**	**0**	**0**	**10**	**36**	**0**	**50**	**0**	**0**	**0**	**0**	**10**	**60**

EXISTING PLUS NO PROJECT ALTERNATIVE
TRAFFIC VOLUME FIGURES
WEEKDAY PM PEAK / SATURDAY EVENING



Study Intersection | Project Site | Muni Stop | Turn Lane | PM Peak (Saturday Peak) | Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 16a

Peak Hour Traffic Volumes and Lane Configurations
Existing Plus No Project Alternative (2015) Conditions

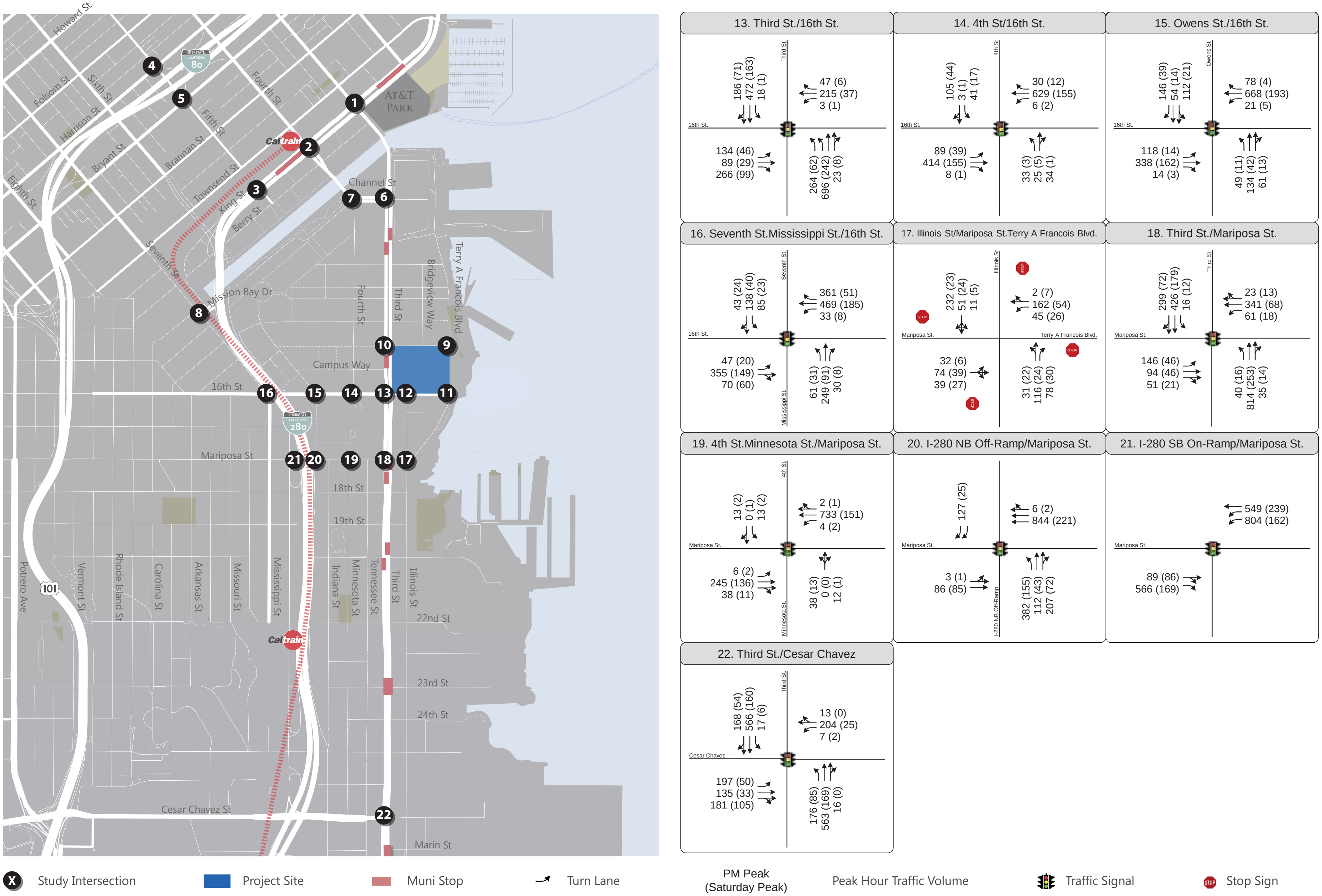


Figure 16b

Peak Hour Traffic Volumes and Lane Configurations
Existing Plus No Project Alternative (2015) Conditions

EXISTING PLUS NO PROJECT ALTERNATIVE
INTERSECTION LEVEL OF SERVICE – WEEKDAY PM PEAK

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

5/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	889	733	12	141	907	36	53	1069	289	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.68			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	1.00		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	3057		2987	3023			5480	942			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	3057		2987	3023			5480	942			
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	916	756	12	145	935	37	55	1102	298	0	0	0
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	200	0	0	0
Lane Group Flow (vph)	916	767	0	145	971	0	0	1157	98	0	0	0
Confl. Peds. (#/hr)			400			400	400		400			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.2	40.3		13.2	36.8			36.1	36.1			
Effective Green, g (s)	18.2	40.3		13.2	36.8			36.1	36.1			
Actuated g/C Ratio	0.17	0.37		0.12	0.33			0.33	0.33			
Clearance Time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	741	1119		358	1011			1798	309			
v/s Ratio Prot	c0.20	0.25		0.05	c0.32							
v/s Ratio Perm								0.21	0.10			
v/c Ratio	1.24	0.69		0.41	0.96			0.64	0.32			
Uniform Delay, d1	45.9	29.5		44.8	35.9			31.5	27.7			
Progression Factor	1.38	1.60		1.54	1.02			0.90	2.83			
Incremental Delay, d2	113.5	2.1		0.2	8.4			0.7	0.6			
Delay (s)	176.8	49.3		69.0	44.9			29.1	78.8			
Level of Service	F	D		E	D			C	E			
Approach Delay (s)		118.7			48.1			39.3			0.0	
Approach LOS		F			D			D			A	

Intersection Summary			
HCM 2000 Control Delay	73.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

5/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	151	1521	25	24	917	19	5	69	79	34	273	304
Ideal Flow (vphpl)	1800	1800	1800	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	0.64	1.00	0.84	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00	0.68	1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85	1.00	0.95	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1459	4155		1296	2553			1585	858	1044	2348	581
Flt Permitted	0.95	1.00		0.95	1.00			0.97	1.00	0.71	1.00	1.00
Satd. Flow (perm)	1459	4155		1296	2553			1543	858	778	2348	581
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	154	1552	26	24	936	19	5	70	81	35	279	310
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	53	0	43	118
Lane Group Flow (vph)	154	1577	0	24	954	0	0	75	28	35	363	65
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.4	45.9		6.0	35.9			38.2	38.2	39.2	39.2	39.2
Effective Green, g (s)	14.4	45.9		6.0	35.9			38.2	38.2	39.2	39.2	39.2
Actuated g/C Ratio	0.13	0.42		0.05	0.33			0.35	0.35	0.36	0.36	0.36
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	190	1733		70	833			535	297	277	836	207
v/s Ratio Prot	0.11	c0.38		0.02	c0.37						c0.15	
v/s Ratio Perm								0.05	0.03	0.04		0.11
v/c Ratio	0.81	0.91		0.34	1.14			0.14	0.09	0.13	0.43	0.32
Uniform Delay, d1	46.5	30.1		50.1	37.0			24.6	24.2	23.9	27.0	25.7
Progression Factor	0.58	1.19		0.88	0.90			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.5	0.9		1.0	70.6			0.1	0.1	0.2	0.4	0.9
Delay (s)	29.5	36.9		45.1	104.0			24.8	24.4	24.1	27.3	26.5
Level of Service	C	D		D	F			C	C	C	C	C
Approach Delay (s)		36.2			102.5			24.6			26.9	
Approach LOS		D			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	52.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	115.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

5/14/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1689	138	0	1226	86	8
Ideal Flow (vphpl)	1850	1850	1850	1850	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2957			2998	1540	1357
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	2957			2998	1540	1357
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1759	144	0	1277	90	8
RTOR Reduction (vph)	6	0	0	0	0	5
Lane Group Flow (vph)	1897	0	0	1277	90	3
Confl. Peds. (#/hr)		37	37		1	3
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	1669			1692	512	451
v/s Ratio Prot	c0.64			0.43	c0.06	
v/s Ratio Perm						0.00
v/c Ratio	1.14			0.75	0.18	0.01
Uniform Delay, d1	23.9			18.2	26.0	24.5
Progression Factor	1.00			0.54	1.00	1.00
Incremental Delay, d2	69.5			1.0	0.7	0.0
Delay (s)	93.5			10.7	26.8	24.6
Level of Service	F			B	C	C
Approach Delay (s)	93.5			10.7	26.6	
Approach LOS	F			B	C	

Intersection Summary			
HCM 2000 Control Delay	59.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	98.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

5/14/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	272	1171	161	52	302	537	219	195	725	265
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		2.0			2.0	2.0			2.0	2.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.99	0.87
Flpb, ped/bikes		0.99			1.00	1.00			1.00	1.00
Frt		0.98			1.00	0.96			1.00	0.85
Flt Protected		0.99			0.99	1.00			0.95	1.00
Satd. Flow (prot)		5749			2857	2464			4086	978
Flt Permitted		0.99			0.66	1.00			0.95	1.00
Satd. Flow (perm)		5749			1899	2464			4086	978
Peak-hour factor, PHF	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93
Adj. Flow (vph)	296	1259	173	56	325	577	235	212	780	285
RTOR Reduction (vph)	0	22	0	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	1706	0	0	381	808	0	0	1021	256
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Perm
Protected Phases		6			4	4		7	7	
Permitted Phases	6			4						7
Actuated Green, G (s)		27.0			25.0	25.0			24.0	24.0
Effective Green, g (s)		29.0			28.0	28.0			27.0	27.0
Actuated g/C Ratio		0.32			0.31	0.31			0.30	0.30
Clearance Time (s)		4.0			5.0	5.0			5.0	5.0
Lane Grp Cap (vph)		1852			590	766			1225	293
v/s Ratio Prot						c0.33			0.25	
v/s Ratio Perm		0.30			0.20					c0.26
v/c Ratio		0.92			0.65	1.05			0.83	0.87
Uniform Delay, d1		29.4			26.7	31.0			29.4	29.9
Progression Factor		1.48			0.06	1.00			1.00	1.00
Incremental Delay, d2		6.6			0.5	47.9			6.7	28.4
Delay (s)		50.1			2.1	78.9			36.1	58.2
Level of Service		D			A	E			D	E
Approach Delay (s)		50.1			2.1	78.9			40.6	
Approach LOS		D			A	E			D	

Intersection Summary			
HCM 2000 Control Delay	48.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	109.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

5/14/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	16	507	568	45	338	362	24	255	129	620
Ideal Flow (vphpl)	1000	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.84		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.99		0.92		0.85		1.00	1.00
Flt Protected		0.95	0.99		1.00		1.00		0.95	0.99
Satd. Flow (prot)		1313	1912		2130		1163		1327	2541
Flt Permitted		0.95	0.99		1.00		1.00		0.15	0.63
Satd. Flow (perm)		1313	1912		2130		1163		207	1616
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	17	545	611	48	363	389	26	274	139	667
RTOR Reduction (vph)	0	0	7	0	0	0	17	0	0	0
Lane Group Flow (vph)	0	480	734	0	755	0	6	0	306	774
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	5	0	5	0	0	0	0	5
Parking (#/hr)			10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		22.5	22.5		23.0		23.0		42.0	42.0
Effective Green, g (s)		22.5	25.0		24.5		23.0		43.5	43.5
Actuated g/C Ratio		0.25	0.28		0.27		0.26		0.48	0.48
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		328	531		579		297		305	950
v/s Ratio Prot		0.37	c0.38		c0.35				c0.18	0.15
v/s Ratio Perm							0.01		0.30	0.24
v/c Ratio		1.46	1.38		1.42dr		0.02		1.00	0.81
Uniform Delay, d1		33.8	32.5		32.8		25.1		31.1	19.8
Progression Factor		1.00	1.00		1.00		1.00		1.10	1.15
Incremental Delay, d2		224.6	183.3		149.0		0.1		27.9	2.2
Delay (s)		258.4	215.8		181.8		25.2		62.2	25.1
Level of Service		F	F		F		C		E	C
Approach Delay (s)			232.6		177.1					35.6
Approach LOS			F		F					D

Intersection Summary			
HCM 2000 Control Delay	149.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	102.8%	ICU Level of Service	G
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

5/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	15	71	19	10	67	20	940	18	12	165	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		0.99	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.91		1.00	1.00		1.00	0.99	
Flt Protected		0.97	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1569	1353		1426		1272	2531		1540	3038	
Flt Permitted		0.87	1.00		0.95		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1405	1353		1373		1272	2531		1540	3038	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	18	16	75	20	11	71	21	989	19	13	174	14
RTOR Reduction (vph)	0	0	51	0	48	0	0	1	0	0	6	0
Lane Group Flow (vph)	0	34	24	0	54	0	21	1007	0	13	182	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		32.1	32.1		32.1		13.8	38.5		13.5	38.5	
Effective Green, g (s)		32.1	32.1		32.1		13.8	38.5		13.5	38.5	
Actuated g/C Ratio		0.32	0.32		0.32		0.14	0.38		0.14	0.38	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Grp Cap (vph)		451	434		440		175	974		207	1169	
v/s Ratio Prot							0.02	c0.40		0.01	c0.06	
v/s Ratio Perm		0.02	0.02		c0.04							
v/c Ratio		0.08	0.06		0.12		0.12	1.03		0.06	0.16	
Uniform Delay, d1		23.6	23.5		24.0		37.8	30.8		37.7	20.1	
Progression Factor		1.00	1.00		1.00		1.22	0.22		1.00	1.00	
Incremental Delay, d2		0.3	0.2		0.6		1.0	33.7		0.6	0.3	
Delay (s)		23.9	23.7		24.6		47.0	40.4		38.3	20.4	
Level of Service		C	C		C		D	D		D	C	
Approach Delay (s)		23.8			24.6			40.5			21.6	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	35.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.9
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.

5/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	12	10	3	10	30	7	84	6	85	114	14
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00	1.00	1.00	1.00		1.00	0.98	
Flpb, ped/bikes		0.99			1.00	1.00	0.84	1.00		1.00	1.00	
Frt		0.96			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.98			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2553			1434	1227	1154	1432		1377	1393	
Flt Permitted		0.95			1.00	1.00	0.80	1.00		0.95	1.00	
Satd. Flow (perm)		2493			1449	1227	972	1432		1377	1393	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	20	13	11	3	11	32	8	90	6	91	123	15
RTOR Reduction (vph)	0	10	0	0	0	17	0	4	0	0	5	0
Lane Group Flow (vph)	0	34	0	0	14	15	8	92	0	91	133	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		2.3			2.3	18.7	5.0	5.0		16.4	26.4	
Effective Green, g (s)		2.3			2.3	18.7	5.0	5.0		16.4	26.4	
Actuated g/C Ratio		0.06			0.06	0.48	0.13	0.13		0.42	0.68	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		148			86	751	125	185		583	950	
v/s Ratio Prot						0.01		c0.06		0.07	c0.10	
v/s Ratio Perm		c0.01			0.01	0.00	0.01					
v/c Ratio		0.23			0.16	0.02	0.06	0.50		0.16	0.14	
Uniform Delay, d1		17.4			17.3	5.2	14.8	15.7		6.9	2.2	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8			0.9	0.0	0.2	2.1		0.1	0.1	
Delay (s)		18.1			18.2	5.2	15.0	17.8		7.0	2.2	
Level of Service		B			B	A	B	B		A	A	
Approach Delay (s)		18.1			9.2			17.5			4.1	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	38.7	Sum of lost time (s)	15.0
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.

5/14/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	34	243	777	29	74	229
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1743	1535	848	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1743	1535	848	1134	1194
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	264	845	32	80	249
RTOR Reduction (vph)	0	236	0	5	0	0
Lane Group Flow (vph)	37	28	845	27	80	249
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	8.7	8.7	47.6	42.6	9.3	61.9
Effective Green, g (s)	8.7	8.7	47.6	42.6	9.3	61.9
Actuated g/C Ratio	0.11	0.11	0.59	0.53	0.12	0.77
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	122	188	906	500	130	916
v/s Ratio Prot	c0.03		c0.55	0.01	c0.07	0.21
v/s Ratio Perm		0.02		0.02		
v/c Ratio	0.30	0.15	0.93	0.05	0.62	0.27
Uniform Delay, d1	33.2	32.6	15.0	9.2	33.9	2.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	0.4	16.0	0.0	8.4	0.2
Delay (s)	34.6	33.0	31.0	9.3	42.3	2.9
Level of Service	C	C	C	A	D	A
Approach Delay (s)	33.2		30.2			12.5
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	80.6	Sum of lost time (s)	20.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
9: Terry A Francois Blvd/Terry A Francois Blvd. & South St.

5/14/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	19	43	13	174	209	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0	5.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frpb, ped/bikes	0.96		1.00	1.00	0.99	
Flpb, ped/bikes	0.99		0.98	1.00	1.00	
Frt	0.91		1.00	1.00	0.98	
Flt Protected	0.99		0.95	1.00	1.00	
Satd. Flow (prot)	1521		1680	1531	3062	
Flt Permitted	0.99		0.58	1.00	1.00	
Satd. Flow (perm)	1521		1027	1531	3062	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	21	48	14	193	232	46
RTOR Reduction (vph)	43	0	0	0	15	0
Lane Group Flow (vph)	26	0	14	193	263	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	10
Turn Type	Perm		Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4		2			
Actuated Green, G (s)	3.6		22.6	22.6	22.6	
Effective Green, g (s)	3.6		22.6	22.6	22.6	
Actuated g/C Ratio	0.10		0.64	0.64	0.64	
Clearance Time (s)	4.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	155		659	982	1965	
v/s Ratio Prot				c0.13	0.09	
v/s Ratio Perm	c0.02		0.01			
v/c Ratio	0.17		0.02	0.20	0.13	
Uniform Delay, d1	14.4		2.3	2.6	2.5	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.5		0.0	0.1	0.0	
Delay (s)	14.9		2.3	2.7	2.5	
Level of Service	B		A	A	A	
Approach Delay (s)	14.9			2.7	2.5	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	4.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	35.2	Sum of lost time (s)	9.0
Intersection Capacity Utilization	37.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: Third St. & South St.

5/14/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	189	148	860	17	14	487
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.96	1.00		1.00	1.00
Flpb, ped/bikes	0.93	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1584	1466	3406		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1584	1466	3406		1711	3421
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	210	164	956	19	16	541
RTOR Reduction (vph)	0	117	1	0	0	0
Lane Group Flow (vph)	210	47	974	0	16	541
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	28.7	28.7	52.0		4.0	61.1
Effective Green, g (s)	28.7	28.7	52.0		4.0	61.1
Actuated g/C Ratio	0.29	0.29	0.52		0.04	0.61
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	454	420	1771		68	2090
v/s Ratio Prot			c0.29		0.01	c0.16
v/s Ratio Perm	c0.13	0.03				
v/c Ratio	0.46	0.11	0.55		0.24	0.26
Uniform Delay, d1	29.3	26.3	16.1		46.5	9.0
Progression Factor	1.00	1.00	2.06		1.08	1.36
Incremental Delay, d2	0.7	0.1	0.8		1.8	0.1
Delay (s)	30.1	26.4	34.0		51.9	12.3
Level of Service	C	C	C		D	B
Approach Delay (s)	28.4		34.0			13.4
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	26.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
11: Terry A Francois Blvd./Terry A Francois Blvd & 16th

5/14/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	10	10	20	177	192	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.97		1.00	0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.96	
Flt Protected	0.95	1.00		0.99	1.00	
Satd. Flow (prot)	1520	1343		3060	2948	
Flt Permitted	0.95	1.00		0.89	1.00	
Satd. Flow (perm)	1520	1343		2733	2948	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	12	12	24	208	226	71
RTOR Reduction (vph)	0	12	0	0	57	0
Lane Group Flow (vph)	12	0	0	232	240	0
Confl. Peds. (#/hr)	1	1	25			25
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	0.6	0.6		9.1	9.1	
Effective Green, g (s)	0.6	0.6		9.1	9.1	
Actuated g/C Ratio	0.01	0.01		0.20	0.20	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	20	17		552	596	
v/s Ratio Prot	c0.01				0.08	
v/s Ratio Perm		0.00		c0.08		
v/c Ratio	0.60	0.01		0.42	0.40	
Uniform Delay, d1	22.1	21.9		15.7	15.6	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	40.2	0.2		0.5	0.4	
Delay (s)	62.3	22.1		16.2	16.0	
Level of Service	E	C		B	B	
Approach Delay (s)	42.2			16.2	16.0	
Approach LOS	D			B	B	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	34.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
12: Illinois St & 16th

5/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	55	8	67	49	28	5	130	13	9	5	181	107
Peak Hour Factor	0.92	0.87	0.87	0.87	0.87	0.92	0.87	0.92	0.87	0.92	0.92	0.92
Hourly flow rate (vph)	60	9	77	56	32	5	149	14	10	5	197	116

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	60	86	56	38	174	202	116
Volume Left (vph)	60	0	56	0	149	5	0
Volume Right (vph)	0	77	0	5	10	0	116
Hadj (s)	0.53	-0.59	0.53	-0.07	0.17	0.05	-0.67
Departure Headway (s)	6.4	5.3	6.5	5.9	5.7	5.4	4.7
Degree Utilization, x	0.11	0.13	0.10	0.06	0.28	0.31	0.15
Capacity (veh/h)	518	624	510	560	603	634	726
Control Delay (s)	9.0	7.9	9.0	8.1	10.9	9.6	7.4
Approach Delay (s)	8.3		8.7		10.9	8.8	
Approach LOS	A		A		B	A	

Intersection Summary			
Delay	9.2		
Level of Service	A		
Intersection Capacity Utilization	44.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

5/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	134	89	266	3	215	47	264	696	23	18	472	186
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1265	1365	1126	1283	1365	1099	2515	2577		1296	2464	
Flt Permitted	0.53	1.00	1.00	0.69	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	711	1365	1126	936	1365	1099	2515	2577		1296	2464	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	147	98	292	3	236	52	290	765	25	20	519	204
RTOR Reduction (vph)	0	0	191	0	0	34	0	2	0	0	42	0
Lane Group Flow (vph)	147	98	101	3	236	18	290	788	0	20	681	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Effective Green, g (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Actuated g/C Ratio	0.34	0.34	0.34	0.34	0.34	0.34	0.14	0.38		0.12	0.36	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Grp Cap (vph)	245	470	388	322	470	379	352	974		155	882	
v/s Ratio Prot		0.07			0.17		0.12	c0.31		0.02	c0.28	
v/s Ratio Perm	c0.21		0.09	0.00		0.02						
v/c Ratio	0.60	0.21	0.26	0.01	0.50	0.05	0.82	0.81		0.13	0.77	
Uniform Delay, d1	27.1	23.1	23.6	21.5	25.9	21.8	41.8	27.9		39.3	28.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.64	0.76		1.15	1.19	
Incremental Delay, d2	10.4	1.0	1.6	0.1	3.8	0.2	8.6	3.0		1.7	6.3	
Delay (s)	37.5	24.1	25.2	21.6	29.7	22.0	35.5	24.3		47.0	40.3	
Level of Service	D	C	C	C	C	C	D	C		D	D	
Approach Delay (s)		28.4			28.3			27.3			40.4	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	31.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	116.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

5/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	89	414	8	6	629	30	33	25	34	41	3	105
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.85	1.00	0.98		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1411	1621	1706	1238	1621	1527		1491	1355	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.68	1.00		0.72	1.00	
Satd. Flow (perm)	1621	1706	1411	1621	1706	1238	1163	1527		1123	1355	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	450	9	7	684	33	36	27	37	45	3	114
RTOR Reduction (vph)	0	0	4	0	0	18	0	28	0	0	85	0
Lane Group Flow (vph)	97	450	5	7	684	15	36	36	0	45	32	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	10.9	47.6	47.6	2.7	39.4	39.4	21.9	21.9		21.9	21.9	
Effective Green, g (s)	10.9	47.6	47.6	2.7	39.4	39.4	21.9	21.9		21.9	21.9	
Actuated g/C Ratio	0.12	0.55	0.55	0.03	0.45	0.45	0.25	0.25		0.25	0.25	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	202	931	770	50	770	559	292	383		282	340	
v/s Ratio Prot	c0.06	c0.26		0.00	c0.40			0.02			0.02	
v/s Ratio Perm			0.00			0.01	0.03			c0.04		
v/c Ratio	0.48	0.48	0.01	0.14	0.89	0.03	0.12	0.09		0.16	0.09	
Uniform Delay, d1	35.5	12.2	9.0	41.1	21.9	13.3	25.2	25.0		25.5	25.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	1.8	0.0	1.3	12.1	0.0	0.2	0.1		0.3	0.1	
Delay (s)	37.3	14.0	9.0	42.4	34.0	13.3	25.4	25.2		25.7	25.2	
Level of Service	D	B	A	D	C	B	C	C		C	C	
Approach Delay (s)		18.0			33.1			25.3			25.3	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	87.2	Sum of lost time (s)	15.0
Intersection Capacity Utilization	84.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.

5/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↱			↰↑	↱
Volume (vph)	118	338	14	21	668	78	49	134	61	112	54	146
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.97	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1048	1540	2934			2978	1072
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.64	1.00			0.67	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1048	1041	2934			2060	1072
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	123	352	15	22	696	81	51	140	64	117	56	152
RTOR Reduction (vph)	0	0	4	0	0	21	0	55	0	0	0	132
Lane Group Flow (vph)	123	352	11	22	696	60	51	149	0	0	173	20
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	10.0	71.2	71.2	2.3	62.5	62.5	14.6	14.6			13.6	13.6
Effective Green, g (s)	10.0	71.2	71.2	2.3	62.5	62.5	14.6	14.6			13.6	13.6
Actuated g/C Ratio	0.10	0.70	0.70	0.02	0.62	0.62	0.14	0.14			0.13	0.13
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	120	855	970	35	751	647	150	423			277	144
v/s Ratio Prot	c0.10	0.29		0.01	c0.57			0.05				
v/s Ratio Perm			0.01			0.06	0.05				c0.08	0.02
v/c Ratio	1.02	0.41	0.01	0.63	0.93	0.09	0.34	0.35			0.94dl	0.14
Uniform Delay, d1	45.5	6.2	4.5	49.0	17.3	7.8	38.9	39.0			41.3	38.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	89.0	1.5	0.0	30.3	17.3	0.1	1.4	0.5			4.3	0.5
Delay (s)	134.5	7.7	4.5	79.3	34.6	7.9	40.3	39.5			45.7	39.1
Level of Service	F	A	A	E	C	A	D	D			D	D
Approach Delay (s)		39.4			33.1			39.7			42.6	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	37.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	101.1	Sum of lost time (s)	15.0
Intersection Capacity Utilization	91.5%	ICU Level of Service	F
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.

5/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↱		↰	↑	↱	↰	↑	↱	↰	↑↱	
Volume (vph)	47	355	70	33	469	361	61	249	30	85	138	43
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.90	1.00	1.00	0.96	1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1337	927		1335	1126	859	1070	957	920	1070	1068	
Flt Permitted	0.15	1.00		0.33	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	214	927		457	1126	859	1070	957	920	1070	1068	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	50	378	74	35	499	384	65	265	32	90	147	46
RTOR Reduction (vph)	0	6	0	0	0	139	0	0	24	0	11	0
Lane Group Flow (vph)	50	446	0	35	499	245	65	265	8	90	182	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	51.8	51.8		51.1	51.1	60.1	13.6	27.1	27.1	9.0	22.5	
Effective Green, g (s)	51.8	51.8		51.1	51.1	60.1	13.6	27.1	27.1	9.0	22.5	
Actuated g/C Ratio	0.47	0.47		0.46	0.46	0.54	0.12	0.25	0.25	0.08	0.20	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	132	435		230	521	506	131	235	226	87	217	
v/s Ratio Prot	0.01	c0.48		0.00	c0.44	0.04	0.06	c0.28		0.08	c0.17	
v/s Ratio Perm	0.17			0.07		0.25			0.01			
v/c Ratio	0.38	1.02		0.15	0.96	0.48	0.50	1.13	0.03	1.03	0.84	
Uniform Delay, d1	21.0	29.2		25.5	28.6	15.5	45.2	41.6	31.6	50.6	42.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.8	49.5		0.3	28.7	0.7	2.9	97.4	0.1	106.2	23.6	
Delay (s)	22.8	78.8		25.8	57.3	16.2	48.1	139.0	31.7	156.9	65.8	
Level of Service	C	E		C	E	B	D	F	C	F	E	
Approach Delay (s)		73.2			38.9			113.2			94.7	
Approach LOS		E			D			F			F	

Intersection Summary			
HCM 2000 Control Delay	67.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	110.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.

5/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	32	74	39	45	162	2	31	116	78	11	51	232
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	36	82	43	50	180	2	34	129	87	12	57	258

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	161	50	182	163	87	327
Volume Left (vph)	36	50	0	34	0	12
Volume Right (vph)	43	0	2	0	87	258
Hadj (s)	-0.08	0.53	0.03	0.14	-0.67	-0.43
Departure Headway (s)	6.5	7.0	6.5	6.4	5.6	5.7
Degree Utilization, x	0.29	0.10	0.33	0.29	0.13	0.52
Capacity (veh/h)	500	474	514	514	592	595
Control Delay (s)	12.2	9.5	11.4	10.8	8.3	14.8
Approach Delay (s)	12.2	11.0		10.0		14.8
Approach LOS	B	B		A		B

Intersection Summary			
Delay	12.2		
Level of Service	B		
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.

5/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	146	94	51	61	341	23	40	814	35	16	426	299
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.99		1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1678	3199		1677	3379		1260	2501		1260	2331	
Flt Permitted	0.48	1.00		0.65	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	843	3199		1155	3379		1260	2501		1260	2331	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	155	100	54	65	363	24	43	866	37	17	453	318
RTOR Reduction (vph)	0	35	0	0	5	0	0	3	0	0	127	0
Lane Group Flow (vph)	155	119	0	65	382	0	43	900	0	17	644	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	34.7	34.7		34.7	34.7		11.9	34.9		14.9	37.9	
Effective Green, g (s)	34.7	34.7		34.7	34.7		11.9	34.9		14.9	37.9	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.12	0.35		0.15	0.38	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Grp Cap (vph)	292	1110		400	1172		149	872		187	883	
v/s Ratio Prot		0.04			0.11		0.03	c0.36		0.01	c0.28	
v/s Ratio Perm	c0.18			0.06								
v/c Ratio	0.53	0.11		0.16	0.33		0.29	1.03		0.09	0.73	
Uniform Delay, d1	26.1	22.1		22.6	24.0		40.2	32.5		36.7	26.6	
Progression Factor	1.00	1.00		1.00	1.00		0.91	0.80		1.55	0.62	
Incremental Delay, d2	6.8	0.2		0.9	0.7		3.7	35.0		0.7	3.8	
Delay (s)	32.9	22.3		23.5	24.8		40.0	61.1		57.6	20.3	
Level of Service	C	C		C	C		D	E		E	C	
Approach Delay (s)		27.6			24.6			60.1			21.1	
Approach LOS		C			C			E			C	

Intersection Summary			
HCM 2000 Control Delay	37.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	107.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

5/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	245	38	4	733	2	38	0	12	13	0	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00			0.97		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3353		1711	3420			1678		1711	1531	
Flt Permitted	0.26	1.00		0.56	1.00			0.84		0.72	1.00	
Satd. Flow (perm)	473	3353		1017	3420			1467		1300	1531	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	266	41	4	797	2	41	0	13	14	0	14
RTOR Reduction (vph)	0	20	0	0	0	0	0	20	0	0	8	0
Lane Group Flow (vph)	7	287	0	4	799	0	0	34	0	14	6	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	24.0	24.0		24.0	24.0			26.0		26.0	26.0	
Effective Green, g (s)	24.0	24.0		24.0	24.0			26.0		26.0	26.0	
Actuated g/C Ratio	0.40	0.40		0.40	0.40			0.43		0.43	0.43	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Grp Cap (vph)	189	1341		406	1368			635		563	663	
v/s Ratio Prot		0.09			c0.23						0.00	
v/s Ratio Perm	0.01			0.00				c0.02		0.01		
v/c Ratio	0.04	0.21		0.01	0.58			0.05		0.02	0.01	
Uniform Delay, d1	11.0	11.8		10.8	14.1			9.9		9.7	9.7	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.4		0.0	1.8			0.2		0.1	0.0	
Delay (s)	11.3	12.2		10.9	15.9			10.0		9.8	9.7	
Level of Service	B	B		B	B			B		A	A	
Approach Delay (s)		12.2			15.9			10.0			9.8	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	14.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	38.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

5/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	86	0	0	844	6	382	112	207	0	0	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				3.5
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Flpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Frt		1.00			1.00		1.00	0.90				0.85
Flt Protected		1.00			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3416			5127		1711	3088				2694
Flt Permitted		0.95			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3244			5127		1711	3088				2694
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	3	88	0	0	861	6	390	114	211	0	0	130
RTOR Reduction (vph)	0	0	0	0	1	0	0	109	0	0	0	121
Lane Group Flow (vph)	0	91	0	0	866	0	390	216	0	0	0	9
Confl. Peds. (#/hr)												20
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		47.5			36.5		53.0	53.0				7.5
Effective Green, g (s)		47.5			36.5		53.0	53.0				7.5
Actuated g/C Ratio		0.43			0.33		0.48	0.48				0.07
Clearance Time (s)		4.5			4.5		5.0	5.0				3.5
Lane Grp Cap (vph)		1412			1701		824	1487				183
v/s Ratio Prot		c0.00			c0.17		c0.23	0.07				0.00
v/s Ratio Perm		0.02										
v/c Ratio		0.06			0.51		0.47	0.15				0.05
Uniform Delay, d1		18.3			29.5		19.1	15.9				47.9
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			1.1		1.9	0.2				0.5
Delay (s)		18.4			30.6		21.1	16.1				48.4
Level of Service		B			C		C	B				D
Approach Delay (s)		18.4			30.6			18.8			48.4	
Approach LOS		B			C			B			D	

Intersection Summary			
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.
5/14/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	89	566	804	549	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.89	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1501	1426	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1501	1426	3319	1801		
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	92	584	829	566	0	0
RTOR Reduction (vph)	29	29	0	0	0	0
Lane Group Flow (vph)	314	304	829	566	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	36.8	36.8	23.2	70.0		
Effective Green, g (s)	36.8	36.8	23.2	70.0		
Actuated g/C Ratio	0.53	0.53	0.33	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	789	749	1100	1801		
v/s Ratio Prot	0.21		c0.25	0.31		
v/s Ratio Perm		c0.21				
v/c Ratio	0.40	0.41	0.75	0.31		
Uniform Delay, d1	10.0	10.0	20.9	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.3	0.4	3.0	0.1		
Delay (s)	10.3	10.4	23.8	0.1		
Level of Service	B	B	C	A		
Approach Delay (s)	10.3			14.2	0.0	
Approach LOS	B			B	A	

Intersection Summary			
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez
5/14/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	197	135	181	7	204	13	176	563	16	17	566	168
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.93		1.00	0.99		1.00	1.00		1.00	0.97	
Flpb, ped/bikes	0.98	1.00		0.94	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.99		1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1188	1945		1139	1257		1215	2413		1215	2289	
Flt Permitted	0.36	1.00		0.55	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	454	1945		662	1257		1215	2413		1215	2289	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	205	141	189	7	212	14	183	586	17	18	590	175
RTOR Reduction (vph)	0	127	0	0	2	0	0	2	0	0	28	0
Lane Group Flow (vph)	205	203	0	7	224	0	183	601	0	18	737	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	33.0	33.0		21.9	21.9		17.3	46.5		4.2	33.4	
Effective Green, g (s)	33.0	33.0		21.9	21.9		17.3	46.5		4.2	33.4	
Actuated g/C Ratio	0.33	0.33		0.22	0.22		0.17	0.46		0.04	0.33	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	192	641		144	275		210	1122		51	764	
v/s Ratio Prot	c0.06	0.10			0.18		c0.15	0.25		0.01	c0.32	
v/s Ratio Perm	c0.29			0.01								
v/c Ratio	1.07	0.32		0.05	0.81		0.87	0.54		0.35	0.96	
Uniform Delay, d1	34.1	25.1		30.8	37.1		40.3	19.1		46.6	32.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.03	0.81	
Incremental Delay, d2	84.1	0.3		0.1	16.6		30.2	1.8		3.4	21.8	
Delay (s)	118.1	25.4		31.0	53.7		70.5	20.9		51.3	48.5	
Level of Service	F	C		C	D		E	C		D	D	
Approach Delay (s)		60.9			53.0			32.4			48.6	
Approach LOS		E			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	46.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	98.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

EXISTING PLUS NO PROJECT ALTERNATIVE
INTERSECTION LEVEL OF SERVICE – SATURDAY EVENING

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	637	670	58	134	569	78	43	485	156	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	0.89			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	0.99		1.00	0.98			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	3018		2987	2982			5514	1233			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	3018		2987	2982			5514	1233			
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	708	744	64	149	632	87	48	539	173	0	0	0
RTOR Reduction (vph)	0	4	0	0	8	0	0	0	142	0	0	0
Lane Group Flow (vph)	708	804	0	149	711	0	0	587	31	0	0	0
Confl. Peds. (#/hr)			100			100	100		100			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	25.6	60.4		10.8	45.6			19.9	19.9			
Effective Green, g (s)	25.6	60.4		10.8	45.6			19.9	19.9			
Actuated g/C Ratio	0.23	0.55		0.10	0.41			0.18	0.18			
Clearance Time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	1042	1657		293	1236			997	223			
v/s Ratio Prot	c0.16	0.27		0.05	c0.24							
v/s Ratio Perm								0.11	0.03			
v/c Ratio	0.68	0.49		0.51	0.58			0.59	0.14			
Uniform Delay, d1	38.5	15.2		47.1	24.8			41.3	37.9			
Progression Factor	0.58	0.25		1.35	0.25			1.12	3.29			
Incremental Delay, d2	1.6	0.9		0.4	0.2			0.8	0.3			
Delay (s)	23.7	4.7		64.2	6.3			47.2	125.0			
Level of Service	C	A		E	A			D	F			
Approach Delay (s)		13.6			16.3			64.9			0.0	
Approach LOS		B			B			E			A	

Intersection Summary			
HCM 2000 Control Delay	26.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.9
Intersection Capacity Utilization	88.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	152	1277	79	51	517	44	7	49	28	60	208	97
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.98		1.00	0.95			1.00	0.63	1.00	0.98	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.96	1.00	0.67	1.00	1.00
Frt	1.00	0.99		1.00	0.99			1.00	0.85	1.00	0.99	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	4288		1296	2437			1540	852	1033	2863	580
Flt Permitted	0.95	1.00		0.95	1.00			0.94	1.00	0.72	1.00	1.00
Satd. Flow (perm)	1540	4288		1296	2437			1452	852	781	2863	580
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	162	1359	84	54	550	47	7	52	30	64	221	103
RTOR Reduction (vph)	0	4	0	0	4	0	0	0	26	0	3	79
Lane Group Flow (vph)	162	1439	0	54	593	0	0	59	4	64	228	14
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	17.5	66.0		8.9	55.8			15.2	15.2	16.2	16.2	16.2
Effective Green, g (s)	17.5	66.0		8.9	55.8			15.2	15.2	16.2	16.2	16.2
Actuated g/C Ratio	0.16	0.60		0.08	0.51			0.14	0.14	0.15	0.15	0.15
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	245	2572		104	1236			200	117	115	421	85
v/s Ratio Prot	0.11	c0.34		0.04	c0.24						0.08	
v/s Ratio Perm								0.04	0.00	c0.08		0.02
v/c Ratio	0.66	0.56		0.52	0.48			0.29	0.04	0.56	0.54	0.16
Uniform Delay, d1	43.5	13.2		48.5	17.6			42.6	41.1	43.6	43.5	41.0
Progression Factor	0.90	1.29		0.84	0.50			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.1	0.7		3.6	0.2			0.8	0.1	5.7	1.4	0.9
Delay (s)	44.4	17.8		44.2	9.2			43.4	41.2	49.3	44.9	41.9
Level of Service	D	B		D	A			D	D	D	D	D
Approach Delay (s)		20.5			12.1			42.7			44.9	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	110.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

4/22/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1458	80	3	618	30	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3052			3078	1540	1357
Flt Permitted	1.00			0.95	0.95	1.00
Satd. Flow (perm)	3052			2922	1540	1357
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	1602	88	3	679	33	55
RTOR Reduction (vph)	1	0	0	0	0	21
Lane Group Flow (vph)	1689	0	0	682	33	35
Confl. Peds. (#/hr)		10	10			3
Confl. Bikes (#/hr)		1				
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Actuated Green, G (s)	91.2			91.2	7.5	7.5
Effective Green, g (s)	91.2			91.2	7.5	7.5
Actuated g/C Ratio	0.83			0.83	0.07	0.07
Clearance Time (s)	4.9			4.9	6.4	6.4
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	2530			2422	105	92
v/s Ratio Prot	c0.55				0.02	
v/s Ratio Perm				0.23		c0.03
v/c Ratio	0.67			0.28	0.31	0.38
Uniform Delay, d1	3.6			2.1	48.8	49.0
Progression Factor	1.00			0.55	1.00	1.00
Incremental Delay, d2	1.4			0.1	1.7	2.6
Delay (s)	5.0			1.2	50.5	51.6
Level of Service	A			A	D	D
Approach Delay (s)	5.0			1.2	51.2	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	5.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

4/22/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	262	1267	145	34	172	356	188	134	444	262
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		3.5			3.0	3.0			3.0	3.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.97	1.00
Flpb, ped/bikes		0.99			0.99	1.00			1.00	1.00
Frt		0.99			1.00	0.95			0.98	0.85
Flt Protected		0.99			0.99	1.00			0.96	1.00
Satd. Flow (prot)		5770			2846	2429			3976	1122
Flt Permitted		0.99			0.83	1.00			0.96	1.00
Satd. Flow (perm)		5770			2373	2429			3976	1122
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	270	1306	149	35	177	367	194	138	458	270
RTOR Reduction (vph)	0	22	0	0	0	6	0	0	0	0
Lane Group Flow (vph)	0	1703	0	0	212	555	0	0	666	200
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Prot
Protected Phases		6			4	4		7	7	7
Permitted Phases	6			4						
Actuated Green, G (s)		22.4			20.4	20.4			14.7	14.7
Effective Green, g (s)		24.4			23.4	23.4			17.7	17.7
Actuated g/C Ratio		0.33			0.31	0.31			0.24	0.24
Clearance Time (s)		5.5			6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1877			740	757			938	264
v/s Ratio Prot						c0.23			0.17	c0.18
v/s Ratio Perm		0.30			0.09					
v/c Ratio		0.91			0.29	0.73			0.71	0.76
Uniform Delay, d1		24.2			19.5	23.0			26.3	26.7
Progression Factor		1.00			0.71	1.00			1.00	1.00
Incremental Delay, d2		6.8			0.2	3.7			2.6	11.7
Delay (s)		31.0			14.0	26.7			28.8	38.4
Level of Service		C			B	C			C	D
Approach Delay (s)		31.0			14.0	26.7			31.1	
Approach LOS		C			B	C			C	

Intersection Summary			
HCM 2000 Control Delay	29.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	84.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	51	303	276	49	155	105	14	231	55	466
Ideal Flow (vphpl)	1400	1400	1400	1400	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.88		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.98		0.94		0.85		1.00	1.00
Flt Protected		0.95	0.99		1.00		1.00		0.95	1.00
Satd. Flow (prot)		1700	2621		2297		1161		1327	2547
Flt Permitted		0.95	0.99		1.00		1.00		0.44	0.91
Satd. Flow (perm)		1700	2621		2297		1161		621	2321
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	63	374	341	60	191	130	17	285	68	575
RTOR Reduction (vph)	0	0	19	0	1	0	12	0	0	0
Lane Group Flow (vph)	0	332	487	0	322	0	3	0	292	636
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	8	0	5	0	0	0	0	5
Parking (#/hr)		10	10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		18.5	18.5		16.0		16.0		31.0	31.0
Effective Green, g (s)		18.5	21.0		17.5		16.0		32.5	32.5
Actuated g/C Ratio		0.25	0.28		0.23		0.21		0.43	0.43
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		419	733		535		247		386	1043
v/s Ratio Prot		c0.20	0.19		0.14				c0.13	0.10
v/s Ratio Perm							0.00		c0.20	0.16
v/c Ratio		0.79	0.66		0.60		0.01		0.76	0.61
Uniform Delay, d1		26.5	23.9		25.6		23.3		20.1	16.4
Progression Factor		1.00	1.00		1.00		1.00		0.88	0.89
Incremental Delay, d2		14.2	4.7		5.0		0.1		10.1	2.0
Delay (s)		40.7	28.6		30.6		23.4		27.9	16.7
Level of Service		D	C		C		C		C	B
Approach Delay (s)			33.4		30.3					20.2
Approach LOS			C		C					C

Intersection Summary			
HCM 2000 Control Delay	27.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	2	40	8	4	14	9	325	2	7	73	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.93		1.00	1.00		1.00	0.99	
Flt Protected		0.96	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1550	1350		1464		1272	2541		1540	3033	
Flt Permitted		1.00	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1614	1350		1486		1272	2541		1540	3033	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	10	2	41	8	4	14	9	335	2	7	75	7
RTOR Reduction (vph)	0	0	38	0	13	0	0	1	0	0	5	0
Lane Group Flow (vph)	0	12	3	0	13	0	9	336	0	7	77	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		1.9	1.9		1.9		0.6	9.0		0.6	9.3	
Effective Green, g (s)		1.9	1.9		1.9		0.6	9.0		0.6	9.3	
Actuated g/C Ratio		0.07	0.07		0.07		0.02	0.33		0.02	0.34	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Vehicle Extension (s)		3.0	3.0		3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		111	93		103		27	834		33	1029	
v/s Ratio Prot							0.01	c0.13		0.00	c0.03	
v/s Ratio Perm		0.01	0.00		c0.01							
v/c Ratio		0.11	0.03		0.13		0.33	0.40		0.21	0.08	
Uniform Delay, d1		12.0	11.9		12.0		13.2	7.1		13.2	6.1	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4	0.1		0.6		2.6	0.3		1.2	0.0	
Delay (s)		12.4	12.0		12.5		15.8	7.4		14.3	6.2	
Level of Service		B	B		B		B	A		B	A	
Approach Delay (s)		12.1			12.5			7.7			6.8	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	27.4	Sum of lost time (s)	15.9
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

7: Fourth St. & Channel St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	5	7	2	2	16	5	29	1	45	59	10
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00	1.00	1.00	1.00		1.00	0.97	
Flpb, ped/bikes		0.99			1.00	1.00	0.83	1.00		1.00	1.00	
Frt		0.95			1.00	0.85	1.00	1.00		1.00	0.98	
Flt Protected		0.98			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2372			1413	1230	1148	1438		1377	1379	
Flt Permitted		0.95			1.00	1.00	1.00	1.00		0.95	1.00	
Satd. Flow (perm)		2306			1448	1230	1208	1438		1377	1379	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	8	6	8	2	2	18	6	33	1	52	68	11
RTOR Reduction (vph)	0	8	0	0	0	8	0	1	0	0	3	0
Lane Group Flow (vph)	0	14	0	0	4	10	6	33	0	52	76	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Parking (#/hr)		2										
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		1.1			1.1	20.5	1.2	1.2		19.4	25.6	
Effective Green, g (s)		1.1			1.1	20.5	1.2	1.2		19.4	25.6	
Actuated g/C Ratio		0.03			0.03	0.56	0.03	0.03		0.53	0.70	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	2.0	3.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		69			43	854	39	47		727	961	
v/s Ratio Prot						0.01		c0.02		0.04	c0.05	
v/s Ratio Perm		c0.01			0.00	0.00	0.00					
v/c Ratio		0.21			0.09	0.01	0.15	0.70		0.07	0.08	
Uniform Delay, d1		17.4			17.3	3.6	17.3	17.6		4.2	1.8	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.5			0.9	0.0	1.8	38.1		0.0	0.0	
Delay (s)		18.9			18.3	3.6	19.1	55.6		4.3	1.8	
Level of Service		B			B	A	B	E		A	A	
Approach Delay (s)		18.9			6.3			50.2			2.8	
Approach LOS		B			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.13		
Actuated Cycle Length (s)	36.7	Sum of lost time (s)	15.0
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

8: Seventh St. & Mission Bay St.

4/22/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	20	90	188	25	40	79
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1744	1535	846	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1744	1535	846	1134	1194
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	23	103	216	29	46	91
RTOR Reduction (vph)	0	91	0	17	0	0
Lane Group Flow (vph)	23	12	216	12	46	91
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	5.8	5.8	25.8	20.8	4.7	35.5
Effective Green, g (s)	5.8	5.8	25.8	20.8	4.7	35.5
Actuated g/C Ratio	0.11	0.11	0.50	0.41	0.09	0.69
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	128	197	771	425	103	826
v/s Ratio Prot	c0.02		c0.14	0.01	c0.04	0.08
v/s Ratio Perm		0.01		0.01		
v/c Ratio	0.18	0.06	0.28	0.03	0.45	0.11
Uniform Delay, d1	20.6	20.3	7.4	9.2	22.1	2.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.7	0.1	0.2	0.0	3.1	0.1
Delay (s)	21.3	20.4	7.6	9.2	25.1	2.7
Level of Service	C	C	A	A	C	A
Approach Delay (s)	20.6		7.8			10.2
Approach LOS	C		A			B

Intersection Summary			
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	51.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	32.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	3	1	7	67	43	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frpb, ped/bikes	0.98		1.00	1.00	1.00	
Flpb, ped/bikes	0.97		0.98	1.00	1.00	
Frt	0.97		1.00	1.00	0.99	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1598		1672	1531	3120	
Flt Permitted	0.96		0.72	1.00	1.00	
Satd. Flow (perm)	1598		1266	1531	3120	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	4	1	8	80	51	4
RTOR Reduction (vph)	1	0	0	0	1	0
Lane Group Flow (vph)	4	0	8	80	54	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	0.9		21.7	21.7	21.7	
Effective Green, g (s)	0.9		21.7	21.7	21.7	
Actuated g/C Ratio	0.03		0.67	0.67	0.67	
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	44		842	1019	2076	
v/s Ratio Prot	c0.00			c0.05	0.02	
v/s Ratio Perm			0.01			
v/c Ratio	0.09		0.01	0.08	0.03	
Uniform Delay, d1	15.5		1.8	1.9	1.9	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.9		0.0	0.0	0.0	
Delay (s)	16.4		1.8	2.0	1.9	
Level of Service	B		A	A	A	
Approach Delay (s)	16.4			1.9	1.9	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	2.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.08		
Actuated Cycle Length (s)	32.6	Sum of lost time (s)	10.0
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	10	10	287	7	5	226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.87	1.00		1.00	1.00
Flpb, ped/bikes	0.96	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1635	1326	3399		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1635	1326	3399		1711	3421
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	11	11	309	8	5	243
RTOR Reduction (vph)	0	11	1	0	0	0
Lane Group Flow (vph)	11	0	316	0	5	243
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	1.2	1.2	42.3		1.1	48.5
Effective Green, g (s)	1.2	1.2	42.3		1.1	48.5
Actuated g/C Ratio	0.02	0.02	0.71		0.02	0.81
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	32	26	2400		31	2769
v/s Ratio Prot			c0.09		0.00	c0.07
v/s Ratio Perm	c0.01	0.00				
v/c Ratio	0.34	0.01	0.13		0.16	0.09
Uniform Delay, d1	29.0	28.8	2.9		28.9	1.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.3	0.1	0.1		2.4	0.1
Delay (s)	35.3	28.9	3.0		31.4	1.2
Level of Service	D	C	A		C	A
Approach Delay (s)	32.1		3.0			1.8
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	3.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	59.9	Sum of lost time (s)	15.3
Intersection Capacity Utilization	40.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	10	5	5	64	34	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.97	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1521	1344		2873	2769	
Flt Permitted	0.95	1.00		0.93	1.00	
Satd. Flow (perm)	1521	1344		2683	2769	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	12	6	6	75	40	12
RTOR Reduction (vph)	0	6	0	0	10	0
Lane Group Flow (vph)	12	0	0	81	42	0
Confl. Peds. (#/hr)	1	1	25			25
Parking (#/hr)				5	5	
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	0.7	0.7		6.6	6.6	
Effective Green, g (s)	0.7	0.7		6.6	6.6	
Actuated g/C Ratio	0.02	0.02		0.16	0.16	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	25	22		416	430	
v/s Ratio Prot	c0.01				0.02	
v/s Ratio Perm		0.00		c0.03		
v/c Ratio	0.48	0.00		0.19	0.10	
Uniform Delay, d1	20.7	20.6		15.6	15.4	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.8	0.1		0.2	0.1	
Delay (s)	34.5	20.6		15.9	15.5	
Level of Service	C	C		B	B	
Approach Delay (s)	29.9			15.9	15.5	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.06		
Actuated Cycle Length (s)	42.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	22.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	18	1	20	2	2	5	28	4	6	5	16	14
Peak Hour Factor	0.92	0.79	0.79	0.79	0.79	0.92	0.79	0.92	0.79	0.92	0.92	0.92
Hourly flow rate (vph)	20	1	25	3	3	5	35	4	8	5	17	15

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	20	27	3	8	47	23	15
Volume Left (vph)	20	0	3	0	35	5	0
Volume Right (vph)	0	25	0	5	8	0	15
Hadj (s)	0.53	-0.63	0.53	-0.44	0.09	0.15	-0.67
Departure Headway (s)	5.2	4.1	5.3	4.3	4.8	4.8	4.0
Degree Utilization, x	0.03	0.03	0.00	0.01	0.06	0.03	0.02
Capacity (veh/h)	672	854	659	810	739	735	875
Control Delay (s)	7.2	6.0	7.1	6.1	8.1	6.8	5.9
Approach Delay (s)	6.5		6.4		8.1	6.4	
Approach LOS	A		A		A	A	

Intersection Summary			
Delay	7.0		
Level of Service	A		
Intersection Capacity Utilization	31.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	46	29	99	1	37	6	62	242	8	1	163	71
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1280	1365	1128	1291	1365	1116	2515	2578		1296	2454	
Flt Permitted	0.73	1.00	1.00	0.74	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	983	1365	1128	1000	1365	1116	2515	2578		1296	2454	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	52	33	111	1	42	7	70	272	9	1	183	80
RTOR Reduction (vph)	0	0	92	0	0	6	0	3	0	0	59	0
Lane Group Flow (vph)	52	33	19	1	42	1	70	278	0	1	204	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	5.9	5.9	5.9	5.9	5.9	5.9	3.4	11.4		1.0	9.0	
Effective Green, g (s)	5.9	5.9	5.9	5.9	5.9	5.9	3.4	11.4		1.0	9.0	
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.17	0.17	0.10	0.34		0.03	0.26	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	170	236	195	173	236	193	251	864		38	649	
v/s Ratio Prot		0.02			0.03		0.03	c0.11		0.00	c0.08	
v/s Ratio Perm	c0.05		0.02	0.00		0.00						
v/c Ratio	0.31	0.14	0.10	0.01	0.18	0.01	0.28	0.32		0.03	0.31	
Uniform Delay, d1	12.3	11.9	11.8	11.6	12.0	11.6	14.2	8.4		16.0	10.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	0.3	0.2	0.0	0.4	0.0	0.6	0.2		0.3	0.3	
Delay (s)	13.3	12.2	12.0	11.6	12.3	11.6	14.8	8.6		16.3	10.3	
Level of Service	B	B	B	B	B	B	B	A		B	B	
Approach Delay (s)		12.4			12.2			9.9			10.3	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	34.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	155	1	2	155	12	3	5	1	17	1	44
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.87	1.00	1.00		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1255	1621	1663		1493	1356	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.73	1.00		0.75	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1255	1239	1663		1185	1356	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	41	161	1	2	161	12	3	5	1	18	1	46
RTOR Reduction (vph)	0	0	0	0	0	6	0	1	0	0	37	0
Lane Group Flow (vph)	41	161	1	2	161	6	3	5	0	18	10	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	7.4	47.2	47.2	2.4	42.2	42.2	14.9	14.9		14.9	14.9	
Effective Green, g (s)	7.4	47.2	47.2	2.4	42.2	42.2	14.9	14.9		14.9	14.9	
Actuated g/C Ratio	0.09	0.59	0.59	0.03	0.53	0.53	0.19	0.19		0.19	0.19	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	150	1012	860	48	905	666	232	311		222	254	
v/s Ratio Prot	c0.03	c0.09		0.00	c0.09			0.00			0.01	
v/s Ratio Perm			0.00			0.01	0.00			c0.02		
v/c Ratio	0.27	0.16	0.00	0.04	0.18	0.01	0.01	0.02		0.08	0.04	
Uniform Delay, d1	33.5	7.2	6.6	37.4	9.7	8.8	26.3	26.3		26.7	26.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	0.3	0.0	0.4	0.1	0.0	0.0	0.0		0.2	0.1	
Delay (s)	34.5	7.6	6.6	37.8	9.8	8.8	26.3	26.4		26.8	26.5	
Level of Service	C	A	A	D	A	A	C	C		C	C	
Approach Delay (s)		13.0			10.0			26.3			26.6	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	14.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.16		
Actuated Cycle Length (s)	79.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	162	3	5	193	4	11	42	13	21	14	39
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.97	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1045	1540	2967			2989	1074
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.95	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1045	1543	2967			2941	1074
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	16	182	3	6	217	4	12	47	15	24	16	44
RTOR Reduction (vph)	0	0	2	0	0	3	0	13	0	0	0	39
Lane Group Flow (vph)	16	182	1	6	217	1	12	49	0	0	40	5
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	0.8	10.7	10.7	0.6	9.5	9.5	4.2	4.2			3.2	3.2
Effective Green, g (s)	0.8	10.7	10.7	0.6	9.5	9.5	4.2	4.2			3.2	3.2
Actuated g/C Ratio	0.03	0.38	0.38	0.02	0.33	0.33	0.15	0.15			0.11	0.11
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	34	456	517	32	405	348	227	437			330	120
v/s Ratio Prot	c0.01	0.15		0.00	c0.18			c0.02				
v/s Ratio Perm			0.00			0.00	0.01				0.01	0.00
v/c Ratio	0.47	0.40	0.00	0.19	0.54	0.00	0.05	0.11			0.12	0.04
Uniform Delay, d1	13.6	6.5	5.6	13.7	7.7	6.3	10.4	10.5			11.4	11.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	9.9	0.6	0.0	2.8	1.4	0.0	0.1	0.1			0.2	0.1
Delay (s)	23.6	7.1	5.6	16.5	9.1	6.3	10.5	10.6			11.6	11.4
Level of Service	C	A	A	B	A	A	B	B			B	B
Approach Delay (s)		8.4			9.2			10.6			11.5	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	28.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.
4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	149	60	8	185	51	31	91	8	23	40	24
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.92	1.00	1.00	0.96	1.00	0.98	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1324	906		1333	1126	877	1070	957	916	1070	1039	
Flt Permitted	0.43	1.00		0.57	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	596	906		804	1126	877	1070	957	916	1070	1039	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	24	175	71	9	218	60	36	107	9	27	47	28
RTOR Reduction (vph)	0	14	0	0	0	33	0	0	7	0	21	0
Lane Group Flow (vph)	24	232	0	9	218	27	36	107	2	27	54	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	24.8	24.8		24.1	24.1	27.9	3.9	11.9	11.9	3.8	11.8	
Effective Green, g (s)	24.8	24.8		24.1	24.1	27.9	3.9	11.9	11.9	3.8	11.8	
Actuated g/C Ratio	0.41	0.41		0.40	0.40	0.46	0.06	0.20	0.20	0.06	0.19	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	255	368		321	445	473	68	187	178	66	201	
v/s Ratio Prot	0.00	c0.26		0.00	c0.19	0.00	0.03	c0.11		0.03	c0.05	
v/s Ratio Perm	0.04			0.01		0.03			0.00			
v/c Ratio	0.09	0.63		0.03	0.49	0.06	0.53	0.57	0.01	0.41	0.27	
Uniform Delay, d1	11.3	14.4		11.2	13.8	9.2	27.6	22.2	19.8	27.5	20.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	3.4		0.0	0.9	0.1	7.3	4.2	0.0	4.1	0.7	
Delay (s)	11.4	17.8		11.3	14.6	9.2	34.9	26.4	19.8	31.6	21.6	
Level of Service	B	B		B	B	A	C	C	B	C	C	
Approach Delay (s)		17.2			13.4			28.0			24.2	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	18.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	60.9	Sum of lost time (s)	20.0
Intersection Capacity Utilization	42.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	6	39	27	26	54	7	22	24	30	5	24	23
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	8	49	34	32	68	9	28	30	38	6	30	29

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total (vph)	90	33	76	58	38	65
Volume Left (vph)	8	33	0	28	0	6
Volume Right (vph)	34	0	9	0	38	29
Hadj (s)	-0.17	0.53	-0.05	0.27	-0.67	-0.21
Departure Headway (s)	4.9	5.5	4.9	5.3	4.4	4.9
Degree Utilization, x	0.12	0.05	0.10	0.09	0.05	0.09
Capacity (veh/h)	714	624	699	645	776	694
Control Delay (s)	8.5	7.6	7.3	7.6	6.4	8.4
Approach Delay (s)	8.5	7.4		7.2		8.4
Approach LOS	A	A		A		A

Intersection Summary			
Delay	7.8		
Level of Service	A		
Intersection Capacity Utilization	34.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.

4/22/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	46	46	21	18	68	13	16	253	14	12	179	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.97	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.98		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1664	3226		1677	3313		1260	2496		1260	2391	
Flt Permitted	0.69	1.00		0.70	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1215	3226		1244	3313		1260	2496		1260	2391	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	53	53	24	21	78	15	18	291	16	14	206	83
RTOR Reduction (vph)	0	18	0	0	11	0	0	3	0	0	35	0
Lane Group Flow (vph)	53	59	0	21	82	0	18	304	0	14	254	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	22.5	22.5		22.5	22.5		6.5	48.9		2.5	44.9	
Effective Green, g (s)	22.5	22.5		22.5	22.5		6.5	48.9		2.5	44.9	
Actuated g/C Ratio	0.25	0.25		0.25	0.25		0.07	0.55		0.03	0.50	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	305	811		313	833		91	1365		35	1200	
v/s Ratio Prot		0.02			0.02		0.01	c0.12		0.01	c0.11	
v/s Ratio Perm	c0.04			0.02								
v/c Ratio	0.17	0.07		0.07	0.10		0.20	0.22		0.40	0.21	
Uniform Delay, d1	26.2	25.5		25.5	25.7		39.0	10.4		42.7	12.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.0		0.1	0.1		1.1	0.4		7.3	0.1	
Delay (s)	26.4	25.5		25.6	25.7		40.1	10.8		50.1	12.5	
Level of Service	C	C		C	C		D	B		D	B	
Approach Delay (s)		25.9			25.7			12.4			14.2	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	89.4	Sum of lost time (s)	15.5
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	136	11	2	151	1	13	0	1	2	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00			0.99		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3383		1711	3418			1705		1711	1621	
Flt Permitted	0.75	1.00		0.75	1.00			0.85		0.75	1.00	
Satd. Flow (perm)	1359	3383		1359	3418			1512		1346	1621	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	148	12	2	164	1	14	0	1	2	1	2
RTOR Reduction (vph)	0	10	0	0	1	0	0	8	0	0	1	0
Lane Group Flow (vph)	2	150	0	2	164	0	0	7	0	2	2	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	5.3	5.3		5.3	5.3			12.8		12.8	12.8	
Effective Green, g (s)	5.3	5.3		5.3	5.3			12.8		12.8	12.8	
Actuated g/C Ratio	0.19	0.19		0.19	0.19			0.46		0.46	0.46	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	256	638		256	644			688		613	738	
v/s Ratio Prot		0.04			c0.05						0.00	
v/s Ratio Perm	0.00			0.00				c0.00		0.00		
v/c Ratio	0.01	0.24		0.01	0.25			0.01		0.00	0.00	
Uniform Delay, d1	9.3	9.7		9.3	9.7			4.2		4.2	4.2	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.2		0.0	0.2			0.0		0.0	0.0	
Delay (s)	9.3	9.9		9.3	9.9			4.2		4.2	4.2	
Level of Service	A	A		A	A			A		A	A	
Approach Delay (s)		9.9			9.9			4.2			4.2	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.08		
Actuated Cycle Length (s)	28.1	Sum of lost time (s)	10.0
Intersection Capacity Utilization	20.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	85	0	0	221	2	155	43	72	0	0	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frt		1.00			1.00		1.00	0.91				0.85
Flt Protected		1.00			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3420			5126		1711	3101				2694
Flt Permitted		0.95			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3265			5126		1711	3101				2694
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	1	106	0	0	276	2	194	54	90	0	0	31
RTOR Reduction (vph)	0	0	0	0	1	0	0	53	0	0	0	29
Lane Group Flow (vph)	0	107	0	0	277	0	194	91	0	0	0	2
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		35.5			26.5		31.0	31.0				4.0
Effective Green, g (s)		35.5			26.5		31.0	31.0				4.0
Actuated g/C Ratio		0.47			0.35		0.41	0.41				0.05
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1533			1787		697	1264				141
v/s Ratio Prot		c0.00			c0.05		c0.11	0.03				0.00
v/s Ratio Perm		0.03										
v/c Ratio		0.07			0.15		0.28	0.07				0.01
Uniform Delay, d1		11.2			17.0		15.0	13.7				34.1
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			0.2		1.0	0.1				0.1
Delay (s)		11.2			17.2		16.0	13.8				34.3
Level of Service		B			B		B	B				C
Approach Delay (s)		11.2			17.2			15.1			34.3	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	32.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	86	169	162	239	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.95	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1609	1428	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1609	1428	3319	1801		
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	105	206	198	291	0	0
RTOR Reduction (vph)	18	47	0	0	0	0
Lane Group Flow (vph)	145	101	198	291	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	41.1	41.1	8.9	60.0		
Effective Green, g (s)	41.1	41.1	8.9	60.0		
Actuated g/C Ratio	0.69	0.69	0.15	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	1102	978	492	1801		
v/s Ratio Prot	0.09		c0.06	c0.16		
v/s Ratio Perm		0.07				
v/c Ratio	0.13	0.10	0.40	0.16		
Uniform Delay, d1	3.3	3.2	23.1	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.1	0.0	0.5	0.0		
Delay (s)	3.3	3.3	23.7	0.0		
Level of Service	A	A	C	A		
Approach Delay (s)	3.3			9.6	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	7.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	22.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	33	105	2	25	0	85	169	0	6	160	54
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.94		1.00	1.00		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	0.98	1.00		0.95	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	1.00		1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1189	1903		1160	1279		1215	2431		1215	2297	
Flt Permitted	0.40	1.00		0.83	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	496	1903		1017	1279		1215	2431		1215	2297	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	56	37	118	2	28	0	96	190	0	7	180	61
RTOR Reduction (vph)	0	87	0	0	0	0	0	0	0	0	25	0
Lane Group Flow (vph)	56	68	0	2	28	0	96	190	0	7	216	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	15.0	15.0		4.8	4.8		6.0	23.4		2.2	19.6	
Effective Green, g (s)	15.0	15.0		4.8	4.8		6.0	23.4		2.2	19.6	
Actuated g/C Ratio	0.26	0.26		0.08	0.08		0.11	0.41		0.04	0.34	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	190	501		85	107		128	999		46	791	
v/s Ratio Prot	c0.03	0.04			0.02		c0.08	0.08		0.01	c0.09	
v/s Ratio Perm	c0.05			0.00								
v/c Ratio	0.29	0.14		0.02	0.26		0.75	0.19		0.15	0.27	
Uniform Delay, d1	16.5	16.0		23.9	24.4		24.7	10.7		26.4	13.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	0.1		0.1	1.3		21.6	0.1		1.5	0.2	
Delay (s)	17.3	16.1		24.0	25.7		46.3	10.8		28.0	13.7	
Level of Service	B	B		C	C		D	B		C	B	
Approach Delay (s)		16.4			25.6			22.7			14.1	
Approach LOS		B			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	56.9	Sum of lost time (s)	21.6
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

NO PROJECT ALTERNATIVE
TRAFFIC CONTRIBUTIONS TO LOS E OR LOS F

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: No Project Alternative, Weekday PM Peak Hour, No Giants

Intersection	Critical Movement Operating at E or F	Project Contribution	Total Volumes	% Project Contribution	Impact ?
1: King / Third	EBL	0	889	0.0%	No
3: King / Fifth / I-280 Ramps	EBT	0	1689	0.0%	No
5: Fifth / Bryant / I-80 EB on-ramp	NBT/R	0	700	0.0%	No
	SBL/L2	0	384	0.0%	No
	EBT/R	0	613	0.0%	No
16: 7th / Mississippi / 16th	NBT	0	357	0.0%	No
	SBL	**10**	**85**	**11.8%**	**Yes**
	WBT	**73**	**469**	**15.6%**	**Yes**
	EBT/R	**27**	**425**	**6.3%**	**Yes**

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: No Project Alternative, Saturday Evening, No Giants

No E → E or F→F intersections.

PROJECT ALTERNATIVES: 2040 CUMULATIVE PLUS ALTERNATIVE

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: No Project Alternative, Weekday PM Peak Hour, No Giants

Intersection	Critical Movement Operating at E or F	Project Contribution	2040 Total Volumes[1]	% Project Contribution	Impact?
1: King / Third	NBR	17	481	3.5%	No
	EBL	0	924	0.0%	No
	WBT/R	0	984	0.0%	No
2: King / Fourth	SBT	5	625	0.8%	No
	EBL	0	346	0.0%	No
	WBT/R	0	986	0.0%	No
4: Fifth / Harrison / I-80 WB off-ramp	SBT	0	810	0.0%	No
	SBR	0	340	0.0%	No
	NWL2 / L	5	1707	0.3%	No
5: Fifth / Bryant / I-80 EB on-ramp	NBT	0	565	0.0%	No
	NBR	0	140	0.0%	No
	SBT	2	956	0.2%	No
	EBT/R	0	1160	0.0%	No
6: Third / Channel	NBL	0	39	0.0%	No
	NBT/R	42	1563	2.7%	No
	SBL	0	58	0.0%	No
15: Owens / 16th	NBL	0	138	0.0%	No
	EBL	0	137	0.0%	No
	WBT	**107**	**831**	**12.9%**	**Yes**
16: 7th / Mississippi / 16th	NBT	0	329	0.0%	No
	SBL	**10**	**162**	**6.2%**	**Yes**
	EBT/R	27	637	4.2%	No
18: Third / Mariposa	NBT/R	18	1257	1.4%	No
	EBL	0	205	0.0%	No
22: Third / Cesar Chavez	SBL	0	110	0.0%	No
	SBT/R	42	1200	3.5%	No
	EBL	4	227	1.8%	No

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: No Project Alternative, Saturday Evening, No Giants

Intersection	Critical Movement Operating at E or F	Project Contribution	2040 Total Volumes[1]	% Project Contribution	Impact?
4: Fifth / Harrison / I-80 WB off-ramp	SBT/R	0	840	0.0%	No
	NWR	0	455	0.0%	No

EXISTING PLUS NO PROJECT ALTERNATIVE FREEWAY MERGE AND DIVERGE LOS

HCM 2000
Merge Ramp Junctions
Capacity Analysis

Jurisdiction San Francisco   Agency or Company Fehr & Peers
Analysis Year Alternative - No Project   Date 2/1/2015
Analyst DW   Project Description GSW - based on Central SoMa and Seawall Lot analysis

General Information				*Freeway Data*			*Freeway Volume Adjustment*									Effective	*On-Ramp Data*							
	Freeway/ Direction	On-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Flow Rate v_p (pcph)	Type	Lanes	Lane Add?	S_{FR} (mph)	V_R (vph)	Accel Lane (ft) L_{A1}	L_{A2}	L_{Aeff}
Existing																								
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	3	60.0	7,673	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	8,549	8,549	Left	1	No	60.0	1,124	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkend	3	60.0	5,018	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	5,590	5,590	Left	1	No	60.0	639	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	5	60.0	8,797	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	9,801	7,301	Right	1	No	45.0	1,106	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkend	5	60.0	5,657	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,302	4,790	Right	1	No	45.0	353	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
M3	I-280 SB	Mariposa on-ramp	Wkday PM	3	60.0	3,625	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,039	4,039	Right	1	No	45.0	1,370	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Eve	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Late	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkend	3	60.0	1,370	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	1,526	1,526	Right	1	No	45.0	331	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	480	0	480
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	3	60.0	4,480	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	4,991	4,991	Right	1	No	45.0	1,130	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Eve	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Late	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkend	3	60.0	1,476	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	1,644	1,644	Right	1	No	45.0	239	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350

HCM 2000
Merge Ramp Junctions
Capacity Analysis

Juri
Analy:

	General Information			*On-Ramp Volume Adjustment*									*Adjacent Upstream Ramp Data*											
	Freeway/ Direction	On-ramp	Analysis Time Period	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
Existing																								
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,252	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	712	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,232	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	393	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
M3	I-280 SB	Mariposa on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,526	No											
	I-280 SB	Mariposa on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	369	No											
	I-280 SB	Mariposa on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	1,259	No											
	I-280 SB	Penn/25th on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	266	No											
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											

HCM 2000 Juri
Merge Ramp Junctions Analy:
Capacity Analysis

General Information				*Adjacent Downstream Ramp Data*												*v_{12} Estimation*						
	Freeway/ Direction	On-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	L_{EQ} 25-2	L_{EQ} 25-3	P_{FM} Equations 1	2	3	P_{FM}	v_{12} (pcph)
Existing																						
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	No														0.597			0.597	5,717
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkend	No														0.597			0.597	3,739
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	No														0.597			0.597	0
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	No														0.585			0.126	918
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkend	No														0.585			0.231	1,104
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	No														0.585			0.280	0
M3	I-280 SB	Mariposa on-ramp	Wkday PM	No														0.591			0.591	2,387
	I-280 SB	Mariposa on-ramp	Wkday Eve	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Late	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkend	No														0.591			0.591	902
	I-280 SB	Mariposa on-ramp	Wkday PM w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Late w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkend w/	No														0.591			0.591	0
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	No														0.587			0.587	2,931
	I-280 SB	Penn/25th on-ramp	Wkday Eve	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Late	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkend	No														0.587			0.587	966
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkend w/	No														0.587			0.587	0

HCM 2000
Merge Ramp Junctions
Capacity Analysis

Juri
Analy:

General Information				*Capacity Checks*																*Results*	
	Freeway/ Direction	On-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	v_{R12a} (pcph)	Max v_{R12a} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?	Density, D (pcplpm)	Level of Service
Existing																					
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	8,549	6,900	**Yes**	9,801	6,900	**Yes**	2,832	Yes	No	5,849	7,101	4,600	**Yes**	1,252	2,200	No	**-**	**F**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkend	5,590	6,900	No	6,302	6,900	No	1,852	No	No	3,739	4,451	4,600	No	712	2,200	No	**35.5**	**E**
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	7,301	11,500	No	8,533	11,500	No	3,192	Yes	Yes	2,920	4,153	4,600	No	1,232	2,100	No	**35.7**	**E**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkend	4,790	11,500	No	5,183	11,500	No	1,843	No	Yes	1,916	2,309	4,600	No	393	2,100	No	**21.7**	**C**
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
M3	I-280 SB	Mariposa on-ramp	Wkday PM	4,039	6,900	No	5,565	6,900	No	1,652	No	No	2,387	3,913	4,600	No	1,526	2,100	No	**32.3**	**D**
	I-280 SB	Mariposa on-ramp	Wkday Eve	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Late	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkend	1,526	6,900	No	1,895	6,900	No	624	No	No	902	1,271	4,600	No	369	2,100	No	**12.2**	**B**
	I-280 SB	Mariposa on-ramp	Wkday PM w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Late w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkend w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	4,991	7,050	No	6,250	7,050	No	2,060	No	No	2,931	4,190	4,600	No	1,259	2,100	No	**35.4**	**E**
	I-280 SB	Penn/25th on-ramp	Wkday Eve	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Late	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkend	1,644	7,050	No	1,911	7,050	No	679	No	No	966	1,232	4,600	No	266	2,100	No	**12.8**	**B**
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkend w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Jurisdiction San Francisco
Agency or Company Fehr & Peers
Analysis Year Alternative - No Project
Date 2/1/2015
Analyst DW
Project Description GSW - based on Central SoMa and Seawall Lot analysis

	General Information			*Freeway Data*			*Freeway Volume Adjustment*									Effective	*Off-Ramp Data*							
	Freeway/ Direction	Off-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Flow Rate v_p (pcph)	Type	Lanes	Lane Drop?	S_{FR} (mph)	V_R (vph)	Decel Lane (ft) L_{D1}	L_{D2}	L_{Deff}
Existing																								
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	4	60	6,358	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,084	7,084	Left	2	Yes	45.0	1,185	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkend	4	60	5,579	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,216	6,216	Left	2	Yes	45.0	840	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
D2	I-280 NB	Mariposa off-ramp	Wkday PM	4	60	4,431	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,937	4,937	Right	1	Yes	45.0	701	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Eve	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Late	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkend	4	60	2,638	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	2,939	2,939	Right	1	Yes	45.0	270	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday PM w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Late w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkend w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Juri
Analy:

General Information				Off-Ramp Volume Adjustment									Adjacent Upstream Ramp Data												
	Freeway/ Direction	Off-ramp	Analysis Time Period	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
Existing																								
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,320	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	936	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
D2	I-280 NB	Mariposa off-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	781	No											
	I-280 NB	Mariposa off-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	301	No											
	I-280 NB	Mariposa off-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Juri
Analy:

General Information | *Adjacent Downstream Ramp Data* | *v_{12} Estimation*

	Freeway/ Direction	Off-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	L_{EQ} 25-13	L_{EQ} 25-14	P_{FD} Equations 5	6	7	P_{FD}	v_{12} (pcph)
Existing																						
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	No														0.522			0.260	3,101
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkend	No														0.562			0.260	2,540
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	No														0.760			0.260	0
D2	I-280 NB	Mariposa off-ramp	Wkday PM	No														0.601			0.436	2,593
	I-280 NB	Mariposa off-ramp	Wkday Eve	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Late	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkend	No														0.673			0.436	1,451
	I-280 NB	Mariposa off-ramp	Wkday PM w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Late w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkend w/	No														0.760			0.436	0

General Information				*Capacity Checks*															*Results*	
	Freeway/ Direction	Off-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	Max v_{12} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?	Density, D (pcplpm)	Level of Service
Existing																				
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	7,084	9,200	No	1,992	No	No	3,101	4,400	No	5,763	6,900	No	1,320	4,100	No	**30.0**	**D**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkend	6,216	9,200	No	1,838	No	No	2,540	4,400	No	5,280	6,900	No	936	4,100	No	**25.2**	**C**
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
D2	I-280 NB	Mariposa off-ramp	Wkday PM	4,937	9,200	No	1,172	No	No	2,593	4,400	No	4,156	6,900	No	781	2,100	No	**26.1**	**C**
	I-280 NB	Mariposa off-ramp	Wkday Eve	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Late	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkend	2,939	9,200	No	744	No	No	1,451	4,400	No	2,638	6,900	No	301	2,100	No	**16.3**	**B**
	I-280 NB	Mariposa off-ramp	Wkday PM w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Late w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkend w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**

EXISTING PLUS NO PROJECT ALTERNATIVE TRANSIT ANALYSIS

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32
TRANSIT CAPACITY UTILIZATION ANALYSIS - EXISTING PLUS NO PROJECT

ORIGIN / DESTINATION SERVICE PROVIDER	Weekday PM No Project (outbound from site) Existing Ridership	Project Trips	Existing + Project	Capacity	Percent Utilization
San Francisco					
T Third	1,945	655	2,600	3,808	68.3%
22 Fillmore	545	182	727	942	77.2%
SF Total	**2,490**	**837**	**3,327**	**4,750**	**70.0%**
		3,327			
East Bay					
BART	19,972	258	20,230	21,220	95.3%
AC Transit	2,275	30	2,305	3,926	58.7%
Ferries	805	11	816	1,615	50.5%
Subtotal	**23,052**	**299**	**23,351**	26,761	87.3%
North Bay					
Buses	1,389	15	1,404	2,817	49.8%
Ferries	968	10	978	1,959	49.9%
Subtotal	**2,357**	**25**	**2,382**	4,776	49.9%
South Bay					
BART	8,698	32	8,730	16,963	51.5%
Caltrain	2,405	96	2,501	3,100	80.7%
SamTrans	146	1	147	320	45.9%
Ferrries	0	0	0	0	0.0%
Subtotal	**11,249**	**129**	**11,378**	20,383	55.8%
Regional Total	**36,658**	**453**	**37,111**	**51,920**	71.5%

GSW Transit Analysis 4-24-15 ver 2 NO PROJECT.xlsx

No Project at Mission Bay Blocks 29-32 (1,056 ksf office + 31.7 kgsf retail)
PERSON TRANSIT TRIP SUMMARY - ALL LAND USES COMBINED

ORIGIN / DESTINATION SERVICE PROVIDER	WEEKDAY No Event PM Peak Hour (1 hr bet. 4 & 6 PM) In	Out	Total	SATURDAY No Event Evening Peak Hour (1 hr bet. 7 & 9 PM) In	Out	Total
Superdistrict 1	6	72	78	1	4	5
Superdistrict 2	5	92	97	1	5	6
Superdistrict 3	21	174	195	4	10	15
Superdistrict 4	2	67	69	0	3	3
East Bay	4	299	304	0	12	13
North Bay	0	25	25	0	1	1
South Bay	2	129	130	1	6	6
Out of Region	2	27	29	1	2	2
Total	**42**	**885**	**927**	**8**	**43**	**51**
SF Muni (incl. transfers)						
San Francisco	34	405	439	7	22	29
East Bay	4	299	304	0	12	13
North Bay	0	25	25	0	1	1
South Bay (except Caltrain)	0	33	34	0	1	2
Out of Region	2	27	29	1	2	2
Subtotal	**41**	**789**	**830**	**8**	**38**	**46**

GS Warriors Trip Gen 2015 01 20 v7 - TRANSIT SUMMARIES.xlsx

REDUCED DEVELOPMENT ALTERNATIVE
TRAVEL DEMAND ANALYSIS

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

REDUCED-REDUCED ALTERNATIVE (40% reduction across all uses) - WEEKDAY DAILY AND PM PEAK HOUR BETWEEN 4 AND 6 PM
SUMMARY OF TRIPS WITH NO EVENT

Land Use	Intensity	
Arena	0	attendees
	105	employees
Retail	37,500	gsf
Quick Service Rest.	6,600	gsf
Sit-down Restaurant	30,900	gsf
XXX	0	xxx
XXX	0	xxx
Office	373,000	gsf

Person-trips by Mode	Daily Trips: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	71	2,379	754	2,286	0	0	3,081	8,571	52%
Transit	162	562	336	895	0	0	2,311	4,265	26%
Taxi/Coach (Event)								0	0%
Bike (Event)								0	0%
Walk	21	828	224	678	0	0	911	2,661	16%
Other	9	74	113	343	0	0	449	988	6%
Total	**263**	**3,843**	**1,426**	**4,202**	**0**	**0**	**6,751**	**16,485**	**100%**
	2%	**23%**	**9%**	**25%**	**0%**	**0%**	**41%**	**100%**	
Vehicle Trips	55	1,270	344	1,022	0	0	1,567	4,258	
	1%	30%	8%	24%	0%	0%	37%	100%	
Avg. veh. occupancy	*1.30*	*1.87*	*2.19*	*2.24*	*0.00*	*0.00*	*1.97*	*2.01*	

Person-trips by Mode	PM Peak Hour Trips: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	6	214	102	309	0	0	183	814	48%
Transit	14	51	45	121	0	0	312	543	32%
Taxi/Coach (Event)								0	0%
Bike (Event)								0	0%
Walk	2	75	30	92	0	0	54	252	15%
Other	1	7	15	46	0	0	25	94	5%
Total	**22**	**346**	**192**	**567**	**0**	**0**	**574**	**1,702**	**100%**
	1%	**20%**	**11%**	**33%**	**0%**	**0%**	**34%**	**100%**	
Vehicle Trips	5	114	46	138	0	0	123	427	
	1%	27%	11%	32%	0%	0%	29%	100%	
Avg. veh. occupancy	*1.30*	*1.87*	*2.19*	*2.24*	*0.00*	*0.00*	*1.49*	*1.91*	

Person-trips by Mode	Percent of Daily during PM Peak Hour: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Auto	8.5%	9.0%	13.5%	13.5%	0.0%	0.0%	6.0%	9.5%
Transit	8.5%	9.0%	13.5%	13.5%	0.0%	0.0%	13.5%	12.7%
Taxi/Coach (Event)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bike (Event)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Walk	8.5%	9.0%	13.5%	13.5%	0.0%	0.0%	5.9%	9.5%
Other	8.5%	9.0%	13.5%	13.5%	0.0%	0.0%	5.5%	9.5%
Total	**8.5%**	**9.0%**	**13.5%**	**13.5%**	**0.0%**	**0.0%**	**8.5%**	**10.3%**
Vehicle Trips	8.5%	9.0%	13.5%	13.5%	0.0%	0.0%	7.9%	10.0%

Weekday Distribution	Total Daily Person-trips	PM Peak Hour Person-Trips: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	1,715	2	21	24	72	0	0	50	168
Superdistrict 2	1,990	2	31	26	78	0	0	61	198
Superdistrict 3	7,147	5	203	80	242	0	0	149	680
Superdistrict 4	1,094	2	18	14	40	0	0	42	115
East Bay	1,889	6	15	21	57	0	0	141	241
North Bay	285	1	7	2	7	0	0	18	35
South Bay	1,814	4	33	19	54	0	0	99	210
Out of Region	550	1	17	6	17	0	0	15	55
Total	**16,485**	**22**	**346**	**192**	**567**	**0**	**0**	**574**	**1,702**

Weekday Distribution	PM Peak Hour Transit-Trips: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	1	7	5	15	0	0	26	54
Superdistrict 2	1	6	5	13	0	0	32	57
Superdistrict 3	2	21	19	54	0	0	63	159
Superdistrict 4	1	3	3	8	0	0	24	38
East Bay	5	6	9	22	0	0	106	147
North Bay	0	1	0	1	0	0	9	11
South Bay	2	5	3	5	0	0	45	59
Out of Region	0	3	1	4	0	0	9	18
Total	**14**	**51**	**45**	**121**	**0**	**0**	**312**	**543**

Weekday Distribution	PM Peak Hour Vehicle-Trips: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total		Avg. Veh. Occ.
Superdistrict 1	0	5	4	13	0	0	6	28	7%	1.87
Superdistrict 2	0	12	9	27	0	0	13	61	14%	1.77
Superdistrict 3	1	60	14	43	0	0	25	143	33%	2.10
Superdistrict 4	0	8	4	11	0	0	9	32	7%	2.04
East Bay	1	5	5	14	0	0	19	43	10%	2.06
North Bay	0	4	0	1	0	0	5	11	3%	2.00
South Bay	2	14	8	23	0	0	44	91	21%	1.63
Out of Region	0	6	2	7	0	0	3	18	4%	1.67
Total	**5**	**114**	**46**	**138**	**0**	**0**	**123**	**427**	**100%**	**1.91**

Assumptions for PM Peak Hour bet. 4 PM & 6 PM	Arena		Retail		Q.S. Rest.		Sit-down Rest.		XXX		XXX		Office	
	Empl.	Attend.	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work
Inbound	0%	50%	0%	50%	0%	50%	0%	50%	100%	100%	100%	55%	0%	50%
Outbound	100%	50%	100%	50%	100%	50%	100%	50%	0%	0%	0%	45%	100%	50%

PM Peak Hour bet. 4 PM & 6 PM	Inbound: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	0	163	86	267	0	0	49	564
	0%	47%	44%	47%	0%	0%	9%	33%
Transit Trips	0	19	16	50	0	0	9	94
	0%	38%	35%	41%	0%	0%	3%	17%
Vehicle Trips	0	55	21	66	0	0	12	154
	0%	48%	45%	47%	0%	0%	10%	36%

PM Peak Hour bet. 4 PM & 6 PM	Outbound: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	22	183	107	300	0	0	525	1,138
	100%	53%	56%	53%	0%	0%	92%	67%
Transit Trips	14	32	29	71	0	0	303	448
	100%	62%	65%	59%	0%	0%	97%	83%
Vehicle Trips	5	59	25	72	0	0	111	273
	100%	52%	55%	53%	0%	0%	90%	64%

PM Peak Hour bet. 4 PM & 6 PM	Total: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	22	346	192	567	0	0	574	1,702
Transit Trips	14	51	45	121	0	0	312	543
Vehicle Trips	5	114	46	138	0	0	123	427

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Inbound: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	4	4	12	0	0	2	23
Superdistrict 2	0	9	8	26	0	0	5	48
Superdistrict 3	0	60	16	51	0	0	9	137
Superdistrict 4	0	7	4	13	0	0	2	26
East Bay	0	4	5	16	0	0	3	28
North Bay	0	3	1	3	0	0	0	7
South Bay	0	13	7	23	0	0	4	47
Out of Region	0	5	2	6	0	0	1	14
Total	**0**	**104**	**48**	**150**	**0**	**0**	**27**	**329**

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Outbound: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	5	4	13	0	0	7	29
Superdistrict 2	0	9	9	26	0	0	15	60
Superdistrict 3	1	61	17	53	0	0	31	163
Superdistrict 4	1	7	5	13	0	0	13	39
East Bay	1	5	6	18	0	0	29	60
North Bay	0	3	1	3	0	0	8	16
South Bay	2	15	9	26	0	0	49	101
Out of Region	0	5	2	6	0	0	4	17
Total	**6**	**110**	**54**	**159**	**0**	**0**	**156**	**484**

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Total: Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	9	8	25	0	0	9	52
Superdistrict 2	0	19	17	52	0	0	20	108
Superdistrict 3	1	121	34	104	0	0	40	300
Superdistrict 4	1	14	9	26	0	0	15	65
East Bay	1	8	12	35	0	0	32	89
North Bay	0	6	2	6	0	0	8	23
South Bay	2	27	17	49	0	0	53	148
Out of Region	0	10	4	12	0	0	5	31
Total	**6**	**214**	**102**	**309**	**0**	**0**	**183**	**814**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

REDUCED-REDUCED ALTERNATIVE (40% reduction across all uses) - WEEKDAY DAILY AND PM PEAK HOUR BETWEEN 4 AND 6 PM

SUMMARY OF TRIPS WITH NO EVENT

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Transit Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	3	2	7	0	0	1	13	1	4	3	8	0	0	24	41	1	7	5	15	0	0	26	54
Superdistrict 2	0	2	2	5	0	0	1	10	1	4	3	8	0	0	31	47	1	6	5	13	0	0	32	57
Superdistrict 3	0	9	8	25	0	0	5	47	2	12	10	29	0	0	58	112	2	21	19	54	0	0	63	159
Superdistrict 4	0	1	1	3	0	0	1	5	1	2	2	5	0	0	23	32	1	3	3	8	0	0	24	38
East Bay	0	1	2	7	0	0	1	11	5	5	7	14	0	0	104	135	5	6	9	22	0	0	106	147
North Bay	0	0	0	0	0	0	0	0	0	1	0	1	0	0	9	11	0	1	0	1	0	0	9	11
South Bay	0	1	0	1	0	0	0	3	2	3	2	4	0	0	45	56	2	5	3	5	0	0	45	59
Out of Region	0	1	1	2	0	0	0	4	0	2	1	2	0	0	9	14	0	3	1	4	0	0	9	18
Total	**0**	**19**	**16**	**50**	**0**	**0**	**9**	**94**	**14**	**32**	**29**	**71**	**0**	**0**	**303**	**448**	**14**	**51**	**45**	**121**	**0**	**0**	**312**	**543**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Bike (Event)	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1								0								0	0	0	0	0	0	0	0	0
Superdistrict 2								0								0	0	0	0	0	0	0	0	0
Superdistrict 3								0								0	0	0	0	0	0	0	0	0
Superdistrict 4								0								0	0	0	0	0	0	0	0	0
East Bay								0								0	0	0	0	0	0	0	0	0
North Bay								0								0	0	0	0	0	0	0	0	0
South Bay								0								0	0	0	0	0	0	0	0	0
Out of Region								0								0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Taxi/Walk/Other	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	3	5	16	0	0	3	26	0	3	5	16	0	0	12	37	0	5	10	32	0	0	15	63
Superdistrict 2	0	3	2	6	0	0	1	13	0	4	2	7	0	0	8	21	0	7	4	13	0	0	9	33
Superdistrict 3	0	30	13	41	0	0	7	91	1	31	15	43	0	0	39	129	1	61	28	84	0	0	47	221
Superdistrict 4	0	0	1	3	0	0	1	5	0	1	1	3	0	0	2	7	0	1	2	6	0	0	3	12
East Bay	0	1	0	0	0	0	0	1	0	1	0	1	0	0	3	4	0	1	0	1	0	0	3	6
North Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1
South Bay	0	1	0	0	0	0	0	1	0	1	0	0	0	0	1	2	0	1	0	1	0	0	1	4
Out of Region	0	2	0	0	0	0	0	3	0	2	0	0	0	0	1	3	0	4	0	1	0	0	1	6
Total	**0**	**39**	**21**	**67**	**0**	**0**	**12**	**140**	**3**	**42**	**24**	**71**	**0**	**0**	**66**	**205**	**3**	**81**	**45**	**138**	**0**	**0**	**78**	**345**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Total Person Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	10	11	35	0	0	6	62	2	11	13	37	0	0	43	106	2	21	24	72	0	0	50	168
Superdistrict 2	0	15	12	37	0	0	7	71	2	17	14	41	0	0	54	128	2	31	26	78	0	0	61	198
Superdistrict 3	0	99	38	117	0	0	21	276	5	104	42	125	0	0	128	404	5	203	80	242	0	0	149	680
Superdistrict 4	0	8	6	19	0	0	3	36	2	10	8	21	0	0	39	79	2	18	14	40	0	0	42	115
East Bay	0	5	8	24	0	0	4	41	6	10	14	33	0	0	136	200	6	15	21	57	0	0	141	241
North Bay	0	3	1	3	0	0	0	7	1	4	2	4	0	0	17	27	1	7	2	7	0	0	18	35
South Bay	0	15	8	24	0	0	4	51	4	18	12	30	0	0	95	159	4	33	19	54	0	0	99	210
Out of Region	0	8	3	8	0	0	1	20	1	9	3	9	0	0	13	35	1	17	6	17	0	0	15	55
Total	**0**	**163**	**86**	**267**	**0**	**0**	**49**	**564**	**22**	**183**	**107**	**300**	**0**	**0**	**525**	**1,138**	**22**	**346**	**192**	**567**	**0**	**0**	**574**	**1,702**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total							
Vehicle-Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	2	2	6	0	0	1	12	0	3	2	6	0	0	5	16	0	5	4	13	0	0	6	28
Superdistrict 2	0	6	4	13	0	0	2	26	0	6	5	14	0	0	11	35	0	12	9	27	0	0	13	61
Superdistrict 3	0	29	7	21	0	0	4	61	1	30	8	22	0	0	21	82	1	60	14	43	0	0	25	143
Superdistrict 4	0	4	2	5	0	0	1	11	0	4	2	6	0	0	8	20	0	8	4	11	0	0	9	32
East Bay	0	2	2	6	0	0	1	12	1	3	3	7	0	0	18	31	1	5	5	14	0	0	19	43
North Bay	0	2	0	0	0	0	0	3	0	2	0	1	0	0	5	9	0	4	0	1	0	0	5	11
South Bay	0	6	3	10	0	0	2	21	2	8	5	13	0	0	42	69	2	14	8	23	0	0	44	91
Out of Region	0	3	1	4	0	0	1	8	0	3	1	4	0	0	2	10	0	6	2	7	0	0	3	18
Total	**0**	**55**	**21**	**66**	**0**	**0**	**12**	**154**	**5**	**59**	**25**	**72**	**0**	**0**	**111**	**273**	**5**	**114**	**46**	**138**	**0**	**0**	**123**	**427**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

REDUCED-REDUCED ALTERNATIVE (40% reduction across all uses) - SATURDAY DAILY AND EVENING PEAK HOUR BETWEEN 7 AND 9 PM

SUMMARY OF TRIPS WITH NO EVENT

Land Use	Intensity
Arena	0 attendees
	105 employees
Retail	37,500 gsf
Quick Service Rest.	6,600 gsf
Sit-down Restaurant	30,900 gsf
XXX	0 xxx
XXX	0 xxx
Office	373,000 gsf

Daily Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	71	2,784	939	2,847	0	0	407	7,048	53%
Transit	162	657	418	1,114	0	0	929	3,281	25%
Taxi/Coach (Event)								0	0%
Bike (Event)								0	0%
Walk	21	969	278	845	0	0	118	2,231	17%
Other	9	87	140	428	0	0	51	715	5%
Total	**263**	**4,497**	**1,776**	**5,234**	**0**	**0**	**1,506**	**13,275**	**100%**
	2%	**34%**	**13%**	**39%**	**0%**	**0%**	**11%**	**100%**	
Vehicle Trips	55	1,486	428	1,273	0	0	314	3,556	
	2%	42%	12%	36%	0%	0%	9%	100%	
Avg. veh. occupancy	*1.30*	*1.87*	*2.19*	*2.24*	*0.00*	*0.00*	*1.30*	*1.98*	

Evening Peak Hour Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	
Auto	0	111	225	683	0	0	4	1,024	55%
Transit	0	26	100	267	0	0	10	404	22%
Taxi/Coach (Event)								0	0%
Bike (Event)								0	0%
Walk	0	39	67	203	0	0	1	310	16%
Other	0	3	34	103	0	0	1	140	7%
Total	**0**	**180**	**426**	**1,256**	**0**	**0**	**17**	**1,879**	**100%**
	0%	**10%**	**23%**	**67%**	**0%**	**0%**	**1%**	**100%**	
Vehicle Trips	0	59	103	306	0	0	3	471	
	0%	13%	22%	65%	0%	0%	1%	100%	
Avg. veh. occupancy	*0.00*	*1.87*	*2.19*	*2.24*	*0.00*	*0.00*	*1.30*	*2.17*	

Percent of Daily during Late PM Peak Hour

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Auto	0.0%	4.0%	24.0%	24.0%	0.0%	0.0%	1.1%	14.5%
Transit	0.0%	4.0%	24.0%	24.0%	0.0%	0.0%	1.1%	12.3%
Taxi/Coach (Event)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bike (Event)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Walk	0.0%	4.0%	24.0%	24.0%	0.0%	0.0%	1.1%	13.9%
Other	0.0%	4.0%	24.0%	24.0%	0.0%	0.0%	1.1%	19.6%
Total	**0.0%**	**4.0%**	**24.0%**	**24.0%**	**0.0%**	**0.0%**	**1.1%**	**14.2%**
Vehicle Trips	0.0%	4.0%	24.0%	24.0%	0.0%	0.0%	1.1%	13.3%

Evening Peak Hour Person-Trips

Saturday Distribution	Total Daily Person-trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	1,296	0	11	53	159	0	0	1	225
Superdistrict 2	1,543	0	16	58	173	0	0	2	248
Superdistrict 3	6,010	0	106	177	537	0	0	4	823
Superdistrict 4	854	0	9	30	88	0	0	1	129
East Bay	1,416	0	8	47	127	0	0	5	187
North Bay	239	0	4	5	14	0	0	1	24
South Bay	1,447	0	17	43	120	0	0	3	184
Out of Region	470	0	9	13	37	0	0	0	59
Total	**13,275**	**0**	**180**	**426**	**1,256**	**0**	**0**	**17**	**1,879**

Evening Peak Hour Transit-Trips

Saturday Distribution	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	3	12	33	0	0	1	49
Superdistrict 2	0	3	11	29	0	0	1	43
Superdistrict 3	0	11	41	120	0	0	2	174
Superdistrict 4	0	1	7	17	0	0	1	26
East Bay	0	3	20	48	0	0	4	75
North Bay	0	1	1	1	0	0	0	3
South Bay	0	2	6	11	0	0	2	20
Out of Region	0	2	3	9	0	0	0	14
Total	**0**	**26**	**100**	**267**	**0**	**0**	**10**	**404**

Evening Peak Hour Vehicle-Trips

Saturday Distribution	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total		Avg. Veh. Occ.
Superdistrict 1	0	3	9	28	0	0	0	40	8%	1.99
Superdistrict 2	0	6	19	59	0	0	0	85	18%	1.92
Superdistrict 3	0	31	32	96	0	0	1	159	34%	2.32
Superdistrict 4	0	4	8	23	0	0	0	36	8%	2.36
East Bay	0	3	11	31	0	0	1	44	9%	2.44
North Bay	0	2	1	2	0	0	0	6	1%	3.54
South Bay	0	8	18	50	0	0	1	77	16%	2.07
Out of Region	0	3	5	16	0	0	0	24	5%	1.68
Total	**0**	**59**	**103**	**306**	**0**	**0**	**3**	**471**	**100%**	**2.17**

Assumptions for Evening Peak Hour bet. 7 PM & 9 PM	Arena		Retail		Q.S. Rest.		Sit-down Rest.		XXX		XXX		Office	
	Empl.	Attend.	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work
Inbound	0%	50%	0%	50%	0%	50%	0%	50%	100%	100%	100%	50%	0%	50%
Outbound	100%	50%	100%	50%	100%	50%	100%	50%	0%	0%	0%	50%	100%	50%

Inbound

Evening Peak Hour bet. 7 PM & 9 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	0	85	189	591	0	0	0	865
	0%	47%	44%	47%	0%	0%	0%	46%
Transit Trips	0	10	36	111	0	0	0	156
	0%	38%	35%	41%	0%	0%	0%	39%
Vehicle Trips	0	29	46	145	0	0	0	220
	0%	48%	45%	47%	0%	0%	0%	47%

Outbound

Evening Peak Hour bet. 7 PM & 9 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	0	95	237	665	0	0	17	1,013
	0%	53%	56%	53%	0%	0%	100%	54%
Transit Trips	0	16	65	157	0	0	10	248
	0%	62%	65%	59%	0%	0%	100%	61%
Vehicle Trips	0	31	56	160	0	0	3	251
	0%	52%	55%	53%	0%	0%	100%	53%

Total

Evening Peak Hour bet. 7 PM & 9 PM	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Total Person Trips	0	180	426	1,256	0	0	17	1,879
Transit Trips	0	26	100	267	0	0	10	404
Vehicle Trips	0	59	103	306	0	0	3	471

Inbound

Evening Peak Hour bet. 7 PM & 9 PM Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	2	9	28	0	0	0	39
Superdistrict 2	0	5	18	57	0	0	0	80
Superdistrict 3	0	31	36	114	0	0	0	181
Superdistrict 4	0	4	9	28	0	0	0	40
East Bay	0	2	12	36	0	0	0	50
North Bay	0	1	2	6	0	0	0	9
South Bay	0	7	16	50	0	0	0	73
Out of Region	0	3	4	13	0	0	0	20
Total	**0**	**54**	**106**	**332**	**0**	**0**	**0**	**492**

Outbound

Evening Peak Hour bet. 7 PM & 9 PM Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	2	9	28	0	0	0	40
Superdistrict 2	0	5	19	58	0	0	0	83
Superdistrict 3	0	32	39	117	0	0	1	188
Superdistrict 4	0	4	10	30	0	0	0	44
East Bay	0	2	14	40	0	0	1	58
North Bay	0	2	3	7	0	0	0	12
South Bay	0	8	21	57	0	0	2	87
Out of Region	0	3	4	13	0	0	0	21
Total	**0**	**57**	**119**	**352**	**0**	**0**	**4**	**532**

Total

Evening Peak Hour bet. 7 PM & 9 PM Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	5	18	56	0	0	0	79
Superdistrict 2	0	10	37	115	0	0	0	163
Superdistrict 3	0	63	75	231	0	0	1	369
Superdistrict 4	0	7	19	57	0	0	0	84
East Bay	0	4	26	77	0	0	1	108
North Bay	0	3	5	13	0	0	0	21
South Bay	0	14	37	108	0	0	2	160
Out of Region	0	5	9	27	0	0	0	40
Total	**0**	**111**	**225**	**683**	**0**	**0**	**4**	**1,024**

Event Center & Mixed-Use Development at Mission Bay Blocks 29-32

REDUCED-REDUCED ALTERNATIVE (40% reduction across all uses) - SATURDAY DAILY AND EVENING PEAK HOUR BETWEEN 7 AND 9 PM

SUMMARY OF TRIPS WITH NO EVENT

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Transit Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	1	5	15	0	0	0	21	0	2	7	18	0	0	1	28	0	3	12	33	0	0	1	49
Superdistrict 2	0	1	4	12	0	0	0	17	0	2	7	17	0	0	1	26	0	3	11	29	0	0	1	43
Superdistrict 3	0	5	18	56	0	0	0	79	0	6	23	64	0	0	2	95	0	11	41	120	0	0	2	174
Superdistrict 4	0	0	2	7	0	0	0	9	0	1	4	10	0	0	1	16	0	1	7	17	0	0	1	26
East Bay	0	0	5	16	0	0	0	21	0	3	15	32	0	0	4	53	0	3	20	48	0	0	4	75
North Bay	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	3	0	1	1	1	0	0	0	3
South Bay	0	1	1	2	0	0	0	3	0	2	5	9	0	0	2	17	0	2	6	11	0	0	2	20
Out of Region	0	1	1	4	0	0	0	6	0	1	2	5	0	0	0	8	0	2	3	9	0	0	0	14
Total	**0**	**10**	**36**	**111**	**0**	**0**	**0**	**156**	**0**	**16**	**65**	**157**	**0**	**0**	**10**	**248**	**0**	**26**	**100**	**267**	**0**	**0**	**10**	**404**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Bike (Event)	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1								0								0	0	0	0	0	0	0	0	0
Superdistrict 2								0								0	0	0	0	0	0	0	0	0
Superdistrict 3								0								0	0	0	0	0	0	0	0	0
Superdistrict 4								0								0	0	0	0	0	0	0	0	0
East Bay								0								0	0	0	0	0	0	0	0	0
North Bay								0								0	0	0	0	0	0	0	0	0
South Bay								0								0	0	0	0	0	0	0	0	0
Out of Region								0								0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Taxi/Walk/Other	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	1	11	34	0	0	0	47	0	2	12	36	0	0	0	50	0	3	23	70	0	0	0	96
Superdistrict 2	0	2	4	14	0	0	0	20	0	2	5	15	0	0	0	22	0	4	10	29	0	0	0	42
Superdistrict 3	0	16	29	91	0	0	0	135	0	16	32	95	0	0	1	145	0	32	61	186	0	0	1	280
Superdistrict 4	0	0	2	7	0	0	0	9	0	0	2	7	0	0	0	10	0	1	4	14	0	0	0	19
East Bay	0	0	0	1	0	0	0	2	0	0	1	1	0	0	0	2	0	1	1	2	0	0	0	4
North Bay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Bay	0	0	0	1	0	0	0	2	0	0	0	1	0	0	0	2	0	1	1	2	0	0	0	3
Out of Region	0	1	0	1	0	0	0	2	0	1	0	1	0	0	0	2	0	2	1	2	0	0	0	5
Total	**0**	**21**	**48**	**149**	**0**	**0**	**0**	**217**	**0**	**22**	**53**	**157**	**0**	**0**	**2**	**233**	**0**	**42**	**101**	**305**	**0**	**0**	**2**	**450**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Total Person Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	5	25	77	0	0	0	107	0	6	28	83	0	0	1	118	0	11	53	159	0	0	1	225
Superdistrict 2	0	8	27	83	0	0	0	117	0	9	31	90	0	0	2	132	0	16	58	173	0	0	2	248
Superdistrict 3	0	52	83	260	0	0	0	395	0	54	94	277	0	0	4	428	0	106	177	537	0	0	4	823
Superdistrict 4	0	4	13	41	0	0	0	59	0	5	17	47	0	0	1	70	0	9	30	88	0	0	1	129
East Bay	0	3	17	53	0	0	0	73	0	5	30	74	0	0	5	114	0	8	47	127	0	0	5	187
North Bay	0	2	2	6	0	0	0	9	0	2	4	9	0	0	1	15	0	4	5	14	0	0	1	24
South Bay	0	8	17	53	0	0	0	78	0	10	26	67	0	0	3	106	0	17	43	120	0	0	3	184
Out of Region	0	4	6	18	0	0	0	28	0	4	7	20	0	0	0	31	0	9	13	37	0	0	0	59
Total	**0**	**85**	**189**	**591**	**0**	**0**	**0**	**865**	**0**	**95**	**237**	**665**	**0**	**0**	**17**	**1,013**	**0**	**180**	**426**	**1,256**	**0**	**0**	**17**	**1,879**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total							
Vehicle-Trips	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	XX	XX	Office	Total
Superdistrict 1	0	1	4	14	0	0	0	19	0	1	5	14	0	0	0	20	0	3	9	28	0	0	0	40
Superdistrict 2	0	3	9	29	0	0	0	41	0	3	10	30	0	0	0	44	0	6	19	59	0	0	0	85
Superdistrict 3	0	15	15	47	0	0	0	77	0	16	17	49	0	0	1	82	0	31	32	96	0	0	1	159
Superdistrict 4	0	2	4	11	0	0	0	17	0	2	4	12	0	0	0	19	0	4	8	23	0	0	0	36
East Bay	0	1	5	14	0	0	0	20	0	1	6	17	0	0	1	25	0	3	11	31	0	0	1	44
North Bay	0	1	0	1	0	0	0	2	0	1	1	2	0	0	0	4	0	2	1	2	0	0	0	6
South Bay	0	3	7	22	0	0	0	32	0	4	11	28	0	0	1	45	0	8	18	50	0	0	1	77
Out of Region	0	1	2	8	0	0	0	12	0	2	3	8	0	0	0	12	0	3	5	16	0	0	0	24
Total	**0**	**29**	**46**	**145**	**0**	**0**	**0**	**220**	**0**	**31**	**56**	**160**	**0**	**0**	**3**	**251**	**0**	**59**	**103**	**306**	**0**	**0**	**3**	**471**

EXISTING PLUS REDUCED DEVELOPMENT ALTERNATIVE
TRAFFIC VOLUME FIGURES
WEEKDAY PM PEAK / SATURDAY EVENING

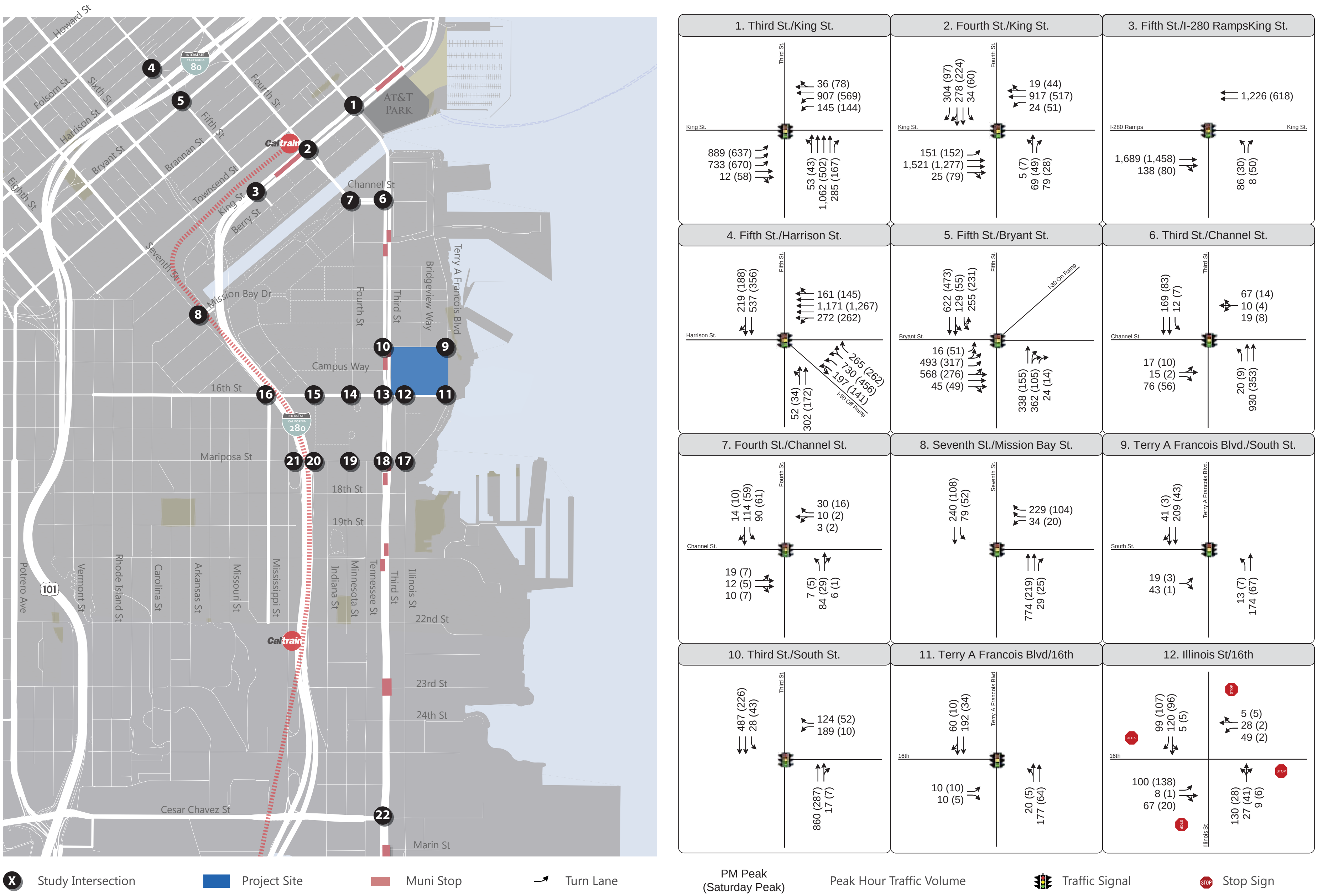
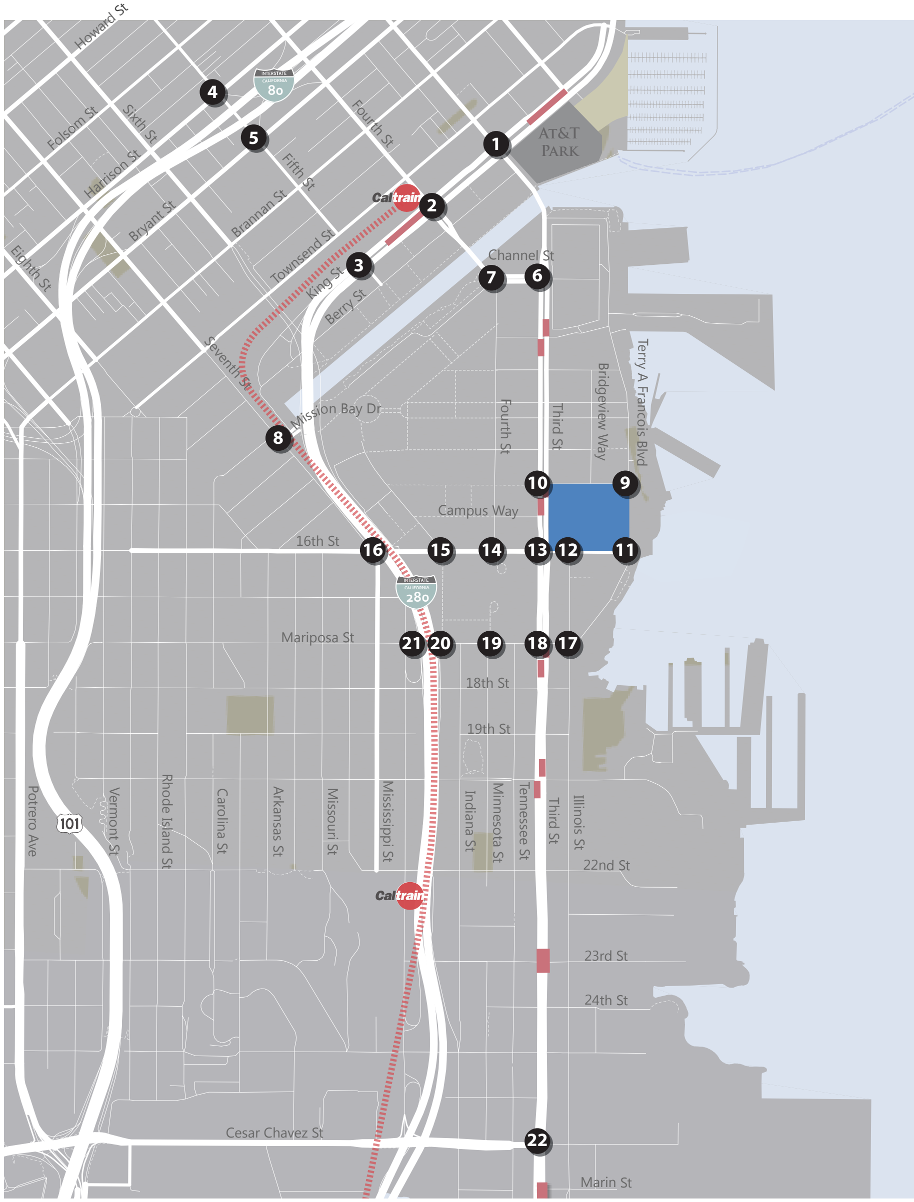
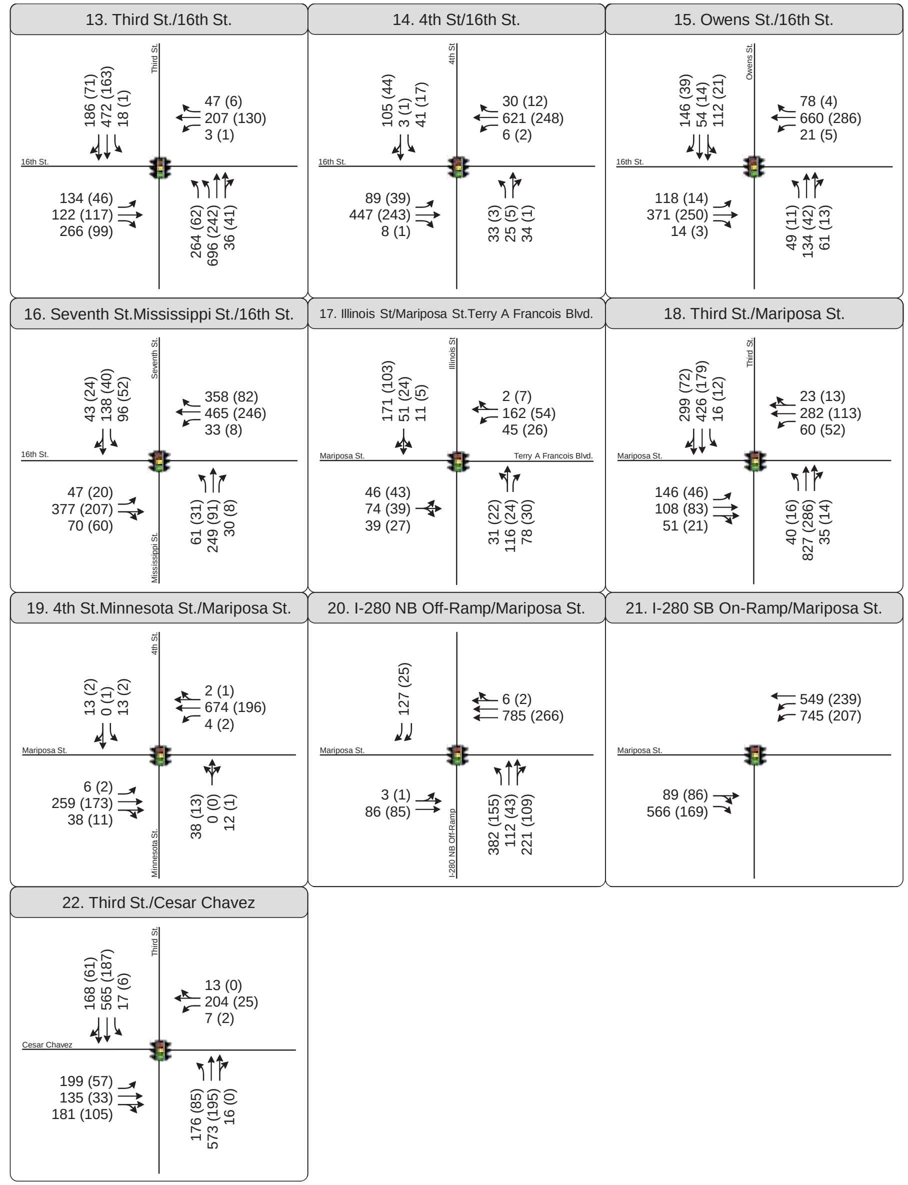


Figure 17a

Peak Hour Traffic Volumes and Lane Configurations
Existing Plus Reduced Project Alternative (2015) Conditions





X Study Intersection | Project Site | Muni Stop | Turn Lane | PM Peak (Saturday Peak) Peak Hour Traffic Volume | Traffic Signal | Stop Sign

Figure 17b

Peak Hour Traffic Volumes and Lane Configurations
Existing Plus Reduced Project Alternative (2015) Conditions

Existing plus Reduced Development Alternative Intersection Level of Service – Weekday PM Peak

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	889	733	12	145	907	36	53	1062	285	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.68			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	1.00		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	3057		2987	3023			5480	941			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	3057		2987	3023			5480	941			
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	916	756	12	149	935	37	55	1095	294	0	0	0
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	198	0	0	0
Lane Group Flow (vph)	916	767	0	149	971	0	0	1150	96	0	0	0
Confl. Peds. (#/hr)			400			400	400		400			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.2	40.5		13.2	37.0			35.9	35.9			
Effective Green, g (s)	18.2	40.5		13.2	37.0			35.9	35.9			
Actuated g/C Ratio	0.17	0.37		0.12	0.34			0.33	0.33			
Clearance Time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	741	1125		358	1016			1788	307			
v/s Ratio Prot	c0.20	0.25		0.05	c0.32							
v/s Ratio Perm								0.21	0.10			
v/c Ratio	1.24	0.68		0.42	0.96			0.64	0.31			
Uniform Delay, d1	45.9	29.3		44.8	35.7			31.6	27.8			
Progression Factor	1.38	1.61		1.53	1.02			0.90	2.84			
Incremental Delay, d2	113.5	2.0		0.2	7.7			0.7	0.5			
Delay (s)	176.8	49.1		69.0	44.1			29.1	79.4			
Level of Service	F	D		E	D			C	E			
Approach Delay (s)		118.6			47.4			39.3			0.0	
Approach LOS		F			D			D			A	

Intersection Summary			
HCM 2000 Control Delay	72.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	151	1521	25	24	917	19	5	69	79	34	278	304
Ideal Flow (vphpl)	1800	1800	1800	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	0.64	1.00	0.84	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00	0.68	1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85	1.00	0.95	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1459	4155		1296	2553			1585	858	1044	2355	581
Flt Permitted	0.95	1.00		0.95	1.00			0.97	1.00	0.71	1.00	1.00
Satd. Flow (perm)	1459	4155		1296	2553			1542	858	778	2355	581
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	154	1552	26	24	936	19	5	70	81	35	284	310
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	53	0	42	118
Lane Group Flow (vph)	154	1577	0	24	954	0	0	75	28	35	369	65
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.4	45.9		6.0	35.9			38.2	38.2	39.2	39.2	39.2
Effective Green, g (s)	14.4	45.9		6.0	35.9			38.2	38.2	39.2	39.2	39.2
Actuated g/C Ratio	0.13	0.42		0.05	0.33			0.35	0.35	0.36	0.36	0.36
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	190	1733		70	833			535	297	277	839	207
v/s Ratio Prot	0.11	c0.38		0.02	c0.37						c0.16	
v/s Ratio Perm								0.05	0.03	0.04		0.11
v/c Ratio	0.81	0.91		0.34	1.14			0.14	0.09	0.13	0.44	0.32
Uniform Delay, d1	46.5	30.1		50.1	37.0			24.6	24.2	23.9	27.0	25.7
Progression Factor	0.58	1.19		0.88	0.90			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.5	0.9		1.0	70.7			0.1	0.1	0.2	0.4	0.9
Delay (s)	29.5	36.9		45.0	104.2			24.8	24.4	24.1	27.4	26.5
Level of Service	C	D		D	F			C	C	C	C	C
Approach Delay (s)		36.2			102.7			24.6			27.0	
Approach LOS		D			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	52.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	115.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

5/12/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1689	138	0	1226	86	8
Ideal Flow (vphpl)	1850	1850	1850	1850	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	2957			2998	1540	1357
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	2957			2998	1540	1357
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1759	144	0	1277	90	8
RTOR Reduction (vph)	6	0	0	0	0	5
Lane Group Flow (vph)	1897	0	0	1277	90	3
Confl. Peds. (#/hr)		37	37		1	3
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	1669			1692	512	451
v/s Ratio Prot	c0.64			0.43	c0.06	
v/s Ratio Perm						0.00
v/c Ratio	1.14			0.75	0.18	0.01
Uniform Delay, d1	23.9			18.2	26.0	24.5
Progression Factor	1.00			0.53	1.00	1.00
Incremental Delay, d2	69.5			1.0	0.7	0.0
Delay (s)	93.5			10.7	26.8	24.6
Level of Service	F			B	C	C
Approach Delay (s)	93.5			10.7	26.6	
Approach LOS	F			B	C	

Intersection Summary			
HCM 2000 Control Delay	59.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	98.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

5/12/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	272	1171	161	52	302	537	219	197	730	265
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		2.0			2.0	2.0			2.0	2.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.99	0.87
Flpb, ped/bikes		0.99			1.00	1.00			1.00	1.00
Frt		0.98			1.00	0.96			1.00	0.85
Flt Protected		0.99			0.99	1.00			0.95	1.00
Satd. Flow (prot)		5749			2857	2464			4087	978
Flt Permitted		0.99			0.66	1.00			0.95	1.00
Satd. Flow (perm)		5749			1899	2464			4087	978
Peak-hour factor, PHF	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93
Adj. Flow (vph)	296	1259	173	56	325	577	235	214	785	285
RTOR Reduction (vph)	0	22	0	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	1706	0	0	381	808	0	0	1028	256
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Perm
Protected Phases		6			4	4		7	7	
Permitted Phases	6			4						7
Actuated Green, G (s)		27.0			25.0	25.0			24.0	24.0
Effective Green, g (s)		29.0			28.0	28.0			27.0	27.0
Actuated g/C Ratio		0.32			0.31	0.31			0.30	0.30
Clearance Time (s)		4.0			5.0	5.0			5.0	5.0
Lane Grp Cap (vph)		1852			590	766			1226	293
v/s Ratio Prot						c0.33			0.25	
v/s Ratio Perm		0.30			0.20					c0.26
v/c Ratio		0.92			0.65	1.05			0.84	0.87
Uniform Delay, d1		29.4			26.7	31.0			29.5	29.9
Progression Factor		1.48			0.06	1.00			1.00	1.00
Incremental Delay, d2		6.6			0.5	47.9			7.0	28.4
Delay (s)		50.1			2.1	78.9			36.4	58.2
Level of Service		D			A	E			D	E
Approach Delay (s)		50.1			2.1	78.9			40.8	
Approach LOS		D			A	E			D	

Intersection Summary			
HCM 2000 Control Delay	48.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	109.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	16	493	568	45	338	362	24	255	129	622
Ideal Flow (vphpl)	1000	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.84		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.99		0.92		0.85		1.00	1.00
Flt Protected		0.95	0.99		1.00		1.00		0.95	0.99
Satd. Flow (prot)		1313	1913		2130		1163		1327	2541
Flt Permitted		0.95	0.99		1.00		1.00		0.15	0.63
Satd. Flow (perm)		1313	1913		2130		1163		207	1622
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	17	530	611	48	363	389	26	274	139	669
RTOR Reduction (vph)	0	0	7	0	0	0	17	0	0	0
Lane Group Flow (vph)	0	473	726	0	755	0	6	0	307	775
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	5	0	5	0	0	0	0	5
Parking (#/hr)			10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		22.5	22.5		23.0		23.0		42.0	42.0
Effective Green, g (s)		22.5	25.0		24.5		23.0		43.5	43.5
Actuated g/C Ratio		0.25	0.28		0.27		0.26		0.48	0.48
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		328	531		579		297		305	952
v/s Ratio Prot		0.36	c0.38		c0.35				c0.18	0.15
v/s Ratio Perm							0.01		0.30	0.24
v/c Ratio		1.44	1.37		1.42dr		0.02		1.01	0.81
Uniform Delay, d1		33.8	32.5		32.8		25.1		31.1	19.8
Progression Factor		1.00	1.00		1.00		1.00		1.10	1.15
Incremental Delay, d2		215.5	176.9		149.0		0.1		28.6	2.2
Delay (s)		249.2	209.4		181.8		25.2		62.9	25.0
Level of Service		F	F		F		C		E	C
Approach Delay (s)			225.0		177.1					35.8
Approach LOS			F		F					D

Intersection Summary			
HCM 2000 Control Delay	146.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	102.4%	ICU Level of Service	G
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	15	76	19	10	67	20	930	18	12	169	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		0.99	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.91		1.00	1.00		1.00	0.99	
Flt Protected		0.97	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1569	1353		1426		1272	2531		1540	3039	
Flt Permitted		0.87	1.00		0.95		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1405	1353		1373		1272	2531		1540	3039	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	18	16	80	20	11	71	21	979	19	13	178	14
RTOR Reduction (vph)	0	0	54	0	48	0	0	1	0	0	6	0
Lane Group Flow (vph)	0	34	26	0	54	0	21	997	0	13	186	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		32.1	32.1		32.1		13.8	38.5		13.5	38.5	
Effective Green, g (s)		32.1	32.1		32.1		13.8	38.5		13.5	38.5	
Actuated g/C Ratio		0.32	0.32		0.32		0.14	0.38		0.14	0.38	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Grp Cap (vph)		451	434		440		175	974		207	1170	
v/s Ratio Prot							0.02	c0.39		0.01	c0.06	
v/s Ratio Perm		0.02	0.02		c0.04							
v/c Ratio		0.08	0.06		0.12		0.12	1.02		0.06	0.16	
Uniform Delay, d1		23.6	23.5		24.0		37.8	30.8		37.7	20.1	
Progression Factor		1.00	1.00		1.00		1.21	0.21		1.00	1.00	
Incremental Delay, d2		0.3	0.3		0.6		1.0	30.5		0.6	0.3	
Delay (s)		23.9	23.8		24.6		46.6	36.9		38.3	20.4	
Level of Service		C	C		C		D	D		D	C	
Approach Delay (s)		23.8			24.6			37.1			21.6	
Approach LOS		C			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	33.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.9
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.

5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	12	10	3	10	30	7	84	6	90	114	14
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00	1.00	1.00	1.00		1.00	0.98	
Flpb, ped/bikes		0.99			1.00	1.00	0.84	1.00		1.00	1.00	
Frt		0.96			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.98			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2552			1434	1227	1153	1432		1377	1393	
Flt Permitted		0.95			1.00	1.00	0.80	1.00		0.95	1.00	
Satd. Flow (perm)		2493			1449	1227	971	1432		1377	1393	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	20	13	11	3	11	32	8	90	6	97	123	15
RTOR Reduction (vph)	0	10	0	0	0	16	0	4	0	0	5	0
Lane Group Flow (vph)	0	34	0	0	14	16	8	92	0	97	133	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		2.3			2.3	18.9	5.0	5.0		16.6	26.6	
Effective Green, g (s)		2.3			2.3	18.9	5.0	5.0		16.6	26.6	
Actuated g/C Ratio		0.06			0.06	0.49	0.13	0.13		0.43	0.68	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		147			85	753	124	184		587	952	
v/s Ratio Prot						0.01		c0.06		c0.07	0.10	
v/s Ratio Perm		c0.01			0.01	0.00	0.01					
v/c Ratio		0.23			0.16	0.02	0.06	0.50		0.17	0.14	
Uniform Delay, d1		17.5			17.4	5.2	14.9	15.8		6.9	2.2	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8			0.9	0.0	0.2	2.1		0.1	0.1	
Delay (s)		18.3			18.3	5.2	15.1	17.9		7.0	2.2	
Level of Service		B			B	A	B	B		A	A	
Approach Delay (s)		18.3			9.2			17.7			4.2	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	38.9	Sum of lost time (s)	15.0
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.

5/12/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	34	229	774	29	79	240
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.98	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1743	1535	848	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1743	1535	848	1134	1194
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	249	841	32	86	261
RTOR Reduction (vph)	0	222	0	5	0	0
Lane Group Flow (vph)	37	27	841	27	86	261
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	8.7	8.7	47.6	42.6	9.7	62.3
Effective Green, g (s)	8.7	8.7	47.6	42.6	9.7	62.3
Actuated g/C Ratio	0.11	0.11	0.59	0.53	0.12	0.77
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	121	187	902	498	135	918
v/s Ratio Prot	c0.03		c0.55	0.01	c0.08	0.22
v/s Ratio Perm		0.02		0.02		
v/c Ratio	0.31	0.14	0.93	0.05	0.64	0.28
Uniform Delay, d1	33.4	32.8	15.2	9.4	34.0	2.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.4	0.4	16.0	0.0	9.5	0.2
Delay (s)	34.8	33.1	31.2	9.4	43.4	2.9
Level of Service	C	C	C	A	D	A
Approach Delay (s)	33.3		30.4			13.0
Approach LOS	C		C			B

Intersection Summary			
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	81.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
9: Terry A Francois Blvd/Terry A Francois Blvd. & South St.

5/12/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	19	43	13	174	209	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		5.0	5.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frpb, ped/bikes	0.96		1.00	1.00	0.99	
Flpb, ped/bikes	0.99		0.98	1.00	1.00	
Frt	0.91		1.00	1.00	0.98	
Flt Protected	0.99		0.95	1.00	1.00	
Satd. Flow (prot)	1521		1680	1531	3062	
Flt Permitted	0.99		0.58	1.00	1.00	
Satd. Flow (perm)	1521		1027	1531	3062	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	21	48	14	193	232	46
RTOR Reduction (vph)	43	0	0	0	15	0
Lane Group Flow (vph)	26	0	14	193	263	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	10
Turn Type	Perm		Perm	NA	NA	
Protected Phases				2	6	
Permitted Phases	4		2			
Actuated Green, G (s)	3.6		22.6	22.6	22.6	
Effective Green, g (s)	3.6		22.6	22.6	22.6	
Actuated g/C Ratio	0.10		0.64	0.64	0.64	
Clearance Time (s)	4.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	155		659	982	1965	
v/s Ratio Prot				c0.13	0.09	
v/s Ratio Perm	c0.02		0.01			
v/c Ratio	0.17		0.02	0.20	0.13	
Uniform Delay, d1	14.4		2.3	2.6	2.5	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.5		0.0	0.1	0.0	
Delay (s)	14.9		2.3	2.7	2.5	
Level of Service	B		A	A	A	
Approach Delay (s)	14.9			2.7	2.5	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	4.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	35.2	Sum of lost time (s)	9.0
Intersection Capacity Utilization	37.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
10: Third St. & South St.

5/12/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	189	124	860	17	28	487
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.96	1.00		1.00	1.00
Flpb, ped/bikes	0.93	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1584	1466	3406		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1584	1466	3406		1711	3421
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	210	138	956	19	31	541
RTOR Reduction (vph)	0	98	1	0	0	0
Lane Group Flow (vph)	210	40	974	0	31	541
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	28.7	28.7	50.1		5.9	61.1
Effective Green, g (s)	28.7	28.7	50.1		5.9	61.1
Actuated g/C Ratio	0.29	0.29	0.50		0.06	0.61
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	454	420	1706		100	2090
v/s Ratio Prot			c0.29		0.02	c0.16
v/s Ratio Perm	c0.13	0.03				
v/c Ratio	0.46	0.09	0.57		0.31	0.26
Uniform Delay, d1	29.3	26.1	17.4		45.1	9.0
Progression Factor	1.00	1.00	1.97		1.07	1.35
Incremental Delay, d2	0.7	0.1	0.9		1.8	0.1
Delay (s)	30.1	26.2	35.3		50.2	12.2
Level of Service	C	C	D		D	B
Approach Delay (s)	28.5		35.3			14.2
Approach LOS	C		D			B

Intersection Summary			
HCM 2000 Control Delay	27.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.3
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
11: Terry A Francois Blvd./Terry A Francois Blvd & 16th

5/12/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	10	10	20	177	192	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.97		1.00	0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.96	
Flt Protected	0.95	1.00		0.99	1.00	
Satd. Flow (prot)	1520	1343		3060	2948	
Flt Permitted	0.95	1.00		0.89	1.00	
Satd. Flow (perm)	1520	1343		2733	2948	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	12	12	24	208	226	71
RTOR Reduction (vph)	0	12	0	0	57	0
Lane Group Flow (vph)	12	0	0	232	240	0
Confl. Peds. (#/hr)	1	1	25			25
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	0.6	0.6		9.1	9.1	
Effective Green, g (s)	0.6	0.6		9.1	9.1	
Actuated g/C Ratio	0.01	0.01		0.20	0.20	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	20	17		552	596	
v/s Ratio Prot	c0.01				0.08	
v/s Ratio Perm		0.00		c0.08		
v/c Ratio	0.60	0.01		0.42	0.40	
Uniform Delay, d1	22.1	21.9		15.7	15.6	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	40.2	0.2		0.5	0.4	
Delay (s)	62.3	22.1		16.2	16.0	
Level of Service	E	C		B	B	
Approach Delay (s)	42.2			16.2	16.0	
Approach LOS	D			B	B	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.14		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	34.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
12: Illinois St & 16th

5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	100	8	67	49	28	5	130	27	9	5	120	99
Peak Hour Factor	0.92	0.87	0.87	0.87	0.87	0.92	0.87	0.92	0.87	0.92	0.92	0.92
Hourly flow rate (vph)	109	9	77	56	32	5	149	29	10	5	130	108

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	109	86	56	38	189	136	108
Volume Left (vph)	109	0	56	0	149	5	0
Volume Right (vph)	0	77	0	5	10	0	108
Hadj (s)	0.53	-0.59	0.53	-0.07	0.16	0.05	-0.67
Departure Headway (s)	6.3	5.2	6.5	5.9	5.8	5.6	4.9
Degree Utilization, x	0.19	0.12	0.10	0.06	0.30	0.21	0.15
Capacity (veh/h)	534	646	514	565	598	609	696
Control Delay (s)	9.6	7.8	9.0	8.1	11.3	8.9	7.5
Approach Delay (s)	8.8		8.6		11.3	8.3	
Approach LOS	A		A		B	A	

Intersection Summary			
Delay	9.3		
Level of Service	A		
Intersection Capacity Utilization	35.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	134	122	266	3	207	47	264	696	36	18	472	186
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.95	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1265	1365	1126	1283	1365	1099	2515	2568		1296	2464	
Flt Permitted	0.55	1.00	1.00	0.67	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	727	1365	1126	907	1365	1099	2515	2568		1296	2464	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	147	134	292	3	227	52	290	765	40	20	519	204
RTOR Reduction (vph)	0	0	191	0	0	34	0	4	0	0	42	0
Lane Group Flow (vph)	147	134	101	3	227	18	290	801	0	20	681	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Effective Green, g (s)	34.5	34.5	34.5	34.5	34.5	34.5	14.0	37.8		12.0	35.8	
Actuated g/C Ratio	0.34	0.34	0.34	0.34	0.34	0.34	0.14	0.38		0.12	0.36	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Grp Cap (vph)	250	470	388	312	470	379	352	970		155	882	
v/s Ratio Prot		0.10			0.17		0.12	c0.31		0.02	c0.28	
v/s Ratio Perm	c0.20		0.09	0.00		0.02						
v/c Ratio	0.59	0.29	0.26	0.01	0.48	0.05	0.82	0.83		0.13	0.77	
Uniform Delay, d1	26.9	23.8	23.6	21.5	25.7	21.8	41.8	28.1		39.3	28.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.64	0.76		1.16	1.19	
Incremental Delay, d2	9.8	1.5	1.6	0.1	3.5	0.2	8.4	3.3		1.7	6.3	
Delay (s)	36.7	25.3	25.2	21.6	29.3	22.0	35.2	24.6		47.4	40.3	
Level of Service	D	C	C	C	C	C	D	C		D	D	
Approach Delay (s)		28.2			27.9			27.4			40.5	
Approach LOS		C			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	31.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	116.7%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	89	447	8	6	621	30	33	25	34	41	3	105
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.85	1.00	0.98		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1411	1621	1706	1238	1621	1527		1491	1355	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.68	1.00		0.72	1.00	
Satd. Flow (perm)	1621	1706	1411	1621	1706	1238	1163	1527		1123	1355	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	486	9	7	675	33	36	27	37	45	3	114
RTOR Reduction (vph)	0	0	4	0	0	18	0	28	0	0	85	0
Lane Group Flow (vph)	97	486	5	7	675	15	36	36	0	45	32	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)			10			10			10			10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	10.9	47.6	47.6	2.7	39.4	39.4	21.9	21.9		21.9	21.9	
Effective Green, g (s)	10.9	47.6	47.6	2.7	39.4	39.4	21.9	21.9		21.9	21.9	
Actuated g/C Ratio	0.12	0.55	0.55	0.03	0.45	0.45	0.25	0.25		0.25	0.25	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	202	931	770	50	770	559	292	383		282	340	
v/s Ratio Prot	c0.06	c0.28		0.00	c0.40			0.02			0.02	
v/s Ratio Perm			0.00			0.01	0.03			c0.04		
v/c Ratio	0.48	0.52	0.01	0.14	0.88	0.03	0.12	0.09		0.16	0.09	
Uniform Delay, d1	35.5	12.6	9.0	41.1	21.7	13.3	25.2	25.0		25.5	25.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	2.1	0.0	1.3	11.0	0.0	0.2	0.1		0.3	0.1	
Delay (s)	37.3	14.7	9.0	42.4	32.7	13.3	25.4	25.2		25.7	25.2	
Level of Service	D	B	A	D	C	B	C	C		C	C	
Approach Delay (s)		18.3			31.9			25.3			25.3	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	87.2	Sum of lost time (s)	15.0
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.
5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	118	371	14	21	660	78	49	134	61	112	54	146
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.97	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1049	1540	2934			2978	1072
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.64	1.00			0.67	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1049	1041	2934			2060	1072
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	123	386	15	22	688	81	51	140	64	117	56	152
RTOR Reduction (vph)	0	0	4	0	0	20	0	55	0	0	0	132
Lane Group Flow (vph)	123	386	11	22	688	61	51	149	0	0	173	20
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	9.0	71.2	71.2	2.3	63.5	63.5	14.6	14.6			13.6	13.6
Effective Green, g (s)	9.0	71.2	71.2	2.3	63.5	63.5	14.6	14.6			13.6	13.6
Actuated g/C Ratio	0.09	0.70	0.70	0.02	0.63	0.63	0.14	0.14			0.13	0.13
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	108	855	970	35	763	658	150	423			277	144
v/s Ratio Prot	c0.10	0.32		0.01	c0.57			0.05				
v/s Ratio Perm			0.01			0.06	0.05				c0.08	0.02
v/c Ratio	1.14	0.45	0.01	0.63	0.90	0.09	0.34	0.35			0.94dl	0.14
Uniform Delay, d1	46.0	6.5	4.5	49.0	16.1	7.4	38.9	39.0			41.3	38.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	128.8	1.7	0.0	30.3	13.8	0.1	1.4	0.5			4.3	0.5
Delay (s)	174.9	8.2	4.5	79.3	30.0	7.5	40.3	39.5			45.7	39.1
Level of Service	F	A	A	E	C	A	D	D			D	D
Approach Delay (s)		47.2			29.0			39.7			42.6	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	37.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	101.1	Sum of lost time (s)	15.0
Intersection Capacity Utilization	90.9%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.
5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	377	70	33	465	358	61	249	30	96	138	43
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.90	1.00	1.00	0.96	1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1337	929		1335	1126	859	1070	957	919	1070	1068	
Flt Permitted	0.18	1.00		0.31	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	248	929		439	1126	859	1070	957	919	1070	1068	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	50	401	74	35	495	381	65	265	32	102	147	46
RTOR Reduction (vph)	0	6	0	0	0	128	0	0	25	0	11	0
Lane Group Flow (vph)	50	469	0	35	495	253	65	265	7	102	182	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	53.8	53.8		53.1	53.1	62.1	11.9	25.1	25.1	9.0	22.2	
Effective Green, g (s)	53.8	53.8		53.1	53.1	62.1	11.9	25.1	25.1	9.0	22.2	
Actuated g/C Ratio	0.49	0.49		0.48	0.48	0.56	0.11	0.23	0.23	0.08	0.20	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	151	453		230	542	522	115	217	209	87	214	
v/s Ratio Prot	0.01	c0.51		0.00	c0.44	0.04	0.06	c0.28		c0.10	0.17	
v/s Ratio Perm	0.15			0.07		0.25			0.01			
v/c Ratio	0.33	1.04		0.15	0.91	0.48	0.57	1.22	0.03	1.17	0.85	
Uniform Delay, d1	19.5	28.2		24.8	26.5	14.5	46.7	42.6	33.2	50.6	42.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.3	51.9		0.3	19.8	0.7	6.2	133.6	0.1	150.2	25.6	
Delay (s)	20.8	80.2		25.2	46.3	15.2	53.0	176.2	33.2	200.9	68.1	
Level of Service	C	F		C	D	B	D	F	C	F	E	
Approach Delay (s)		74.5			32.5			141.5			114.0	
Approach LOS		E			C			F			F	

Intersection Summary			
HCM 2000 Control Delay	73.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	110.3	Sum of lost time (s)	20.0
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.

5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	46	74	39	45	162	2	31	116	78	11	51	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		0.99		1.00	1.00			1.00	0.98		0.98	
Flpb, ped/bikes		1.00		0.99	1.00			1.00	1.00		1.00	
Frt		0.97		1.00	1.00			1.00	0.85		0.90	
Flt Protected		0.99		0.95	1.00			0.99	1.00		1.00	
Satd. Flow (prot)		1695		1689	1797			1779	1500		1590	
Flt Permitted		0.85		0.69	1.00			0.91	1.00		0.98	
Satd. Flow (perm)		1466		1234	1797			1631	1500		1565	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	51	82	43	50	180	2	34	129	87	12	57	190
RTOR Reduction (vph)	0	14	0	0	1	0	0	0	65	0	139	0
Lane Group Flow (vph)	0	162	0	50	181	0	0	163	22	0	120	0
Confl. Peds. (#/hr)	13		16	16		13	16		19	19		16
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4		4	8		
Actuated Green, G (s)		12.2		12.2	12.2			12.9	12.9		12.9	
Effective Green, g (s)		12.2		12.2	12.2			12.9	12.9		12.9	
Actuated g/C Ratio		0.24		0.24	0.24			0.26	0.26		0.26	
Clearance Time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		358		301	439			421	387		404	
v/s Ratio Prot					0.10							
v/s Ratio Perm		c0.11		0.04				c0.10	0.01		0.08	
v/c Ratio		0.45		0.17	0.41			0.39	0.06		0.30	
Uniform Delay, d1		16.0		14.8	15.8			15.2	13.9		14.9	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.9		0.3	0.6			0.6	0.1		0.4	
Delay (s)		16.9		15.1	16.5			15.8	14.0		15.3	
Level of Service		B		B	B			B	B		B	
Approach Delay (s)		16.9			16.2			15.2			15.3	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	49.9	Sum of lost time (s)	14.0
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.

5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	146	108	51	60	282	23	40	827	35	16	426	299
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.98	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.99		1.00	0.99		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1674	3219		1678	3371		1260	2501		1260	2331	
Flt Permitted	0.53	1.00		0.65	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	936	3219		1139	3371		1260	2501		1260	2331	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	155	115	54	64	300	24	43	880	37	17	453	318
RTOR Reduction (vph)	0	35	0	0	6	0	0	3	0	0	127	0
Lane Group Flow (vph)	155	134	0	64	318	0	43	914	0	17	644	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	34.7	34.7		34.7	34.7		11.9	34.9		14.9	37.9	
Effective Green, g (s)	34.7	34.7		34.7	34.7		11.9	34.9		14.9	37.9	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.12	0.35		0.15	0.38	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Grp Cap (vph)	324	1116		395	1169		149	872		187	883	
v/s Ratio Prot		0.04			0.09		0.03	c0.37		0.01	c0.28	
v/s Ratio Perm	c0.17			0.06								
v/c Ratio	0.48	0.12		0.16	0.27		0.29	1.05		0.09	0.73	
Uniform Delay, d1	25.6	22.2		22.6	23.5		40.2	32.5		36.7	26.6	
Progression Factor	1.00	1.00		1.00	1.00		0.91	0.80		1.55	0.62	
Incremental Delay, d2	5.0	0.2		0.9	0.6		3.7	40.1		0.7	3.8	
Delay (s)	30.6	22.5		23.5	24.1		40.2	66.3		57.6	20.3	
Level of Service	C	C		C	C		D	E		E	C	
Approach Delay (s)		26.3			24.0			65.1			21.1	
Approach LOS		C			C			E			C	

Intersection Summary			
HCM 2000 Control Delay	39.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	107.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	259	38	4	674	2	38	0	12	13	0	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00			0.97		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3356		1711	3420			1678		1711	1531	
Flt Permitted	0.30	1.00		0.56	1.00			0.84		0.72	1.00	
Satd. Flow (perm)	535	3356		1002	3420			1467		1300	1531	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	282	41	4	733	2	41	0	13	14	0	14
RTOR Reduction (vph)	0	19	0	0	1	0	0	20	0	0	8	0
Lane Group Flow (vph)	7	304	0	4	734	0	0	34	0	14	6	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	24.0	24.0		24.0	24.0			26.0		26.0	26.0	
Effective Green, g (s)	24.0	24.0		24.0	24.0			26.0		26.0	26.0	
Actuated g/C Ratio	0.40	0.40		0.40	0.40			0.43		0.43	0.43	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Grp Cap (vph)	214	1342		400	1368			635		563	663	
v/s Ratio Prot		0.09			c0.21						0.00	
v/s Ratio Perm	0.01			0.00				c0.02		0.01		
v/c Ratio	0.03	0.23		0.01	0.54			0.05		0.02	0.01	
Uniform Delay, d1	10.9	11.9		10.8	13.8			9.9		9.7	9.7	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.4		0.0	1.5			0.2		0.1	0.0	
Delay (s)	11.2	12.3		10.9	15.3			10.0		9.8	9.7	
Level of Service	B	B		B	B			B		A	A	
Approach Delay (s)		12.2			15.2			10.0			9.8	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	36.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	86	0	0	785	6	382	112	221	0	0	127
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				3.5
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Flpb, ped/bikes		1.00			1.00		1.00	1.00				1.00
Frt		1.00			1.00		1.00	0.90				0.85
Flt Protected		1.00			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3416			5126		1711	3080				2694
Flt Permitted		0.95			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3246			5126		1711	3080				2694
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	3	88	0	0	801	6	390	114	226	0	0	130
RTOR Reduction (vph)	0	0	0	0	1	0	0	117	0	0	0	121
Lane Group Flow (vph)	0	91	0	0	806	0	390	223	0	0	0	9
Confl. Peds. (#/hr)												20
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		47.5			36.5		53.0	53.0				7.5
Effective Green, g (s)		47.5			36.5		53.0	53.0				7.5
Actuated g/C Ratio		0.43			0.33		0.48	0.48				0.07
Clearance Time (s)		4.5			4.5		5.0	5.0				3.5
Lane Grp Cap (vph)		1413			1700		824	1484				183
v/s Ratio Prot		c0.00			c0.16		c0.23	0.07				0.00
v/s Ratio Perm		0.02										
v/c Ratio		0.06			0.47		0.47	0.15				0.05
Uniform Delay, d1		18.3			29.1		19.1	15.9				47.9
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			1.0		1.9	0.2				0.5
Delay (s)		18.4			30.1		21.1	16.1				48.4
Level of Service		B			C		C	B				D
Approach Delay (s)		18.4			30.1			18.8			48.4	
Approach LOS		B			C			B			D	

Intersection Summary			
HCM 2000 Control Delay	26.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	89	566	745	549	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.89	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1501	1426	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1501	1426	3319	1801		
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	92	584	768	566	0	0
RTOR Reduction (vph)	35	35	0	0	0	0
Lane Group Flow (vph)	308	298	768	566	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	38.1	38.1	21.9	70.0		
Effective Green, g (s)	38.1	38.1	21.9	70.0		
Actuated g/C Ratio	0.54	0.54	0.31	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	816	776	1038	1801		
v/s Ratio Prot	0.21		c0.23	0.31		
v/s Ratio Perm		c0.21				
v/c Ratio	0.38	0.38	0.74	0.31		
Uniform Delay, d1	9.1	9.2	21.5	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.3	0.3	2.8	0.1		
Delay (s)	9.4	9.5	24.3	0.1		
Level of Service	A	A	C	A		
Approach Delay (s)	9.5			14.0	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	199	135	181	7	204	13	176	573	16	17	565	168
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.93		1.00	0.99		1.00	1.00		1.00	0.97	
Flpb, ped/bikes	0.98	1.00		0.94	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.99		1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1188	1945		1139	1257		1215	2413		1215	2288	
Flt Permitted	0.36	1.00		0.55	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	454	1945		662	1257		1215	2413		1215	2288	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	207	141	189	7	212	14	183	597	17	18	589	175
RTOR Reduction (vph)	0	127	0	0	2	0	0	2	0	0	28	0
Lane Group Flow (vph)	207	203	0	7	224	0	183	612	0	18	736	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	33.0	33.0		21.9	21.9		17.3	46.6		4.1	33.4	
Effective Green, g (s)	33.0	33.0		21.9	21.9		17.3	46.6		4.1	33.4	
Actuated g/C Ratio	0.33	0.33		0.22	0.22		0.17	0.47		0.04	0.33	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	192	641		144	275		210	1124		49	764	
v/s Ratio Prot	c0.06	0.10			0.18		c0.15	0.25		0.01	c0.32	
v/s Ratio Perm	c0.29			0.01								
v/c Ratio	1.08	0.32		0.05	0.81		0.87	0.54		0.37	0.96	
Uniform Delay, d1	34.1	25.1		30.8	37.1		40.3	19.1		46.7	32.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.03	0.81	
Incremental Delay, d2	87.3	0.3		0.1	16.6		30.2	1.9		3.7	21.6	
Delay (s)	121.3	25.4		31.0	53.7		70.5	21.0		51.7	48.1	
Level of Service	F	C		C	D		E	C		D	D	
Approach Delay (s)		62.4			53.0			32.4			48.2	
Approach LOS		E			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	46.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.6
Intersection Capacity Utilization	98.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

EXISTING PLUS REDUCED DEVELOPMENT ALTERNATIVE INTERSECTION LEVEL OF SERVICE – SATURDAY EVENING

HCM Signalized Intersection Capacity Analysis
1: Third St. & King St.

5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	637	670	58	144	569	78	43	502	167	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Lane Util. Factor	*0.97	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	0.90			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.99	1.00			
Frt	1.00	0.99		1.00	0.98			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4480	3018		2987	2982			5516	1233			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4480	3018		2987	2982			5516	1233			
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	708	744	64	160	632	87	48	558	186	0	0	0
RTOR Reduction (vph)	0	4	0	0	8	0	0	0	152	0	0	0
Lane Group Flow (vph)	708	804	0	160	711	0	0	606	34	0	0	0
Confl. Peds. (#/hr)			100			100	100		100			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	25.4	59.6		11.2	45.4			20.3	20.3			
Effective Green, g (s)	25.4	59.6		11.2	45.4			20.3	20.3			
Actuated g/C Ratio	0.23	0.54		0.10	0.41			0.18	0.18			
Clearance Time (s)	6.8	5.3		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	1034	1635		304	1230			1017	227			
v/s Ratio Prot	c0.16	0.27		0.05	c0.24							
v/s Ratio Perm								0.11	0.03			
v/c Ratio	0.68	0.49		0.53	0.58			0.60	0.15			
Uniform Delay, d1	38.6	15.7		46.9	24.9			41.1	37.6			
Progression Factor	0.57	0.25		1.34	0.25			1.13	3.43			
Incremental Delay, d2	1.7	0.9		0.5	0.2			0.8	0.3			
Delay (s)	23.8	4.9		63.1	6.4			47.3	129.5			
Level of Service	C	A		E	A			D	F			
Approach Delay (s)		13.7			16.7			66.6			0.0	
Approach LOS		B			B			E			A	

Intersection Summary			
HCM 2000 Control Delay	27.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.9
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: Fourth St. & King St.

5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	152	1277	79	51	517	44	7	49	28	60	224	97
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.98		1.00	0.95			1.00	0.63	1.00	0.98	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.96	1.00	0.67	1.00	1.00
Frt	1.00	0.99		1.00	0.99			1.00	0.85	1.00	0.99	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	4288		1296	2437			1542	853	1033	2869	580
Flt Permitted	0.95	1.00		0.95	1.00			0.94	1.00	0.72	1.00	1.00
Satd. Flow (perm)	1540	4288		1296	2437			1451	853	781	2869	580
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	162	1359	84	54	550	47	7	52	30	64	238	103
RTOR Reduction (vph)	0	4	0	0	4	0	0	0	26	0	3	79
Lane Group Flow (vph)	162	1439	0	54	593	0	0	59	4	64	245	14
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	17.5	65.8		8.9	55.6			15.4	15.4	16.4	16.4	16.4
Effective Green, g (s)	17.5	65.8		8.9	55.6			15.4	15.4	16.4	16.4	16.4
Actuated g/C Ratio	0.16	0.60		0.08	0.51			0.14	0.14	0.15	0.15	0.15
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	245	2565		104	1231			203	119	116	427	86
v/s Ratio Prot	0.11	c0.34		0.04	c0.24						c0.09	
v/s Ratio Perm								0.04	0.00	0.08		0.02
v/c Ratio	0.66	0.56		0.52	0.48			0.29	0.04	0.55	0.57	0.16
Uniform Delay, d1	43.5	13.4		48.5	17.8			42.4	40.9	43.4	43.5	40.8
Progression Factor	0.90	1.29		0.84	0.50			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.1	0.7		3.6	0.2			0.8	0.1	5.6	1.9	0.9
Delay (s)	44.4	17.9		44.2	9.1			43.2	41.0	49.0	45.4	41.7
Level of Service	D	B		D	A			D	D	D	D	D
Approach Delay (s)		20.6			12.0			42.5			45.1	
Approach LOS		C			B			D			D	

Intersection Summary			
HCM 2000 Control Delay	22.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	110.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: Fifth St. & I-280 Ramps/King St.

5/12/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1458	80	3	618	30	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3052			3078	1540	1357
Flt Permitted	1.00			0.95	0.95	1.00
Satd. Flow (perm)	3052			2922	1540	1357
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	1602	88	3	679	33	55
RTOR Reduction (vph)	1	0	0	0	0	21
Lane Group Flow (vph)	1689	0	0	682	33	35
Confl. Peds. (#/hr)		10	10			3
Confl. Bikes (#/hr)		1				
Turn Type	NA		Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Actuated Green, G (s)	91.2			91.2	7.5	7.5
Effective Green, g (s)	91.2			91.2	7.5	7.5
Actuated g/C Ratio	0.83			0.83	0.07	0.07
Clearance Time (s)	4.9			4.9	6.4	6.4
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	2530			2422	105	92
v/s Ratio Prot	c0.55				0.02	
v/s Ratio Perm				0.23		c0.03
v/c Ratio	0.67			0.28	0.31	0.38
Uniform Delay, d1	3.6			2.1	48.8	49.0
Progression Factor	1.00			0.53	1.00	1.00
Incremental Delay, d2	1.4			0.1	1.7	2.6
Delay (s)	5.0			1.2	50.5	51.6
Level of Service	A			A	D	D
Approach Delay (s)	5.0			1.2	51.2	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	5.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	69.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
4: Fifth St. & I-80 WB Off-Ramp & Harrison St.

5/12/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	262	1267	145	34	172	356	188	141	456	262
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		3.5			3.0	3.0			3.0	3.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.98	1.00
Flpb, ped/bikes		0.99			0.99	1.00			1.00	1.00
Frt		0.99			1.00	0.95			0.99	0.85
Flt Protected		0.99			0.99	1.00			0.96	1.00
Satd. Flow (prot)		5770			2846	2429			3989	1122
Flt Permitted		0.99			0.83	1.00			0.96	1.00
Satd. Flow (perm)		5770			2373	2429			3989	1122
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	270	1306	149	35	177	367	194	145	470	270
RTOR Reduction (vph)	0	22	0	0	0	6	0	0	0	0
Lane Group Flow (vph)	0	1703	0	0	212	555	0	0	680	205
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Prot	Prot	Prot
Protected Phases		6			4	4		7	7	7
Permitted Phases	6			4						
Actuated Green, G (s)		22.4			20.4	20.4			14.7	14.7
Effective Green, g (s)		24.4			23.4	23.4			17.7	17.7
Actuated g/C Ratio		0.33			0.31	0.31			0.24	0.24
Clearance Time (s)		5.5			6.0	6.0			6.0	6.0
Vehicle Extension (s)		3.0			3.0	3.0			3.0	3.0
Lane Grp Cap (vph)		1877			740	757			941	264
v/s Ratio Prot						c0.23			0.17	c0.18
v/s Ratio Perm		0.30			0.09					
v/c Ratio		0.91			0.29	0.73			0.72	0.78
Uniform Delay, d1		24.2			19.5	23.0			26.4	26.8
Progression Factor		1.00			0.70	1.00			1.00	1.00
Incremental Delay, d2		6.8			0.2	3.7			2.8	13.3
Delay (s)		31.0			13.8	26.7			29.2	40.1
Level of Service		C			B	C			C	D
Approach Delay (s)		31.0			13.8	26.7			31.7	
Approach LOS		C			B	C			C	

Intersection Summary			
HCM 2000 Control Delay	29.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	85.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
5: Fifth St. & Bryant St. & I-80 EB On-Ramp

5/12/2015

Movement	EBL2	EBL	EBT	EBR	NBT	NBR	NBR2	SBL2	SBL	SBT
Lane Configurations										
Volume (vph)	51	317	276	49	155	105	14	231	55	473
Ideal Flow (vphpl)	1400	1400	1400	1400	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.5	2.0		2.5		4.0		2.5	2.5
Lane Util. Factor		0.81	0.81		0.91		0.91		0.91	0.91
Frpb, ped/bikes		1.00	0.99		0.88		0.98		1.00	1.00
Flpb, ped/bikes		1.00	1.00		1.00		1.00		1.00	1.00
Frt		1.00	0.98		0.94		0.85		1.00	1.00
Flt Protected		0.95	0.99		1.00		1.00		0.95	1.00
Satd. Flow (prot)		1700	2620		2297		1161		1327	2547
Flt Permitted		0.95	0.99		1.00		1.00		0.44	0.91
Satd. Flow (perm)		1700	2620		2297		1161		621	2322
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	63	391	341	60	191	130	17	285	68	584
RTOR Reduction (vph)	0	0	19	0	1	0	12	0	0	0
Lane Group Flow (vph)	0	337	499	0	322	0	3	0	292	645
Confl. Peds. (#/hr)	25			60		200				
Confl. Bikes (#/hr)				10		10	10			
Bus Blockages (#/hr)	0	0	8	0	5	0	0	0	0	5
Parking (#/hr)		10	10							10
Turn Type	Split	Split	NA		NA		Perm	pm+pt	pm+pt	NA
Protected Phases	2	2	2		8			7	7	4
Permitted Phases							8	4	4	
Actuated Green, G (s)		18.5	18.5		16.0		16.0		31.0	31.0
Effective Green, g (s)		18.5	21.0		17.5		16.0		32.5	32.5
Actuated g/C Ratio		0.25	0.28		0.23		0.21		0.43	0.43
Clearance Time (s)		4.5	4.5		4.0		4.0		4.0	4.0
Lane Grp Cap (vph)		419	733		535		247		386	1043
v/s Ratio Prot		c0.20	0.19		0.14				c0.13	0.10
v/s Ratio Perm							0.00		c0.20	0.16
v/c Ratio		0.80	0.68		0.60		0.01		0.76	0.62
Uniform Delay, d1		26.5	24.0		25.6		23.3		20.1	16.4
Progression Factor		1.00	1.00		1.00		1.00		0.88	0.89
Incremental Delay, d2		15.1	5.1		5.0		0.1		10.1	2.1
Delay (s)		41.6	29.1		30.6		23.4		27.8	16.7
Level of Service		D	C		C		C		C	B
Approach Delay (s)			34.0		30.3					20.2
Approach LOS			C		C					C

Intersection Summary			
HCM 2000 Control Delay	27.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: Third St. & Channel St.

5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	2	56	8	4	14	9	353	2	7	83	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1570	1570	1570	1900	1900	1900
Total Lost time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.98		0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.93		1.00	1.00		1.00	0.99	
Flt Protected		0.96	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1550	1350		1464		1272	2541		1540	3038	
Flt Permitted		1.00	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1614	1350		1486		1272	2541		1540	3038	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	10	2	58	8	4	14	9	364	2	7	86	7
RTOR Reduction (vph)	0	0	54	0	13	0	0	1	0	0	5	0
Lane Group Flow (vph)	0	12	4	0	13	0	9	365	0	7	88	0
Confl. Peds. (#/hr)	15		5	5		15			64			14
Confl. Bikes (#/hr)			2			1			16			14
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		1.9	1.9		1.9		0.6	9.0		0.6	9.3	
Effective Green, g (s)		1.9	1.9		1.9		0.6	9.0		0.6	9.3	
Actuated g/C Ratio		0.07	0.07		0.07		0.02	0.33		0.02	0.34	
Clearance Time (s)		4.9	4.9		4.9		5.2	5.5		5.5	5.5	
Vehicle Extension (s)		3.0	3.0		3.0		2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		111	93		103		27	834		33	1031	
v/s Ratio Prot							0.01	c0.14		0.00	c0.03	
v/s Ratio Perm		0.01	0.00		c0.01							
v/c Ratio		0.11	0.04		0.13		0.33	0.44		0.21	0.09	
Uniform Delay, d1		12.0	11.9		12.0		13.2	7.2		13.2	6.2	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4	0.2		0.6		2.6	0.4		1.2	0.0	
Delay (s)		12.4	12.1		12.5		15.8	7.6		14.3	6.2	
Level of Service		B	B		B		B	A		B	A	
Approach Delay (s)		12.1			12.5			7.8			6.8	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	27.4	Sum of lost time (s)	15.9
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
7: Fourth St. & Channel St.
5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	5	7	2	2	16	5	29	1	61	59	10
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor		0.95			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00	1.00	1.00	1.00		1.00	0.97	
Flpb, ped/bikes		0.99			1.00	1.00	0.83	1.00		1.00	1.00	
Frt		0.95			1.00	0.85	1.00	1.00		1.00	0.98	
Flt Protected		0.98			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		2371			1413	1230	1146	1438		1377	1379	
Flt Permitted		0.95			1.00	1.00	1.00	1.00		0.95	1.00	
Satd. Flow (perm)		2306			1448	1230	1206	1438		1377	1379	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	8	6	8	2	2	18	6	33	1	70	68	11
RTOR Reduction (vph)	0	8	0	0	0	8	0	1	0	0	3	0
Lane Group Flow (vph)	0	14	0	0	4	10	6	33	0	70	76	0
Confl. Peds. (#/hr)	28		3	3		28	213		19			213
Confl. Bikes (#/hr)			1						18			10
Parking (#/hr)		2										
Turn Type	Perm	NA		Perm	NA	pm+ov	Perm	NA		Prot	NA	
Protected Phases		4			8	1		2		1	6	
Permitted Phases	4			8		8	2					
Actuated Green, G (s)		1.1			1.1	20.8	1.2	1.2		19.7	25.9	
Effective Green, g (s)		1.1			1.1	20.8	1.2	1.2		19.7	25.9	
Actuated g/C Ratio		0.03			0.03	0.56	0.03	0.03		0.53	0.70	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.0	2.0	3.0	3.0		2.0	3.0	
Lane Grp Cap (vph)		68			43	857	39	46		733	965	
v/s Ratio Prot						0.01		c0.02		c0.05	0.05	
v/s Ratio Perm		c0.01			0.00	0.00	0.00					
v/c Ratio		0.21			0.09	0.01	0.15	0.72		0.10	0.08	
Uniform Delay, d1		17.5			17.5	3.6	17.4	17.7		4.3	1.8	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.5			0.9	0.0	1.8	41.6		0.0	0.0	
Delay (s)		19.1			18.4	3.6	19.2	59.3		4.3	1.8	
Level of Service		B			B	A	B	E		A	A	
Approach Delay (s)		19.1			6.3			53.3			3.0	
Approach LOS		B			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.13		
Actuated Cycle Length (s)	37.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
8: Seventh St. & Mission Bay St.
5/12/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	20	104	219	25	52	108
Ideal Flow (vphpl)	1400	1400	1200	1200	1400	1400
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	0.88	*0.75	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	0.97	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1134	1743	1535	848	1134	1194
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1134	1743	1535	848	1134	1194
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	23	120	252	29	60	124
RTOR Reduction (vph)	0	107	0	17	0	0
Lane Group Flow (vph)	23	13	252	12	60	124
Confl. Peds. (#/hr)	60	1		5		
Confl. Bikes (#/hr)		1		30		
Turn Type	Prot	Perm	NA	custom	Prot	NA
Protected Phases	4		2 5	5	1	6
Permitted Phases		4		2		
Actuated Green, G (s)	5.7	5.7	27.3	22.3	5.2	37.5
Effective Green, g (s)	5.7	5.7	27.3	22.3	5.2	37.5
Actuated g/C Ratio	0.11	0.11	0.51	0.42	0.10	0.70
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	121	186	787	435	110	841
v/s Ratio Prot	c0.02		c0.16	0.01	c0.05	0.10
v/s Ratio Perm		0.01		0.01		
v/c Ratio	0.19	0.07	0.32	0.03	0.55	0.15
Uniform Delay, d1	21.6	21.4	7.5	9.1	22.9	2.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.2	0.2	0.0	5.4	0.1
Delay (s)	22.4	21.5	7.8	9.1	28.3	2.7
Level of Service	C	C	A	A	C	A
Approach Delay (s)	21.7		7.9			11.0
Approach LOS	C		A			B

Intersection Summary			
HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	53.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	34.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
9: Terry A Francois Blvd/Terry A Francois Blvd. & South St.

5/12/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	3	1	7	67	43	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95	
Frpb, ped/bikes	0.98		1.00	1.00	1.00	
Flpb, ped/bikes	0.97		0.98	1.00	1.00	
Frt	0.97		1.00	1.00	0.99	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1598		1672	1531	3120	
Flt Permitted	0.96		0.72	1.00	1.00	
Satd. Flow (perm)	1598		1266	1531	3120	
Peak-hour factor, PHF	0.84	0.84	0.84	0.84	0.84	0.84
Adj. Flow (vph)	4	1	8	80	51	4
RTOR Reduction (vph)	1	0	0	0	1	0
Lane Group Flow (vph)	4	0	8	80	54	0
Confl. Peds. (#/hr)	50	50	50			50
Confl. Bikes (#/hr)		10				30
Parking (#/hr)				10	10	
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	0.9		21.7	21.7	21.7	
Effective Green, g (s)	0.9		21.7	21.7	21.7	
Actuated g/C Ratio	0.03		0.67	0.67	0.67	
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	44		842	1019	2076	
v/s Ratio Prot	c0.00			c0.05	0.02	
v/s Ratio Perm			0.01			
v/c Ratio	0.09		0.01	0.08	0.03	
Uniform Delay, d1	15.5		1.8	1.9	1.9	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	0.9		0.0	0.0	0.0	
Delay (s)	16.4		1.8	2.0	1.9	
Level of Service	B		A	A	A	
Approach Delay (s)	16.4			1.9	1.9	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	2.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.08		
Actuated Cycle Length (s)	32.6	Sum of lost time (s)	10.0
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: Third St. & South St.

5/12/2015

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	10	52	287	7	43	226
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.3	5.3	4.9		5.1	4.9
Lane Util. Factor	1.00	1.00	0.95		1.00	0.95
Frpb, ped/bikes	1.00	0.94	1.00		1.00	1.00
Flpb, ped/bikes	0.96	1.00	1.00		1.00	1.00
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1635	1445	3399		1711	3421
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1635	1445	3399		1711	3421
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	11	56	309	8	46	243
RTOR Reduction (vph)	0	52	1	0	0	0
Lane Group Flow (vph)	11	4	316	0	46	243
Confl. Peds. (#/hr)	71	22		46	46	
Confl. Bikes (#/hr)		10		10		
Turn Type	Perm	Perm	NA		Prot	NA
Protected Phases			2		1	6
Permitted Phases	8	8				
Actuated Green, G (s)	4.2	4.2	36.8		2.9	44.8
Effective Green, g (s)	4.2	4.2	36.8		2.9	44.8
Actuated g/C Ratio	0.07	0.07	0.62		0.05	0.76
Clearance Time (s)	5.3	5.3	4.9		5.1	4.9
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	115	102	2112		83	2588
v/s Ratio Prot			c0.09		c0.03	0.07
v/s Ratio Perm	c0.01	0.00				
v/c Ratio	0.10	0.04	0.15		0.55	0.09
Uniform Delay, d1	25.7	25.6	4.7		27.5	1.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.4	0.2	0.1		7.8	0.1
Delay (s)	26.1	25.8	4.8		35.3	2.0
Level of Service	C	C	A		D	A
Approach Delay (s)	25.8		4.8			7.3
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	59.2	Sum of lost time (s)	15.3
Intersection Capacity Utilization	48.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
11: Terry A Francois Blvd./Terry A Francois Blvd & 16th

5/12/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	10	5	5	64	34	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.97	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1521	1344		2873	2769	
Flt Permitted	0.95	1.00		0.93	1.00	
Satd. Flow (perm)	1521	1344		2683	2769	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	12	6	6	75	40	12
RTOR Reduction (vph)	0	6	0	0	10	0
Lane Group Flow (vph)	12	0	0	81	42	0
Confl. Peds. (#/hr)	1	1	25			25
Parking (#/hr)				5	5	
Turn Type	Prot	Perm	Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	0.7	0.7		6.6	6.6	
Effective Green, g (s)	0.7	0.7		6.6	6.6	
Actuated g/C Ratio	0.02	0.02		0.16	0.16	
Clearance Time (s)	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	25	22		416	430	
v/s Ratio Prot	c0.01				0.02	
v/s Ratio Perm		0.00		c0.03		
v/c Ratio	0.48	0.00		0.19	0.10	
Uniform Delay, d1	20.7	20.6		15.6	15.4	
Progression Factor	1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.8	0.1		0.2	0.1	
Delay (s)	34.5	20.6		15.9	15.5	
Level of Service	C	C		B	B	
Approach Delay (s)	29.9			15.9	15.5	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.06		
Actuated Cycle Length (s)	42.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	22.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
12: Illinois St & 16th

5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	138	1	20	2	2	5	28	41	6	5	96	107
Peak Hour Factor	0.92	0.79	0.79	0.79	0.79	0.92	0.79	0.92	0.79	0.92	0.92	0.92
Hourly flow rate (vph)	150	1	25	3	3	5	35	45	8	5	104	116

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total (vph)	150	27	3	8	88	110	116
Volume Left (vph)	150	0	3	0	35	5	0
Volume Right (vph)	0	25	0	5	8	0	116
Hadj (s)	0.53	-0.63	0.53	-0.44	0.06	0.06	-0.67
Departure Headway (s)	5.8	4.6	6.0	5.0	5.3	5.2	4.4
Degree Utilization, x	0.24	0.03	0.00	0.01	0.13	0.16	0.14
Capacity (veh/h)	589	731	558	664	647	667	775
Control Delay (s)	9.5	6.6	7.8	6.9	9.1	7.9	7.0
Approach Delay (s)	9.0		7.1		9.1	7.4	
Approach LOS	A		A		A	A	

Intersection Summary			
Delay	8.3		
Level of Service	A		
Intersection Capacity Utilization	33.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
13: Third St. & 16th St.

5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	46	117	99	1	130	6	62	242	41	1	163	71
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.96	1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1279	1365	1128	1290	1365	1114	2515	2525		1296	2456	
Flt Permitted	0.66	1.00	1.00	0.67	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	894	1365	1128	914	1365	1114	2515	2525		1296	2456	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	52	131	111	1	146	7	70	272	46	1	183	80
RTOR Reduction (vph)	0	0	90	0	0	6	0	12	0	0	49	0
Lane Group Flow (vph)	52	131	21	1	146	1	70	306	0	1	214	0
Confl. Peds. (#/hr)	41		14	14		41			39			8
Confl. Bikes (#/hr)			9			10			4			14
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)	7.9	7.9	7.9	7.9	7.9	7.9	3.6	17.1		0.8	14.3	
Effective Green, g (s)	7.9	7.9	7.9	7.9	7.9	7.9	3.6	17.1		0.8	14.3	
Actuated g/C Ratio	0.19	0.19	0.19	0.19	0.19	0.19	0.09	0.41		0.02	0.34	
Clearance Time (s)	5.5	5.5	5.5	5.5	5.5	5.5	5.0	5.2		5.0	5.2	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	170	259	214	173	259	212	218	1040		24	846	
v/s Ratio Prot		0.10			c0.11		0.03	c0.12		0.00	c0.09	
v/s Ratio Perm	0.06		0.02	0.00		0.00						
v/c Ratio	0.31	0.51	0.10	0.01	0.56	0.01	0.32	0.29		0.04	0.25	
Uniform Delay, d1	14.4	15.1	13.9	13.6	15.2	13.6	17.8	8.2		20.0	9.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	1.6	0.2	0.0	2.8	0.0	0.9	0.2		0.7	0.2	
Delay (s)	15.5	16.6	14.1	13.6	18.0	13.6	18.7	8.3		20.7	9.9	
Level of Service	B	B	B	B	B	B	B	A		C	A	
Approach Delay (s)		15.4			17.8			10.2			10.0	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	41.5	Sum of lost time (s)	15.7
Intersection Capacity Utilization	68.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Construction Driveway/4th St & 16th St.

5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	243	1	2	248	12	3	5	1	17	1	44
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.87	1.00	1.00		1.00	0.93	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.92	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1621	1706	1450	1621	1706	1255	1621	1663		1493	1356	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.73	1.00		0.75	1.00	
Satd. Flow (perm)	1621	1706	1450	1621	1706	1255	1239	1663		1185	1356	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	41	253	1	2	258	12	3	5	1	18	1	46
RTOR Reduction (vph)	0	0	0	0	0	6	0	1	0	0	37	0
Lane Group Flow (vph)	41	253	1	2	258	6	3	5	0	18	10	0
Confl. Peds. (#/hr)	50					50				50		50
Confl. Bikes (#/hr)						10						10
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	7.4	47.2	47.2	2.4	42.2	42.2	14.9	14.9		14.9	14.9	
Effective Green, g (s)	7.4	47.2	47.2	2.4	42.2	42.2	14.9	14.9		14.9	14.9	
Actuated g/C Ratio	0.09	0.59	0.59	0.03	0.53	0.53	0.19	0.19		0.19	0.19	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	150	1012	860	48	905	666	232	311		222	254	
v/s Ratio Prot	c0.03	c0.15		0.00	c0.15			0.00			0.01	
v/s Ratio Perm			0.00			0.01	0.00			c0.02		
v/c Ratio	0.27	0.25	0.00	0.04	0.29	0.01	0.01	0.02		0.08	0.04	
Uniform Delay, d1	33.5	7.7	6.6	37.4	10.3	8.8	26.3	26.3		26.7	26.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	0.6	0.0	0.4	0.2	0.0	0.0	0.0		0.2	0.1	
Delay (s)	34.5	8.3	6.6	37.8	10.5	8.8	26.3	26.4		26.8	26.5	
Level of Service	C	A	A	D	B	A	C	C		C	C	
Approach Delay (s)		11.9			10.6			26.3			26.6	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	13.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	79.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: 16th St. & Owens St.

5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑↱			↰↑	↱
Volume (vph)	14	250	3	5	286	4	11	42	13	21	14	39
Ideal Flow (vphpl)	1500	1500	1900	1900	1500	1500	1900	1900	1900	1500	1900	1500
Total Lost time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Lane Util. Factor	1.00	*0.95	1.00	1.00	*0.95	1.00	1.00	0.95			0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.96	1.00	1.00			1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.97	1.00
Satd. Flow (prot)	1215	1215	1378	1540	1215	1049	1540	2967			2989	1074
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.95	1.00
Satd. Flow (perm)	1215	1215	1378	1540	1215	1049	1543	2967			2941	1074
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	16	281	3	6	321	4	12	47	15	24	16	44
RTOR Reduction (vph)	0	0	2	0	0	2	0	13	0	0	0	39
Lane Group Flow (vph)	16	281	1	6	321	2	12	49	0	0	40	5
Confl. Peds. (#/hr)						17						3
Confl. Bikes (#/hr)						36						
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	0.7	13.6	13.6	0.4	12.3	12.3	4.2	4.2			3.2	3.2
Effective Green, g (s)	0.7	13.6	13.6	0.4	12.3	12.3	4.2	4.2			3.2	3.2
Actuated g/C Ratio	0.02	0.44	0.44	0.01	0.39	0.39	0.13	0.13			0.10	0.10
Clearance Time (s)	5.0	5.0	5.0	4.0	5.0	5.0	4.0	4.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	27	529	600	19	478	413	207	399			301	110
v/s Ratio Prot	c0.01	0.23		0.00	c0.26			c0.02				
v/s Ratio Perm			0.00			0.00	0.01				0.01	0.00
v/c Ratio	0.59	0.53	0.00	0.32	0.67	0.00	0.06	0.12			0.13	0.04
Uniform Delay, d1	15.1	6.5	5.0	15.3	7.8	5.7	11.8	11.9			12.7	12.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	30.3	1.0	0.0	9.3	3.7	0.0	0.1	0.1			0.2	0.2
Delay (s)	45.4	7.5	5.0	24.6	11.5	5.7	11.9	12.0			12.9	12.8
Level of Service	D	A	A	C	B	A	B	B			B	B
Approach Delay (s)		9.5			11.6			12.0			12.9	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	11.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	31.2	Sum of lost time (s)	15.0
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Mississippi St./Seventh St. & 16th St.

5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↑	↱	↰	↑	↱	↰	↱	
Volume (vph)	20	207	60	8	246	82	31	91	8	52	40	24
Ideal Flow (vphpl)	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650	1650
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	*0.80		1.00	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	*0.80	
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.92	1.00	1.00	0.95	1.00	0.97	
Flpb, ped/bikes	0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1326	917		1333	1126	881	1070	957	911	1070	1036	
Flt Permitted	0.37	1.00		0.53	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	521	917		742	1126	881	1070	957	911	1070	1036	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	24	244	71	9	289	96	36	107	9	61	47	28
RTOR Reduction (vph)	0	10	0	0	0	43	0	0	8	0	22	0
Lane Group Flow (vph)	24	305	0	9	289	53	36	107	1	61	53	0
Confl. Peds. (#/hr)	28		6	6		28			4			11
Confl. Bikes (#/hr)			9			50			7			15
Parking (#/hr)		10	10					10				
Turn Type	pm+pt	NA		pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases	2			6		6			8			
Actuated Green, G (s)	33.2	33.2		32.6	32.6	40.0	7.5	11.9	11.9	7.4	11.8	
Effective Green, g (s)	33.2	33.2		32.6	32.6	40.0	7.5	11.9	11.9	7.4	11.8	
Actuated g/C Ratio	0.45	0.45		0.45	0.45	0.55	0.10	0.16	0.16	0.10	0.16	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	249	417		335	502	543	109	156	148	108	167	
v/s Ratio Prot	0.00	c0.33		0.00	c0.26	0.01	0.03	c0.11		c0.06	0.05	
v/s Ratio Perm	0.04			0.01		0.05			0.00			
v/c Ratio	0.10	0.73		0.03	0.58	0.10	0.33	0.69	0.01	0.56	0.32	
Uniform Delay, d1	11.8	16.3		11.3	15.0	7.9	30.4	28.8	25.6	31.3	27.0	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	6.5		0.0	1.6	0.1	1.8	11.8	0.0	6.6	1.1	
Delay (s)	11.9	22.8		11.4	16.6	8.0	32.2	40.6	25.6	37.9	28.2	
Level of Service	B	C		B	B	A	C	D	C	D	C	
Approach Delay (s)		22.0			14.4			37.7			32.5	
Approach LOS		C			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	22.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	73.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
17: Illinois St./Illinois St & Mariposa St./Terry A Francois Blvd.
5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	39	27	26	54	7	22	24	30	5	24	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Lane Util. Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		0.99		1.00	1.00			1.00	0.98		0.98	
Flpb, ped/bikes		0.99		0.99	1.00			1.00	1.00		1.00	
Frt		0.97		1.00	0.98			1.00	0.85		0.89	
Flt Protected		0.98		0.95	1.00			0.98	1.00		1.00	
Satd. Flow (prot)		1430		1688	1762			1751	1501		1342	
Flt Permitted		0.85		0.78	1.00			0.84	1.00		0.99	
Satd. Flow (perm)		1239		1391	1762			1514	1501		1328	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	54	49	34	32	68	9	28	30	38	6	30	129
RTOR Reduction (vph)	0	15	0	0	6	0	0	0	31	0	105	0
Lane Group Flow (vph)	0	122	0	32	71	0	0	58	7	0	60	0
Confl. Peds. (#/hr)	13		16	16		13	16		19	19		16
Parking (#/hr)		10	10								10	10
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4		4	8		
Actuated Green, G (s)		11.6		11.6	11.6			8.7	8.7		8.7	
Effective Green, g (s)		11.6		11.6	11.6			8.7	8.7		8.7	
Actuated g/C Ratio		0.25		0.25	0.25			0.19	0.19		0.19	
Clearance Time (s)		5.0		5.0	5.0			5.0	5.0		5.0	
Vehicle Extension (s)		3.0		3.0	3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		313		351	445			286	284		251	
v/s Ratio Prot					0.04							
v/s Ratio Perm		c0.10		0.02				0.04	0.00		c0.05	
v/c Ratio		0.39		0.09	0.16			0.20	0.03		0.24	
Uniform Delay, d1		14.2		13.1	13.4			15.7	15.1		15.8	
Progression Factor		1.00		1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.8		0.1	0.2			0.4	0.0		0.5	
Delay (s)		15.0		13.2	13.5			16.0	15.2		16.3	
Level of Service		B		B	B			B	B		B	
Approach Delay (s)		15.0			13.4			15.7			16.3	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	45.9	Sum of lost time (s)	14.0
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
18: Third St. & Mariposa St.
5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	46	83	21	52	113	13	16	286	14	12	179	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1400	1400	1400	1400	1400	1400
Total Lost time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.97	1.00		0.98	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.98		1.00	0.99		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1666	3294		1678	3352		1260	2498		1260	2390	
Flt Permitted	0.66	1.00		0.68	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1158	3294		1195	3352		1260	2498		1260	2390	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	53	95	24	60	130	15	18	329	16	14	206	83
RTOR Reduction (vph)	0	16	0	0	9	0	0	3	0	0	40	0
Lane Group Flow (vph)	53	103	0	60	136	0	18	342	0	14	249	0
Confl. Peds. (#/hr)	34		24	24		34			16			15
Confl. Bikes (#/hr)			2			6			6			19
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	30.1	30.1		30.1	30.1		6.8	43.9		2.6	39.7	
Effective Green, g (s)	30.1	30.1		30.1	30.1		6.8	43.9		2.6	39.7	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.07	0.48		0.03	0.43	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.1	5.1		5.1	5.1	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	378	1076		390	1095		93	1190		35	1030	
v/s Ratio Prot		0.03			0.04		0.01	c0.14		0.01	c0.10	
v/s Ratio Perm	0.05			c0.05								
v/c Ratio	0.14	0.10		0.15	0.12		0.19	0.29		0.40	0.24	
Uniform Delay, d1	21.9	21.5		22.0	21.8		40.1	14.6		44.0	16.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.0		0.2	0.1		1.0	0.6		7.3	0.1	
Delay (s)	22.0	21.6		22.2	21.8		41.1	15.2		51.3	16.8	
Level of Service	C	C		C	C		D	B		D	B	
Approach Delay (s)		21.7			21.9			16.5			18.4	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	92.1	Sum of lost time (s)	15.5
Intersection Capacity Utilization	80.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
19: Minnesota St./4th St. & Mariposa St.

5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑↱		↰	↑↑↱			✥		↰	↱	
Volume (vph)	2	173	11	2	196	1	13	0	1	2	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00			0.99		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00			0.96		0.95	1.00	
Satd. Flow (prot)	1711	3390		1711	3419			1705		1711	1621	
Flt Permitted	0.62	1.00		0.63	1.00			0.83		0.75	1.00	
Satd. Flow (perm)	1112	3390		1127	3419			1479		1346	1621	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	188	12	2	213	1	14	0	1	2	1	2
RTOR Reduction (vph)	0	9	0	0	1	0	0	9	0	0	1	0
Lane Group Flow (vph)	2	191	0	2	213	0	0	6	0	2	2	0
Parking (#/hr)									5			
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	7.2	7.2		7.2	7.2			10.8		10.8	10.8	
Effective Green, g (s)	7.2	7.2		7.2	7.2			10.8		10.8	10.8	
Actuated g/C Ratio	0.26	0.26		0.26	0.26			0.39		0.39	0.39	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	285	871		289	879			570		519	625	
v/s Ratio Prot		0.06			c0.06						0.00	
v/s Ratio Perm	0.00			0.00				c0.00		0.00		
v/c Ratio	0.01	0.22		0.01	0.24			0.01		0.00	0.00	
Uniform Delay, d1	7.7	8.2		7.7	8.2			5.3		5.3	5.3	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.1		0.0	0.1			0.0		0.0	0.0	
Delay (s)	7.7	8.3		7.7	8.4			5.3		5.3	5.3	
Level of Service	A	A		A	A			A		A	A	
Approach Delay (s)		8.3			8.4			5.3			5.3	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.10		
Actuated Cycle Length (s)	28.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	21.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
20: I-280 NB Off-Ramp & Mariposa St.

5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑			↑↑↑↱		↰	↑↱				↱↱
Volume (vph)	1	85	0	0	266	2	155	43	109	0	0	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		5.0	5.0				5.0
Lane Util. Factor		0.95			*0.95		1.00	0.95				0.88
Frt		1.00			1.00		1.00	0.89				0.85
Flt Protected		1.00			1.00		0.95	1.00				1.00
Satd. Flow (prot)		3420			5127		1711	3054				2694
Flt Permitted		0.95			1.00		0.95	1.00				1.00
Satd. Flow (perm)		3265			5127		1711	3054				2694
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	1	106	0	0	332	2	194	54	136	0	0	31
RTOR Reduction (vph)	0	0	0	0	1	0	0	81	0	0	0	29
Lane Group Flow (vph)	0	107	0	0	333	0	194	109	0	0	0	2
Turn Type	Prot	NA			NA		Split	NA				Over
Protected Phases	1	6			2		8	8				1
Permitted Phases												
Actuated Green, G (s)		35.5			26.5		31.0	31.0				4.0
Effective Green, g (s)		35.5			26.5		31.0	31.0				4.0
Actuated g/C Ratio		0.47			0.35		0.41	0.41				0.05
Clearance Time (s)		4.5			4.5		5.0	5.0				5.0
Lane Grp Cap (vph)		1533			1787		697	1245				141
v/s Ratio Prot		c0.00			c0.07		c0.11	0.04				0.00
v/s Ratio Perm		0.03										
v/c Ratio		0.07			0.19		0.28	0.09				0.01
Uniform Delay, d1		11.2			17.2		15.0	13.8				34.1
Progression Factor		1.00			1.00		1.00	1.00				1.00
Incremental Delay, d2		0.1			0.2		1.0	0.1				0.1
Delay (s)		11.2			17.5		16.0	14.0				34.3
Level of Service		B			B		B	B				C
Approach Delay (s)		11.2			17.5			15.0			34.3	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	16.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.23		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	32.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
21: I-280 SB On-Ramp & Mariposa St.
5/12/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	86	169	207	239	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0		
Lane Util. Factor	0.95	0.95	0.97	1.00		
Frpb, ped/bikes	0.99	0.98	1.00	1.00		
Flpb, ped/bikes	1.00	1.00	1.00	1.00		
Frt	0.95	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1609	1428	3319	1801		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1609	1428	3319	1801		
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	105	206	252	291	0	0
RTOR Reduction (vph)	19	49	0	0	0	0
Lane Group Flow (vph)	144	99	252	291	0	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		5				
Turn Type	NA	Perm	Prot	NA		
Protected Phases	4		3	8		
Permitted Phases		4				
Actuated Green, G (s)	40.1	40.1	9.9	60.0		
Effective Green, g (s)	40.1	40.1	9.9	60.0		
Actuated g/C Ratio	0.67	0.67	0.17	1.00		
Clearance Time (s)	5.0	5.0	5.0	5.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	1075	954	547	1801		
v/s Ratio Prot	0.09		c0.08	c0.16		
v/s Ratio Perm		0.07				
v/c Ratio	0.13	0.10	0.46	0.16		
Uniform Delay, d1	3.6	3.5	22.6	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.1	0.0	0.6	0.0		
Delay (s)	3.7	3.6	23.3	0.0		
Level of Service	A	A	C	A		
Approach Delay (s)	3.6			10.8	0.0	
Approach LOS	A			B	A	

Intersection Summary			
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	23.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
22: Third St. & Cesar Chavez
5/12/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	57	33	105	2	25	0	85	195	0	6	187	61
Ideal Flow (vphpl)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Total Lost time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.94		1.00	1.00		1.00	1.00		1.00	0.98	
Flpb, ped/bikes	0.98	1.00		0.95	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	1.00		1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1186	1897		1155	1279		1215	2431		1215	2297	
Flt Permitted	0.41	1.00		0.65	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	508	1897		795	1279		1215	2431		1215	2297	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	64	37	118	2	28	0	96	219	0	7	210	69
RTOR Reduction (vph)	0	85	0	0	0	0	0	0	0	0	25	0
Lane Group Flow (vph)	64	70	0	2	28	0	96	219	0	7	254	0
Confl. Peds. (#/hr)	100		100	100		100			100			100
Confl. Bikes (#/hr)			10			10			10			10
Parking (#/hr)		5	5									
Turn Type	pm+pt	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	17.4	17.4		6.5	6.5		8.6	25.4		2.5	19.3	
Effective Green, g (s)	17.4	17.4		6.5	6.5		8.6	25.4		2.5	19.3	
Actuated g/C Ratio	0.28	0.28		0.11	0.11		0.14	0.41		0.04	0.31	
Clearance Time (s)	5.3	5.3		5.3	5.3		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	205	535		83	134		169	1002		49	719	
v/s Ratio Prot	c0.03	0.04			0.02		c0.08	0.09		0.01	c0.11	
v/s Ratio Perm	c0.06			0.00								
v/c Ratio	0.31	0.13		0.02	0.21		0.57	0.22		0.14	0.35	
Uniform Delay, d1	17.0	16.5		24.7	25.2		24.8	11.7		28.5	16.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	0.1		0.1	0.8		4.3	0.1		1.3	0.3	
Delay (s)	17.9	16.6		24.8	26.0		29.1	11.8		29.9	16.6	
Level of Service	B	B		C	C		C	B		C	B	
Approach Delay (s)		17.0			25.9			17.1			17.0	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	61.6	Sum of lost time (s)	21.6
Intersection Capacity Utilization	70.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

REDUCED DEVELOPMENT ALTERNATIVE
TRAFFIC CONTRIBUTIONS TO LOS E OR LOS F

PROJECT ALTERNATIVES: 2015 EXISTING PLUS ALTERNATIVE

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: Reduced Project Alternative, Weekday PM Peak Hour, No Giants

Intersection	Critical Movement Operating at E or F	Project Contribution	Total Volumes	% Project Contribution	Impact ?
1: King / Third	EBL	0	889	0.0%	No
3: King / Fifth / I-280 Ramps	EBT	0	1689	0.0%	No
5: Fifth / Bryant / I-80 EB on-ramp	NBT/R	0	700	0.0%	No
	SBL/L2	0	384	0.0%	No
	EBT/R	0	613	0.0%	No
16: 7th / Mississippi / 16th	NBT	0	357	0.0%	No
	SBL	**21**	**96**	**21.9%**	**Yes**
	WBT	**69**	**465**	**14.8%**	**Yes**
	EBT/R	**49**	**447**	**11.0%**	**Yes**

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: Reduced Project Alternative, Saturday Evening, No Giants

No E → E or F→F intersections.

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: Reduced Project Alternative, Weekday PM Peak Hour, No Giants

Intersection	Critical Movement Operating at E or F	Project Contribution	2040 Total Volumes[1]	% Project Contribution	Impact ?
1: King / Third	NBR	13	481	2.7%	No
	EBL	0	924	0.0%	No
	WBT/R	0	984	0.0%	No
2: King / Fourth	SBT	10	625	1.6%	No
	EBL	0	346	0.0%	No
	WBT/R	0	986	0.0%	No
4: Fifth / Harrison / I-80 WB off-ramp	SBT	0	810	0.0%	No
	SBR	0	340	0.0%	No
	NWL2 / L	12	1707	0.7%	No
5: Fifth / Bryant / I-80 EB on-ramp	NBT	0	565	0.0%	No
	NBR	0	140	0.0%	No
	SBT	4	956	0.4%	No
	EBT/R	0	1160	0.0%	No
6: Third / Channel	NBL	0	39	0.0%	No
	NBT/R	32	1563	2.0%	No
	SBL	0	58	0.0%	No
15: Owens / 16th	NBL	0	138	0.0%	No
	EBL	0	137	0.0%	No
	WBT	**99**	**831**	**11.9%**	**Yes**
16: 7th / Mississippi / 16th	NBT	0	329	0.0%	No
	SBL	**21**	**162**	**13.0%**	**Yes**
	EBT/R	**49**	**637**	**7.7%**	**Yes**
18: Third / Mariposa	NBT/R	31	1257	2.4%	No
	EBL	0	205	0.0%	No
22: Third / Cesar Chavez	SBL	0	110	0.0%	No
	SBT/R	41	1200	3.4%	No
	EBL	6	227	2.6%	No

Project Contributions to Critical Movements at Intersections Operating at LOS E or F: Reduced Project Alternative, Saturday Evening, No Giants

Intersection	Critical Movement Operating at E or F	Project Contribution	2040 Total Volumes[1]	% Project Contribution	Impact?
4: Fifth / Harrison / I-80 WB off-ramp	SBT/R	0	840	0.0%	No
	NWR	0	455	0.0%	No

[1] Volumes presented are 2040 Cumulative Plus Project, No Event for the corresponding time period.

EXISTING PLUS REDUCED DEVELOPMENT ALTERNATIVE
FREEWAY MERGE AND DIVERGE LOS

HCM 2000
Merge Ramp Junctions
Capacity Analysis

Jurisdiction San Francisco — Agency or Company Fehr & Peers
Analysis Year Alternative - R2 Project — Date 2/1/2015
Analyst DW — Project Description GSW - based on Central SoMa and Seawall Lot analysis

General Information				*Freeway Data*			*Freeway Volume Adjustment*									Effective	*On-Ramp Data*							
	Freeway/ Direction	On-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Flow Rate v_p (pcph)	Type	Lanes	Lane Add?	S_{FR} (mph)	V_R (vph)	Accel Lane (ft) L_{A1}	L_{A2}	L_{Aeff}
Existing																								
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	3	60.0	7,673	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	8,549	8,549	Left	1	No	60.0	1,110	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkend	3	60.0	5,018	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	5,590	5,590	Left	1	No	60.0	653	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	1	No	60.0	0	700	0	700
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	5	60.0	8,783	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	9,785	7,285	Right	1	No	45.0	1,099	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkend	5	60.0	5,671	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,318	4,802	Right	1	No	45.0	360	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	5	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	250	0	250
M3	I-280 SB	Mariposa on-ramp	Wkday PM	3	60.0	3,625	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,039	4,039	Right	1	No	45.0	1,311	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Eve	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Late	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkend	3	60.0	1,370	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	1,526	1,526	Right	1	No	45.0	376	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	No	45.0	0	480	0	480
	I-280 SB	Mariposa on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	480	0	480
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	3	60.0	4,421	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	4,926	4,926	Right	1	No	45.0	1,130	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Eve	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Late	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkend	3	60.0	1,521	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	1,695	1,695	Right	1	No	45.0	239	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350
	I-280 SB	Penn/25th on-ramp	Wkend w/	3	60.0	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.98	1.00	0	0	Right	1	No	45.0	0	350	0	350

HCM 2000
Merge Ramp Junctions
Capacity Analysis

Juri
Analy:

	General Information			*On-Ramp Volume Adjustment*									*Adjacent Upstream Ramp Data*											
	Freeway/ Direction	On-ramp	Analysis Time Period	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
Existing																								
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,237	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	728	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,224	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	401	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
M3	I-280 SB	Mariposa on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,461	No											
	I-280 SB	Mariposa on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	419	No											
	I-280 SB	Mariposa on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 SB	Mariposa on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	1,259	No											
	I-280 SB	Penn/25th on-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	266	No											
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											
	I-280 SB	Penn/25th on-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.98	1.00	0	No											

HCM 2000
Merge Ramp Junctions
Capacity Analysis

Juri
Analy:

	General Information			*Adjacent Downstream Ramp Data*												*v_{12} Estimation*						
	Freeway/ Direction	On-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	L_{EQ} 25-2	L_{EQ} 25-3	P_{FM} Equations 1	P_{FM} Equations 2	P_{FM} Equations 3	P_{FM}	v_{12} (pcph)
Existing																						
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	No														0.597			0.597	5,717
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkend	No														0.597			0.597	3,739
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	No														0.597			0.597	0
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	No														0.597			0.597	0
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	No														0.585			0.127	923
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkend	No														0.585			0.230	1,102
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	No														0.585			0.280	0
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	No														0.585			0.280	0
M3	I-280 SB	Mariposa on-ramp	Wkday PM	No														0.591			0.591	2,387
	I-280 SB	Mariposa on-ramp	Wkday Eve	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Late	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkend	No														0.591			0.591	902
	I-280 SB	Mariposa on-ramp	Wkday PM w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkday Late w/	No														0.591			0.591	0
	I-280 SB	Mariposa on-ramp	Wkend w/	No														0.591			0.591	0
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	No														0.587			0.587	2,893
	I-280 SB	Penn/25th on-ramp	Wkday Eve	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Late	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkend	No														0.587			0.587	995
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	No														0.587			0.587	0
	I-280 SB	Penn/25th on-ramp	Wkend w/	No														0.587			0.587	0

	General Information			*Capacity Checks*																*Results*	
	Freeway/ Direction	On-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	v_{R12a} (pcph)	Max v_{R12a} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?	Density, D (pcplpm)	Level of Service
Existing																					
M1	I-80 EB	Fifth/Bryant on-ramp	Wkday PM	8,549	6,900	**Yes**	9,785	6,900	**Yes**	2,832	Yes	No	5,849	7,085	4,600	**Yes**	1,237	2,200	No	**-**	**F**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkend	5,590	6,900	No	6,318	6,900	No	1,852	No	No	3,739	4,466	4,600	No	728	2,200	No	**35.6**	**E**
	I-80 EB	Fifth/Bryant on-ramp	Wkday PM w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Eve w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkday Late w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
	I-80 EB	Fifth/Bryant on-ramp	Wkend w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,200	No	**1.1**	**A**
M2	I-80 EB	Sterling/Bryant on-ramp	Wkday PM	7,285	11,500	No	8,510	11,500	No	3,181	Yes	Yes	2,914	4,139	4,600	No	1,224	2,100	No	**35.6**	**E**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkend	4,802	11,500	No	5,203	11,500	No	1,850	No	Yes	1,921	2,322	4,600	No	401	2,100	No	**21.8**	**C**
	I-80 EB	Sterling/Bryant on-ramp	Wkday PM w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Eve w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkday Late w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
	I-80 EB	Sterling/Bryant on-ramp	Wkend w/	0	11,500	No	0	11,500	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.9**	**A**
M3	I-280 SB	Mariposa on-ramp	Wkday PM	4,039	6,900	No	5,499	6,900	No	1,652	No	No	2,387	3,847	4,600	No	1,461	2,100	No	**31.8**	**D**
	I-280 SB	Mariposa on-ramp	Wkday Eve	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Late	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkend	1,526	6,900	No	1,945	6,900	No	624	No	No	902	1,321	4,600	No	419	2,100	No	**12.6**	**B**
	I-280 SB	Mariposa on-ramp	Wkday PM w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Eve w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkday Late w/	0	6,900	No	0	6,900	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
	I-280 SB	Mariposa on-ramp	Wkend w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**2.5**	**A**
M4	I-280 SB	Penn/25th on-ramp	Wkday PM	4,926	7,050	No	6,185	7,050	No	2,033	No	No	2,893	4,152	4,600	No	1,259	2,100	No	**35.1**	**E**
	I-280 SB	Penn/25th on-ramp	Wkday Eve	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Late	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkend	1,695	7,050	No	1,961	7,050	No	699	No	No	995	1,262	4,600	No	266	2,100	No	**13.0**	**B**
	I-280 SB	Penn/25th on-ramp	Wkday PM w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Eve w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkday Late w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**
	I-280 SB	Penn/25th on-ramp	Wkend w/	0	7,050	No	0	7,050	No	0	No	No	0	0	4,600	No	0	2,100	No	**3.3**	**A**

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Jurisdiction San Francisco | Agency or Company Fehr & Peers
Analysis Year Alternative - R2 Project | Date 2/1/2015
Analyst DW | Project Description GSW - based on Central SoMa and Seawall Lot analysis

General Information				*Freeway Data*			*Freeway Volume Adjustment*									Effective	*Off-Ramp Data*							
	Freeway/ Direction	Off-ramp	Analysis Time Period	Lanes	S_{FF} (mph)	V (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Flow Rate v_p (pcph)	Type	Lanes	Lane Drop?	S_{FR} (mph)	V_R (vph)	Decel Lane (ft) L_{D1}	L_{D2}	L_{Deff}
Existing																								
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	4	60	6,365	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	7,091	7,091	Left	2	Yes	45.0	1,192	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkend	4	60	5,598	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	6,237	6,237	Left	2	Yes	45.0	859	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Left	2	Yes	45.0	0	50	0	100
D2	I-280 NB	Mariposa off-ramp	Wkday PM	4	60	4,445	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	4,952	4,952	Right	1	Yes	45.0	715	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Eve	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Late	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkend	4	60	2,675	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	2,980	2,980	Right	1	Yes	45.0	307	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday PM w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkday Late w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50
	I-280 NB	Mariposa off-ramp	Wkend w/	4	60	0	0.92	Level	5.0%	0.0%	1.5	1.20	0.976	1.00	0	0	Right	1	Yes	45.0	0	50	0	50

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Juri
Analy:

	General Information			*Off-Ramp Volume Adjustment*									*Adjacent Upstream Ramp Data*											
	Freeway/ Direction	Off-ramp	Analysis Time Period	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)
Existing																								
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	1,328	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	957	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
D2	I-280 NB	Mariposa off-ramp	Wkday PM	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	797	No											
	I-280 NB	Mariposa off-ramp	Wkday Eve	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Late	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkend	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	342	No											
	I-280 NB	Mariposa off-ramp	Wkday PM w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkday Late w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											
	I-280 NB	Mariposa off-ramp	Wkend w/	0.92	Level	5.0%	0.0%	1.5	1.2	0.976	1.00	0	No											

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Juri
Analy

	General Information			*Adjacent Downstream Ramp Data*												*v_{12} Estimation*						
	Freeway/ Direction	Off-ramp	Analysis Time Period	Exists?	Distance	Volume (vph)	PHF	Terrain	Truck/ Bus %	RV %	E_T	E_R	f_{HV}	f_P	Flow Rate v_p (pcph)	L_{EQ} 25-13	L_{EQ} 25-14	P_{FD} Equations 5	P_{FD} Equations 6	P_{FD} Equations 7	P_{FD}	v_{12} (pcph)
Existing																						
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	No														0.522			0.260	3,109
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkend	No														0.560			0.260	2,563
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	No														0.760			0.260	0
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	No														0.760			0.260	0
D2	I-280 NB	Mariposa off-ramp	Wkday PM	No														0.600			0.436	2,608
	I-280 NB	Mariposa off-ramp	Wkday Eve	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Late	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkend	No														0.670			0.436	1,492
	I-280 NB	Mariposa off-ramp	Wkday PM w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkday Late w/	No														0.760			0.436	0
	I-280 NB	Mariposa off-ramp	Wkend w/	No														0.760			0.436	0

HCM 2000
Diverge Ramp Junctions
Capacity Analysis

Juri
Analy:

	General Information			Capacity Checks															Results	
	Freeway/ Direction	Off-ramp	Analysis Time Period	v_{Fi} (pcph)	Max v_{Fi} (pcph)	LOS F?	v_3, v_{av34} (pcphpl)	v_3, v_{av34} > 2,700?	v_3, v_{av34} >1.5*v_{12}/2?	v_{12a} (pcph)	Max v_{12} (pcph)	LOS F?	v_{FO} (pcph)	Max v_{FO} (pcph)	LOS F?	v_R (pcph)	Max v_R (pcph)	LOS F?	Density, D (pcplpm)	Level of Service
Existing																				
D1	I-80 WB	Fifth/Harrison off-ramp	Wkday PM	7,091	9,200	No	1,991	No	No	3,109	4,400	No	5,763	6,900	No	1,328	4,100	No	**30.1**	**D**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkend	6,237	9,200	No	1,837	No	No	2,563	4,400	No	5,280	6,900	No	957	4,100	No	**25.4**	**C**
	I-80 WB	Fifth/Harrison off-ramp	Wkday PM w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Eve w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkday Late w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
	I-80 WB	Fifth/Harrison off-ramp	Wkend w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	4,100	No	**3.4**	**A**
D2	I-280 NB	Mariposa off-ramp	Wkday PM	4,952	9,200	No	1,172	No	No	2,608	4,400	No	4,156	6,900	No	797	2,100	No	**26.2**	**C**
	I-280 NB	Mariposa off-ramp	Wkday Eve	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Late	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkend	2,980	9,200	No	744	No	No	1,492	4,400	No	2,638	6,900	No	342	2,100	No	**16.6**	**B**
	I-280 NB	Mariposa off-ramp	Wkday PM w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Eve w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkday Late w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**
	I-280 NB	Mariposa off-ramp	Wkend w/	0	9,200	No	0	No	No	0	4,400	No	0	6,900	No	0	2,100	No	**3.8**	**A**

OFF-SITE ALTERNATIVE AT PIERS 30/32 & SWL 330
TRAVEL DEMAND ANALYSIS

Event Center and Mixed Use Development at Piers 30-32 and Seawall Lot 330

PROJECT TRIP GENERATION - WEEKDAY DAILY AND PM PEAK HOUR BETWEEN 4 AND 6 PM

SUMMARY OF TRIPS WITH NO EVENT

	Piers 30-32		Seawall Lot 330		Total Project	
Land Use	**Intensity**	**% of total**	**Intensity**	**% of total**	**Intensity**	**Total**
Arena	0 attend.	0%		0%	0 attend.	0%
	100 empl.	100%		0%	100 empl.	100%
Retail	18,000 gsf	45%	22,390 gsf	55%	40,390 gsf	100%
Quick Service Rest.	36,000 gsf	100%	0 gsf	0%	36,000 gsf	100%
Sit-down Restaurant	36,000 gsf	83%	7,464 gsf	17%	43,464 gsf	100%
Residential	0 units	0%	176 units	100%	176 units	100%
Hotel	0 rooms	0%	227 rooms	100%	227 rooms	100%
Office	35,600 gsf	100%	0 gsf	0%	35,600 gsf	100%

Daily Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total		Piers 30-32	SWL 330
Auto	97	1,134	1,078	1,629	566	575	238	5,317	36%	3,268	2,049
Transit	129	581	980	1,254	333	458	226	3,961	27%	2,633	1,328
Taxi/Coach (Event)								0	0%	-	-
Bike (Event)								0	0%	-	-
Walk	17	1,066	722	1,357	571	460	148	4,341	30%	2,487	1,855
Other	6	370	157	281	46	96	33	988	7%	593	395
Total	**250**	**3,150**	**2,938**	**4,520**	**1,515**	**1,589**	**644**	**14,607**	**100%**	**8,980**	**5,627**
	2%	**22%**	**20%**	**31%**	**10%**	**11%**	**4%**	**100%**			
Vehicle Trips	63	488	531	719	524	260	121	2,705		1,528	1,177
	2%	18%	20%	27%	19%	10%	4%	100%			
Avg. veh. occupancy	*1.54*	*2.32*	*2.03*	*2.27*	*1.08*	*2.21*	*1.97*	*1.97*		2.14	1.74

PM Peak Hour Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total		Piers 30-32	SWL 330
Auto	8	102	146	220	98	60	21	655	37%	402	252
Transit	11	52	132	169	58	66	26	514	29%	333	181
Taxi/Coach (Event)								0	0%	-	-
Bike (Event)								0	0%	-	-
Walk	1	96	98	183	99	27	6	510	29%	300	210
Other	1	33	21	38	8	7	2	109	6%	70	39
Total	**21**	**284**	**397**	**610**	**262**	**159**	**55**	**1,787**	**100%**	**1,104**	**683**
	1%	**16%**	**22%**	**34%**	**15%**	**9%**	**3%**	**100%**			
Vehicle Trips	5	44	72	97	91	34	13	355		190	165
	2%	12%	20%	27%	26%	9%	4%	100%			
Avg. veh. occupancy	*1.54*	*2.32*	*2.03*	*2.27*	*1.08*	*1.78*	*1.63*	*1.84*		2.12	1.53

Percent of Daily during PM Peak Hour

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Auto	8.5%	9.0%	13.5%	13.5%	17.3%	10.4%	8.8%	12.3%
Transit	8.5%	9.0%	13.5%	13.5%	17.3%	14.3%	11.5%	13.0%
Taxi/Coach (Event)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bike (Event)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Walk	8.5%	9.0%	13.5%	13.5%	17.3%	5.8%	4.1%	11.7%
Other	8.5%	9.0%	13.5%	13.5%	17.3%	6.8%	5.3%	11.0%
Total	**8.5%**	**9.0%**	**13.5%**	**13.5%**	**17.3%**	**10.0%**	**8.5%**	**12.2%**
Vehicle Trips	8.5%	9.0%	13.5%	13.5%	17.3%	13.0%	10.6%	13.1%

PM Peak Hour Person-Trips

Weekday Distribution	Total Daily Person-trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Superdistrict 1	3,122	3	53	77	130	91	26	8	387
Superdistrict 2	1,690	3	21	56	86	9	23	8	206
Superdistrict 3	2,062	4	25	56	81	73	24	9	272
Superdistrict 4	942	2	10	33	45	9	15	6	120
East Bay	1,816	5	34	57	72	23	28	11	231
North Bay	691	1	14	21	31	2	9	3	82
South Bay	1,419	3	24	36	46	55	18	7	190
Out of Region	2,864	0	102	61	119	0	15	3	301
Total	**14,607**	**21**	**284**	**397**	**610**	**262**	**159**	**55**	**1,787**

PM Peak Hour Transit-Trips

Weekday Distribution	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Superdistrict 1	1	8	16	23	17	7	2	74
Superdistrict 2	2	8	25	32	2	12	5	85
Superdistrict 3	2	7	24	31	13	12	5	94
Superdistrict 4	1	4	14	16	2	7	3	47
East Bay	3	9	23	21	7	14	6	83
North Bay	1	3	5	4	0	3	1	17
South Bay	1	4	12	12	17	7	3	56
Out of Region	0	9	15	29	0	4	1	58
Total	**11**	**52**	**132**	**169**	**58**	**66**	**26**	**514**

PM Peak Hour Vehicle-Trips

Weekday Distribution	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total		Avg. Veh. Occ.
Superdistrict 1	0	6	5	8	21	2	1	43	12%	1.50
Superdistrict 2	1	4	10	14	2	5	2	38	11%	1.70
Superdistrict 3	1	4	12	14	17	6	3	57	16%	1.64
Superdistrict 4	1	2	8	10	2	4	2	29	8%	1.69
East Bay	1	5	9	13	14	4	1	47	13%	2.20
North Bay	0	3	7	11	2	3	1	28	8%	1.84
South Bay	1	7	13	13	33	8	3	78	22%	1.52
Out of Region	0	12	7	14	0	2	0	36	10%	3.06
Total	**5**	**44**	**72**	**97**	**91**	**34**	**13**	**355**	**100%**	**1.84**

Assumptions for PM Peak Hour bet. 4 PM & 6 PM	Arena		Retail		Q.S. Rest.		Sit-down Rest.		Residential		Hotel		Office	
	Empl.	Attend.	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work	Work	Non-work
Inbound	0%	50%	0%	50%	0%	50%	0%	50%	100%	33%	0%	50%	0%	50%
Outbound	100%	50%	100%	50%	100%	50%	100%	50%	0%	67%	100%	50%	100%	50%

Inbound

PM Peak Hour bet. 4 PM & 6 PM	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Total Person Trips	0	131	140	282	174	32	5	763
	0%	46%	35%	46%	67%	20%	9%	43%
Transit Trips	0	21	36	72	38	8	1	177
	0%	39%	27%	43%	67%	12%	5%	34%
Vehicle Trips	0	19	21	43	60	5	1	149
	0%	44%	30%	44%	67%	14%	5%	42%

Outbound

PM Peak Hour bet. 4 PM & 6 PM	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Total Person Trips	21	153	257	329	88	127	50	1,024
	100%	54%	65%	54%	34%	80%	92%	57%
Transit Trips	11	32	96	97	19	57	25	337
	100%	61%	73%	57%	34%	88%	95%	66%
Vehicle Trips	5	25	51	54	30	29	12	206
	100%	56%	70%	56%	34%	86%	95%	58%

Total

PM Peak Hour bet. 4 PM & 6 PM	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Total Person Trips	21	284	397	610	262	159	55	1,787
Transit Trips	11	52	132	169	58	66	26	514
Vehicle Trips	5	44	72	97	91	34	13	355

Inbound

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Superdistrict 1	0	5	4	8	15	1	0	32
Superdistrict 2	0	3	6	13	1	1	0	25
Superdistrict 3	0	3	7	14	12	2	0	38
Superdistrict 4	0	1	4	8	1	1	0	16
East Bay	0	5	7	15	10	2	0	39
North Bay	0	3	5	10	1	1	0	21
South Bay	0	8	6	12	24	1	0	51
Out of Region	0	19	11	21	0	2	0	53
Total	**0**	**47**	**50**	**101**	**65**	**11**	**2**	**276**

Outbound

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Superdistrict 1	0	5	6	9	8	3	1	31
Superdistrict 2	1	4	12	15	1	6	2	40
Superdistrict 3	1	5	15	17	6	8	3	56
Superdistrict 4	1	2	10	11	1	5	2	32
East Bay	2	7	18	19	5	10	4	65
North Bay	1	4	9	12	1	4	2	31
South Bay	2	10	16	16	12	9	4	68
Out of Region	0	19	12	22	0	3	1	56
Total	**8**	**55**	**95**	**119**	**33**	**48**	**19**	**379**

Total

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Superdistrict 1	0	9	10	17	23	3	1	64
Superdistrict 2	1	6	18	27	2	7	2	64
Superdistrict 3	1	8	22	32	18	10	4	94
Superdistrict 4	1	4	14	19	2	6	2	48
East Bay	2	13	25	34	15	12	4	104
North Bay	1	7	14	22	2	5	2	52
South Bay	2	17	21	27	36	11	4	119
Out of Region	0	38	22	43	0	6	1	110
Total	**8**	**102**	**146**	**220**	**98**	**60**	**21**	**655**

PM Peak Hour bet. 4 PM & 6 PM Auto Trips	Piers 30-32 In	Piers 30-32 Out	Piers 30-32 Total	Seawall Lot 330 In	Seawall Lot 330 Out	Seawall Lot 330 Total
Superdistrict 1	13	17	30	20	14	34
Superdistrict 2	18	29	47	6	11	18
Superdistrict 3	21	36	57	18	20	37
Superdistrict 4	12	23	35	5	9	14
East Bay	22	43	65	17	22	40
North Bay	15	22	37	6	9	15
South Bay	19	38	58	32	29	61
Out of Region	37	39	76	17	18	34
Total	**156**	**246**	**402**	**120**	**132**	**252**

DRAFT - SUBJECT TO REVIEW

Event Center and Mixed Use Development at Piers 30-32 and Seawall Lot 330

PROJECT TRIP GENERATION - WEEKDAY DAILY AND PM PEAK HOUR BETWEEN 4 AND 6 PM

SUMMARY OF TRIPS WITH NO EVENT

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total								Piers 30-32			Seawall Lot 330		
Transit Trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	In	Out	Total	In	Out	Total
Superdistrict 1	0	4	5	11	11	1	0	32	1	5	11	13	6	6	2	42	1	8	16	23	17	7	2	74	16	27	42	16	16	32
Superdistrict 2	0	3	7	14	1	2	0	27	2	5	18	18	1	11	5	59	2	8	25	32	2	12	5	85	20	42	62	7	17	24
Superdistrict 3	0	2	7	13	9	2	0	33	2	4	17	18	4	10	4	61	2	7	24	31	13	12	5	94	19	41	60	14	20	34
Superdistrict 4	0	1	3	6	1	1	0	13	1	3	10	9	1	7	3	34	1	4	14	16	2	7	3	47	9	23	33	4	10	14
East Bay	0	3	4	8	5	1	0	21	3	6	19	14	2	13	6	63	3	9	23	21	7	14	6	83	12	41	53	9	21	30
North Bay	0	1	1	1	0	0	0	4	1	2	4	3	0	3	1	13	1	3	5	4	0	3	1	17	2	9	11	1	4	6
South Bay	0	1	2	5	11	1	0	20	1	3	9	8	6	6	3	35	1	4	12	12	17	7	3	56	7	21	28	13	15	28
Out of Region	0	4	7	14	0	2	0	27	0	4	8	15	0	2	1	31	0	9	15	29	0	4	1	58	21	23	44	6	7	14
Total	**0**	**21**	**36**	**72**	**38**	**8**	**1**	**177**	**11**	**32**	**96**	**97**	**19**	**57**	**25**	**337**	**11**	**52**	**132**	**169**	**58**	**66**	**26**	**514**	**106**	**226**	**333**	**70**	**111**	**181**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total								Piers 30-32			Seawall Lot 330		
Bike (Event)	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	In	Out	Total	In	Out	Total
Superdistrict 1								0								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Superdistrict 2								0								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Superdistrict 3								0								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Superdistrict 4								0								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Bay								0								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North Bay								0								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Bay								0								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Out of Region								0								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total								Piers 30-32			Seawall Lot 330		
Taxi/Walk/Other	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	In	Out	Total	In	Out	Total
Superdistrict 1	0	17	22	43	34	5	1	122	1	18	29	46	17	11	4	127	1	35	51	90	52	16	4	248	66	81	146	56	46	102
Superdistrict 2	0	4	6	13	3	1	0	28	0	4	7	13	2	2	0	28	0	7	13	26	5	3	1	56	19	20	39	9	8	17
Superdistrict 3	0	5	4	9	27	1	0	47	0	5	6	9	14	2	1	37	0	10	10	18	41	3	1	84	14	17	31	33	20	53
Superdistrict 4	0	1	2	5	3	1	0	13	0	1	3	5	2	1	0	12	0	3	5	10	5	2	0	25	7	8	15	6	4	10
East Bay	0	6	4	9	1	1	0	20	0	6	5	9	0	2	1	23	0	11	9	18	1	3	1	43	14	16	30	6	7	13
North Bay	0	2	1	3	0	0	0	7	0	2	1	3	0	0	0	7	0	5	3	5	0	1	0	14	5	5	10	2	2	4
South Bay	0	1	2	3	1	0	0	8	0	1	2	3	1	1	0	8	0	3	3	6	2	1	0	16	5	5	10	3	3	6
Out of Region	0	28	12	24	0	3	0	66	0	28	12	24	0	3	0	66	0	56	24	47	0	5	1	133	44	44	88	22	22	44
Total	**0**	**64**	**54**	**108**	**71**	**12**	**2**	**311**	**2**	**66**	**65**	**113**	**36**	**21**	**6**	**308**	**2**	**129**	**119**	**221**	**107**	**33**	**8**	**619**	**174**	**196**	**369**	**137**	**113**	**250**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total								Piers 30-32			Seawall Lot 330		
Total Person Trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	In	Out	Total	In	Out	Total
Superdistrict 1	0	25	31	62	60	7	1	186	3	28	46	68	30	19	7	201	3	53	77	130	91	26	8	387	94	124	218	92	77	168
Superdistrict 2	0	9	20	39	6	4	1	79	3	12	36	46	3	18	7	126	3	21	56	86	9	23	8	206	57	90	147	22	36	58
Superdistrict 3	0	10	18	37	48	4	1	118	4	14	38	45	24	20	8	153	4	25	56	81	73	24	9	272	54	93	147	65	60	125
Superdistrict 4	0	4	10	20	6	2	0	42	2	6	23	25	3	13	5	78	2	10	33	45	9	15	6	120	28	54	82	14	24	38
East Bay	0	14	15	31	15	3	1	80	5	19	42	41	8	25	11	150	5	34	57	72	23	28	11	231	48	100	148	32	50	83
North Bay	0	7	7	14	1	2	0	31	1	8	14	17	1	7	3	51	1	14	21	31	2	9	3	82	22	36	58	9	15	24
South Bay	0	10	10	20	37	2	0	79	3	14	26	26	18	16	7	111	3	24	36	46	55	18	7	190	31	64	95	48	46	94
Out of Region	0	51	29	59	0	7	1	147	0	51	31	60	0	8	2	153	0	102	61	119	0	15	3	301	102	106	208	45	47	92
Total	**0**	**131**	**140**	**282**	**174**	**32**	**5**	**763**	**21**	**153**	**257**	**329**	**88**	**127**	**50**	**1,024**	**21**	**284**	**397**	**610**	**262**	**159**	**55**	**1,787**	**436**	**668**	**1,104**	**327**	**356**	**683**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total								Piers 30-32			Seawall Lot 330		
Vehicle-Trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	In	Out	Total	In	Out	Total
Superdistrict 1	0	3	2	3	14	0	0	22	0	3	3	4	7	2	1	20	0	6	5	8	21	2	1	43	6	9	15	16	11	28
Superdistrict 2	0	2	3	6	1	1	0	13	1	2	7	8	1	4	2	25	1	4	10	14	2	5	2	38	9	17	26	4	8	12
Superdistrict 3	0	2	3	6	11	1	0	22	1	3	9	8	6	6	2	35	1	4	12	14	17	6	3	57	9	21	29	14	14	28
Superdistrict 4	0	1	2	4	1	0	0	9	1	2	6	6	1	3	1	19	1	2	8	10	2	4	2	29	6	13	20	3	6	9
East Bay	0	2	3	6	9	1	0	21	1	3	6	7	5	3	1	26	1	5	9	13	14	4	1	47	9	15	24	12	11	23
North Bay	0	1	3	5	1	1	0	11	0	2	5	6	1	2	1	17	0	3	7	11	2	3	1	28	8	12	20	3	5	8
South Bay	0	3	2	5	22	1	0	33	1	4	10	8	11	7	3	45	1	7	13	13	33	8	3	78	8	23	31	25	22	47
Out of Region	0	6	3	7	0	1	0	17	0	6	4	7	0	1	0	19	0	12	7	14	0	2	0	36	12	13	25	5	6	11
Total	**0**	**19**	**21**	**43**	**60**	**5**	**1**	**149**	**5**	**25**	**51**	**54**	**30**	**29**	**12**	**206**	**5**	**44**	**72**	**97**	**91**	**34**	**13**	**355**	**66**	**124**	**190**	**83**	**82**	**165**

DRAFT - SUBJECT TO REVIEW

Event Center and Mixed Use Development at Piers 30-32 and Seawall Lot 330

PROJECT TRIP GENERATION - SATURDAY DAILY AND LATE PM PEAK HOUR BETWEEN 7 AND 9 PM
SUMMARY OF TRIPS WITH NO EVENT

Land Use	Piers 30-32 Intensity	Piers 30-32 % of total	Seawall Lot 330 Intensity	Seawall Lot 330 % of total	Total Project Intensity	Total Project Total
Arena	0 attend.	0%		0%	0 attend.	0%
	100 empl.	100%		0%	100 empl.	100%
Retail	18,000 gsf	45%	22,390 gsf	55%	40,390 gsf	100%
Quick Service Rest.	36,000 gsf	100%	0 gsf	0%	36,000 gsf	100%
Sit-down Restaurant	36,000 gsf	83%	7,464 gsf	17%	43,464 gsf	100%
Residential	0 units	0%	176 units	100%	176 units	100%
Hotel	0 rooms	0%	227 rooms	100%	227 rooms	100%
Office	35,600 gsf	100%	0 gsf	0%	35,600 gsf	100%

Person-trips by Mode	Daily Trips Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total		Piers 30-32	SWL 330
Auto	97	1,327	1,343	2,029	552	576	56	5,980	36%	3,768	2,212
Transit	129	680	1,221	1,561	325	460	74	4,450	27%	3,021	1,429
Taxi/Coach (Event)								0	0%	-	-
Bike (Event)								0	0%	-	-
Walk	17	1,247	900	1,690	557	461	10	4,883	30%	2,883	2,000
Other	6	433	195	349	45	96	4	1,128	7%	687	441
Total	**250**	**3,687**	**3,659**	**5,630**	**1,478**	**1,593**	**144**	**16,441**	**100%**	**10,359**	**6,082**
	2%	**22%**	**22%**	**34%**	**9%**	**10%**	**1%**	**100%**			
Vehicle Trips	63	571	662	895	511	260	36	2,999		1,757	1,241
	2%	19%	22%	30%	17%	9%	1%	100%			
Avg. veh. occupancy	*1.54*	*2.32*	*2.03*	*2.27*	*1.08*	*2.21*	*1.54*	*1.99*		2.14	1.78

Person-trips by Mode	Evening Peak Hour Trips Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total		Piers 30-32	SWL 330
Auto	0	60	312	471	62	72	0	976	36%	729	248
Transit	0	31	284	363	36	79	0	792	30%	598	194
Taxi/Coach (Event)								0	0%	-	-
Bike (Event)								0	0%	-	-
Walk	0	56	209	393	62	32	0	752	28%	559	193
Other	0	19	45	81	5	8	0	159	6%	121	38
Total	**0**	**166**	**850**	**1,308**	**166**	**191**	**0**	**2,680**	**100%**	**2,007**	**673**
	0%	**6%**	**32%**	**49%**	**6%**	**7%**	**0%**	**100%**			
Vehicle Trips	0	26	154	208	57	40	0	485		337	148
	0%	5%	32%	43%	12%	8%	0%	100%			
Avg. veh. occupancy	*0.00*	*2.32*	*2.03*	*2.27*	*1.08*	*1.78*	*0.00*	*2.01*		2.16	1.68

Person-trips by Mode	Percent of Daily during Late PM Peak Hour Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Auto	0.0%	4.5%	23.2%	23.2%	11.2%	12.5%	0.0%	16.3%
Transit	0.0%	4.5%	23.2%	23.2%	11.2%	17.1%	0.0%	17.8%
Taxi/Coach (Event)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bike (Event)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Walk	0.0%	4.5%	23.2%	23.2%	11.2%	7.0%	0.0%	15.4%
Other	0.0%	4.5%	23.2%	23.2%	11.2%	8.1%	0.0%	14.1%
Total	**0.0%**	**4.5%**	**23.2%**	**23.2%**	**11.2%**	**12.0%**	**0.0%**	**16.3%**
Vehicle Trips	0.0%	4.5%	23.2%	23.2%	11.2%	15.5%	0.0%	16.2%

Saturday Distribution	Total Daily Person-trip	Evening Peak Hour Person-Trips Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Superdistrict 1	3,483	0	31	164	278	57	31	0	562
Superdistrict 2	1,917	0	13	120	183	6	27	0	349
Superdistrict 3	2,280	0	14	120	174	46	29	0	384
Superdistrict 4	1,062	0	6	70	96	6	18	0	196
East Bay	2,048	0	20	122	155	15	34	0	346
North Bay	787	0	8	45	66	1	11	0	132
South Bay	1,565	0	14	78	99	35	22	0	247
Out of Region	3,298	0	60	130	255	0	18	0	464
Total	**16,441**	**0**	**166**	**850**	**1,308**	**166**	**191**	**0**	**2,680**

Saturday Distribution	Evening Peak Hour Transit-Trips Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Evening Peak Hour Vehicle-Trips Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total		Avg. Veh. Occ.
Superdistrict 1	0	5	34	50	11	8	0	108	0	3	11	16	13	3	0	46	10%	1.76
Superdistrict 2	0	5	53	69	1	15	0	142	0	2	22	30	1	6	0	61	13%	1.80
Superdistrict 3	0	4	52	67	8	14	0	145	0	2	26	31	11	8	0	77	16%	1.85
Superdistrict 4	0	2	29	34	1	9	0	75	0	1	17	22	1	5	0	46	9%	1.77
East Bay	0	6	48	46	5	17	0	121	0	3	19	29	9	5	0	65	13%	2.42
North Bay	0	2	10	9	0	4	0	24	0	2	16	24	1	4	0	47	10%	1.86
South Bay	0	2	25	27	11	8	0	73	0	4	27	27	21	9	0	88	18%	1.70
Out of Region	0	5	33	62	0	5	0	105	0	7	16	29	0	2	0	55	11%	3.08
Total	**0**	**31**	**284**	**363**	**36**	**79**	**0**	**792**	**0**	**26**	**154**	**208**	**57**	**40**	**0**	**485**	**100%**	**2.01**

Assumptions for Evening Peak Hour bet. 7 PM & 9 PM	Arena Empl.	Arena Attend.	Retail Work	Retail Non-work	Q.S. Rest. Work	Q.S. Rest. Non-work	Sit-down Rest. Work	Sit-down Rest. Non-work	Residential Work	Residential Non-work	Hotel Work	Hotel Non-work	Office Work	Office Non-work
Inbound	0%	50%	0%	50%	0%	50%	0%	50%	100%	33%	0%	50%	0%	50%
Outbound	100%	50%	100%	50%	100%	50%	100%	50%	0%	67%	100%	50%	100%	50%

Evening Peak Hour bet. 7 PM & 9 PM	Inbound Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Outbound Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Total Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Total Person Trips	0	77	300	603	110	38	0	1,128	0	89	550	704	56	153	0	1,551	0	166	850	1,308	166	191	0	2,680
	0%	46%	35%	46%	67%	20%	0%	42%	0%	54%	65%	54%	34%	80%	0%	58%								
Transit Trips	0	12	77	155	24	10	0	279	0	19	206	207	12	69	0	513	0	31	284	363	36	79	0	792
	0%	39%	27%	43%	67%	12%	0%	35%	0%	61%	73%	57%	34%	88%	0%	65%								
Vehicle Trips	0	11	45	91	38	6	0	192	0	14	108	117	19	35	0	293	0	26	154	208	57	40	0	485
	0%	44%	30%	44%	67%	14%	0%	40%	0%	56%	70%	56%	34%	86%	0%	60%								

Evening Peak Hour bet. 7 PM & 9 PM Auto Trips	Inbound Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Outbound Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Total Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Piers 30-32 In	Out	Total	Seawall Lot 330 In	Out	Total
Superdistrict 1	0	3	9	17	9	1	0	39	0	3	13	19	5	3	0	43	0	5	21	36	14	4	0	81	24	30	54	15	13	28
Superdistrict 2	0	1	13	27	1	2	0	44	0	2	25	32	0	7	0	66	0	4	38	58	1	9	0	110	36	52	88	8	14	22
Superdistrict 3	0	2	15	30	8	2	0	57	0	3	32	37	4	10	0	85	0	5	47	68	11	12	0	142	41	64	105	16	21	37
Superdistrict 4	0	1	9	18	1	1	0	30	0	1	21	23	0	6	0	52	0	2	30	41	1	8	0	81	24	40	64	6	12	17
East Bay	0	3	16	31	6	2	0	59	0	4	38	40	3	12	0	98	0	8	53	72	9	14	0	156	43	73	116	15	25	40
North Bay	0	2	11	21	1	1	0	36	0	2	19	25	0	5	0	51	0	4	29	46	1	6	0	87	29	40	69	7	11	18
South Bay	0	5	12	25	15	2	0	59	0	6	33	33	8	11	0	91	0	10	46	59	23	13	0	150	35	63	99	24	28	51
Out of Region	0	11	23	45	0	3	0	82	0	11	25	46	0	4	0	86	0	22	47	92	0	7	0	168	65	68	133	17	18	35
Total	**0**	**27**	**107**	**216**	**41**	**14**	**0**	**406**	**0**	**32**	**205**	**255**	**21**	**58**	**0**	**571**	**0**	**60**	**312**	**471**	**62**	**72**	**0**	**976**	**298**	**430**	**729**	**107**	**141**	**248**

DRAFT - SUBJECT TO REVIEW

Event Center and Mixed Use Development at Piers 30-32 and Seawall Lot 330

PROJECT TRIP GENERATION - SATURDAY DAILY AND LATE PM PEAK HOUR BETWEEN 7 AND 9 PM
SUMMARY OF TRIPS WITH NO EVENT

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total								Piers 30-32			Seawall Lot 330		
Transit Trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	In	Out	Total	In	Out	Total
Superdistrict 1	0	2	11	23	7	1	0	45	0	3	23	27	4	7	0	63	0	5	34	50	11	8	0	108	31	47	78	14	16	30
Superdistrict 2	0	2	15	30	1	2	0	49	0	3	38	39	0	13	0	93	0	5	53	69	1	15	0	142	40	72	112	9	21	30
Superdistrict 3	0	1	14	29	6	2	0	52	0	3	37	38	3	12	0	93	0	4	52	67	8	14	0	145	39	70	109	13	23	36
Superdistrict 4	0	1	7	14	1	1	0	23	0	2	22	20	0	8	0	52	0	2	29	34	1	9	0	75	19	39	58	4	13	17
East Bay	0	2	8	17	3	1	0	31	0	4	40	29	2	16	0	90	0	6	48	46	5	17	0	121	23	66	89	8	24	32
North Bay	0	1	1	3	0	0	0	5	0	1	8	6	0	3	0	18	0	2	10	9	0	4	0	24	4	14	18	1	5	6
South Bay	0	1	5	10	7	1	0	24	0	2	20	16	4	7	0	48	0	2	25	27	11	8	0	73	14	34	48	10	15	24
Out of Region	0	3	15	31	0	2	0	50	0	3	17	31	0	3	0	54	0	5	33	62	0	5	0	105	42	45	86	9	10	18
Total	**0**	**12**	**77**	**155**	**24**	**10**	**0**	**279**	**0**	**19**	**206**	**207**	**12**	**69**	**0**	**513**	**0**	**31**	**284**	**363**	**36**	**79**	**0**	**792**	**211**	**386**	**598**	**67**	**127**	**194**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total								Piers 30-32			Seawall Lot 330		
Bike (Event)	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	In	Out	Total	In	Out	Total
Superdistrict 1								0								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Superdistrict 2								0								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Superdistrict 3								0								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Superdistrict 4								0								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
East Bay								0								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North Bay								0								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Bay								0								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Out of Region								0								0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total								Piers 30-32			Seawall Lot 330		
Taxi/Walk/Other	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	In	Out	Total	In	Out	Total
Superdistrict 1	0	10	46	93	22	6	0	176	0	11	62	99	11	13	0	196	0	20	108	192	33	19	0	373	128	149	277	49	47	96
Superdistrict 2	0	2	14	28	2	2	0	48	0	2	15	28	1	2	0	49	0	4	29	56	3	4	0	97	38	39	77	10	9	19
Superdistrict 3	0	3	10	19	17	1	0	50	0	3	12	20	9	2	0	46	0	6	22	39	26	4	0	97	27	30	57	23	16	40
Superdistrict 4	0	1	5	10	2	1	0	19	0	1	6	11	1	1	0	20	0	2	11	21	3	2	0	39	14	16	30	5	5	10
East Bay	0	3	9	18	0	1	0	32	0	3	11	19	0	2	0	36	0	7	20	38	1	3	0	68	26	29	54	7	7	14
North Bay	0	1	3	6	0	0	0	10	0	1	3	6	0	1	0	11	0	3	6	12	0	1	0	22	8	9	17	2	2	4
South Bay	0	1	3	7	1	0	0	12	0	1	4	7	0	1	0	13	0	2	7	14	1	1	0	25	9	10	19	3	3	6
Out of Region	0	16	25	51	0	3	0	95	0	16	25	51	0	3	0	96	0	33	50	101	0	6	0	191	74	75	149	21	21	42
Total	**0**	**37**	**115**	**232**	**45**	**15**	**0**	**444**	**0**	**38**	**139**	**242**	**23**	**25**	**0**	**467**	**0**	**76**	**254**	**474**	**67**	**40**	**0**	**911**	**324**	**356**	**680**	**120**	**111**	**231**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total								Piers 30-32			Seawall Lot 330		
Total Person Trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	In	Out	Total	In	Out	Total
Superdistrict 1	0	15	66	133	38	8	0	260	0	16	98	146	19	23	0	302	0	31	164	278	57	31	0	562	182	226	408	77	76	154
Superdistrict 2	0	5	42	84	4	5	0	141	0	7	78	99	2	22	0	208	0	13	120	183	6	27	0	349	114	163	278	27	45	71
Superdistrict 3	0	6	39	78	31	5	0	159	0	8	81	96	15	24	0	225	0	14	120	174	46	29	0	384	107	164	271	52	61	113
Superdistrict 4	0	2	21	42	4	3	0	72	0	4	49	54	2	15	0	124	0	6	70	96	6	18	0	196	57	95	152	15	29	44
East Bay	0	8	33	66	10	4	0	122	0	11	89	89	5	30	0	224	0	20	122	155	15	34	0	346	92	168	259	30	56	86
North Bay	0	4	15	30	1	2	0	52	0	5	30	36	0	9	0	80	0	8	45	66	1	11	0	132	42	62	104	10	18	28
South Bay	0	6	21	42	23	3	0	95	0	8	57	57	12	19	0	152	0	14	78	99	35	22	0	247	59	107	166	36	45	81
Out of Region	0	30	63	127	0	8	0	228	0	30	67	129	0	10	0	236	0	60	130	255	0	18	0	464	181	187	369	46	49	95
Total	**0**	**77**	**300**	**603**	**110**	**38**	**0**	**1,128**	**0**	**89**	**550**	**704**	**56**	**153**	**0**	**1,551**	**0**	**166**	**850**	**1,308**	**166**	**191**	**0**	**2,680**	**834**	**1,173**	**2,007**	**294**	**378**	**673**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total								Piers 30-32			Seawall Lot 330		
Vehicle-Trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	In	Out	Total	In	Out	Total
Superdistrict 1	0	2	4	7	9	0	0	22	0	2	7	9	4	2	0	24	0	3	11	16	13	3	0	46	11	15	26	11	9	20
Superdistrict 2	0	1	6	13	1	1	0	22	0	1	16	17	0	5	0	39	0	2	22	30	1	6	0	61	18	30	48	4	9	14
Superdistrict 3	0	1	6	13	7	1	0	28	0	2	19	18	4	7	0	49	0	2	26	31	11	8	0	77	17	35	52	11	14	25
Superdistrict 4	0	1	5	9	1	1	0	16	0	1	12	12	0	4	0	30	0	1	17	22	1	5	0	46	13	23	35	3	7	10
East Bay	0	1	6	13	6	1	0	27	0	2	13	16	3	4	0	37	0	3	19	29	9	5	0	65	18	27	45	10	10	20
North Bay	0	1	6	11	1	1	0	19	0	1	10	13	0	3	0	28	0	2	16	24	1	4	0	47	15	22	37	4	6	10
South Bay	0	2	5	10	14	1	0	32	0	2	22	17	7	8	0	57	0	4	27	27	21	9	0	88	14	37	51	17	20	37
Out of Region	0	4	7	14	0	1	0	26	0	4	9	15	0	2	0	29	0	7	16	29	0	2	0	55	21	23	43	5	6	11
Total	**0**	**11**	**45**	**91**	**38**	**6**	**0**	**192**	**0**	**14**	**108**	**117**	**19**	**35**	**0**	**293**	**0**	**26**	**154**	**208**	**57**	**40**	**0**	**485**	**126**	**211**	**337**	**66**	**82**	**148**

DRAFT - SUBJECT TO REVIEW

Event Center and Mixed Use Development at Piers 30-32 and Seawall Lot 330

PROJECT TRIP GENERATION - WEEKDAY DAILY AND PM PEAK HOUR BETWEEN 4 AND 6 PM

SUMMARY OF TRIPS WITH BASKETBALL GAME

Land Use	Piers 30-32 Intensity	Piers 30-32 % of total	Seawall Lot 330 Intensity	Seawall Lot 330 % of total	Total Project Intensity	Total Project Total
Arena	18,064 attend.	100%		0%	18,064 attend.	100%
	925 empl.	100%		0%	925 empl.	100%
Retail	18,000 gsf	45%	22,390 gsf	55%	40,390 gsf	100%
Quick Service Rest.	36,000 gsf	100%	0 gsf	0%	36,000 gsf	100%
Sit-down Restaurant	36,000 gsf	83%	7,464 gsf	17%	43,464 gsf	100%
Residential	0 units	0%	176 units	100%	176 units	100%
Hotel	0 rooms	0%	227 rooms	100%	227 rooms	100%
Office	35,600 gsf	100%	0 gsf	0%	35,600 gsf	100%

Daily Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	%	Piers 30-32	SWL 330
Auto	13,324	302	1,078	434	566	575	238	16,517	35%	15,134	1,383
Transit	20,817	216	980	394	333	458	226	23,425	50%	22,446	979
Taxi/Coach (Event)	751							751	2%	751	-
Bike (Event)	539							539	1%	539	-
Walk	2,121	227	722	291	571	460	148	4,539	10%	3,333	1,206
Other	426	79	157	63	46	96	33	899	2%	703	196
Total	**37,978**	**824**	**2,938**	**1,182**	**1,515**	**1,589**	**644**	**46,670**	**100%**	**42,906**	**3,764**
	81%	**2%**	**6%**	**3%**	**3%**	**3%**	**1%**	**100%**			
Vehicle Trips	5,420	146	531	214	524	260	121	7,215		6,314	901
	75%	2%	7%	3%	7%	4%	2%	100%			
Avg. veh. occupancy	*2.60*	*2.06*	*2.03*	*2.03*	*1.08*	*2.21*	*1.97*	*2.39*		*2.52*	*1.53*

PM Peak Hour Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	%	Piers 30-32	SWL 330
Auto	2,202	27	146	59	98	60	21	2,613	35%	2,430	183
Transit	3,459	19	132	53	58	66	26	3,813	51%	3,670	143
Taxi/Coach (Event)	114							114	2%	114	-
Bike (Event)	87							87	1%	87	-
Walk	405	20	98	39	99	27	6	694	9%	551	144
Other	77	7	21	9	8	7	2	130	2%	110	20
Total	**6,344**	**74**	**397**	**160**	**262**	**159**	**55**	**7,450**	**100%**	**6,961**	**490**
	85%	**1%**	**5%**	**2%**	**4%**	**2%**	**1%**	**100%**			
Vehicle Trips	961	13	72	29	91	34	13	1,212		1,076	136
	79%	1%	6%	2%	7%	3%	1%	100%			
Avg. veh. occupancy	*2.41*	*2.06*	*2.03*	*2.03*	*1.08*	*1.78*	*1.63*	*2.25*		*2.36*	*1.34*

Percent of Daily during PM Peak Hour

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Auto	16.5%	9.0%	13.5%	13.5%	17.3%	10.4%	8.8%	15.8%
Transit	16.6%	9.0%	13.5%	13.5%	17.3%	14.3%	11.5%	16.3%
Taxi/Coach (Event)	15.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	15.1%
Bike (Event)	16.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	16.1%
Walk	19.1%	9.0%	13.5%	13.5%	17.3%	5.8%	4.1%	15.3%
Other	18.1%	9.0%	13.5%	13.5%	17.3%	6.8%	5.3%	14.5%
Total	**16.7%**	**9.0%**	**13.5%**	**13.5%**	**17.3%**	**10.0%**	**8.5%**	**16.0%**
Vehicle Trips	17.7%	9.0%	13.5%	13.5%	17.3%	13.0%	10.6%	16.8%

PM Peak Hour Person-Trips

Weekday Distribution	Total Daily Person-trip	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Superdistrict 1	6,821	918	13	77	31	91	26	8	1,163
Superdistrict 2	2,739	381	7	56	23	9	23	8	506
Superdistrict 3	3,463	457	8	56	23	73	24	9	650
Superdistrict 4	2,212	342	4	33	13	9	15	6	422
East Bay	13,136	1,894	11	57	23	23	28	11	2,047
North Bay	4,468	541	4	21	8	2	9	3	589
South Bay	11,102	1,577	7	36	15	55	18	7	1,716
Out of Region	2,730	233	21	61	25	0	15	3	357
Total	**46,670**	**6,344**	**74**	**397**	**160**	**262**	**159**	**55**	**7,450**

PM Peak Hour Transit-Trips

Weekday Distribution	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Superdistrict 1	385	2	16	6	17	7	2	436
Superdistrict 2	234	3	25	10	2	12	5	291
Superdistrict 3	262	3	24	10	13	12	5	328
Superdistrict 4	186	2	14	5	2	7	3	219
East Bay	1,239	4	23	9	7	14	6	1,302
North Bay	218	1	5	2	0	3	1	230
South Bay	844	2	12	5	17	7	3	888
Out of Region	91	2	15	6	0	4	1	119
Total	**3,459**	**19**	**132**	**53**	**58**	**66**	**26**	**3,813**

PM Peak Hour Vehicle-Trips

Weekday Distribution	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	%	Avg. Veh. Occ.
Superdistrict 1	73	1	5	2	21	2	1	106	9%	1.91
Superdistrict 2	62	1	10	4	2	5	2	87	7%	1.73
Superdistrict 3	86	2	12	5	17	6	3	130	11%	1.70
Superdistrict 4	62	1	8	3	2	4	2	82	7%	1.96
East Bay	220	2	9	4	14	4	1	254	21%	2.73
North Bay	119	1	7	3	2	3	1	136	11%	2.49
South Bay	292	3	13	5	33	8	3	356	29%	2.23
Out of Region	47	3	7	3	0	2	0	62	5%	2.69
Total	**961**	**13**	**72**	**29**	**91**	**34**	**13**	**1,212**	**100%**	**2.25**

Assumptions for PM Peak Hour bet. 4 PM & 6 PM	Arena Empl.	Arena Attend.	Retail Work	Retail Non-work	Q.S. Rest. Work	Q.S. Rest. Non-work	Sit-down Rest. Work	Sit-down Rest. Non-work	Residential Work	Residential Non-work	Hotel Work	Hotel Non-work	Office Work	Office Non-work
Inbound	95%	100%	0%	50%	0%	50%	0%	50%	100%	33%	0%	50%	0%	50%
Outbound	5%	0%	100%	50%	100%	50%	100%	50%	0%	67%	100%	50%	100%	50%

PM Peak Hour bet. 4 PM & 6 PM — Inbound

	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Total Person Trips	6,298	26	140	56	174	32	5	6,731
	99%	35%	35%	35%	67%	20%	9%	90%
Transit Trips	3,435	4	36	14	38	8	1	3,537
	99%	21%	27%	27%	67%	12%	5%	93%
Vehicle Trips	927	4	21	9	60	5	1	1,027
	96%	29%	30%	30%	67%	14%	5%	85%

PM Peak Hour bet. 4 PM & 6 PM — Outbound

	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Total Person Trips	46	48	257	103	88	127	50	719
	1%	65%	65%	65%	34%	80%	92%	10%
Transit Trips	24	15	96	39	19	57	25	276
	1%	79%	73%	73%	34%	88%	95%	7%
Vehicle Trips	34	9	51	20	30	29	12	185
	4%	71%	70%	70%	34%	86%	95%	15%

PM Peak Hour bet. 4 PM & 6 PM — Total

	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Total Person Trips	6,344	74	397	160	262	159	55	7,450
Transit Trips	3,459	19	132	53	58	66	26	3,813
Vehicle Trips	961	13	72	29	91	34	13	1,212

PM Peak Hour bet. 4 PM & 6 PM Auto Trips — Inbound

Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Superdistrict 1	137	1	4	2	15	1	0	159
Superdistrict 2	103	1	6	3	1	1	0	115
Superdistrict 3	146	1	7	3	12	2	0	171
Superdistrict 4	120	0	4	2	1	1	0	129
East Bay	589	1	7	3	10	2	0	612
North Bay	297	1	5	2	1	1	0	307
South Bay	676	2	6	2	24	1	0	711
Out of Region	117	4	11	4	0	2	0	138
Total	**2,184**	**9**	**50**	**20**	**65**	**11**	**2**	**2,342**

PM Peak Hour bet. 4 PM & 6 PM Auto Trips — Outbound

Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Superdistrict 1	1	1	6	2	8	3	1	22
Superdistrict 2	2	2	12	5	1	6	2	29
Superdistrict 3	3	2	15	6	6	8	3	43
Superdistrict 4	2	1	10	4	1	5	2	25
East Bay	4	3	18	7	5	10	4	51
North Bay	1	1	9	4	1	4	2	21
South Bay	4	3	16	6	12	9	4	54
Out of Region	0	4	12	5	0	3	1	25
Total	**18**	**18**	**95**	**38**	**33**	**48**	**19**	**270**

PM Peak Hour bet. 4 PM & 6 PM Auto Trips — Total

Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Superdistrict 1	138	2	10	4	23	3	1	181
Superdistrict 2	105	2	18	7	2	7	2	144
Superdistrict 3	149	3	22	9	18	10	4	214
Superdistrict 4	122	2	14	6	2	6	2	154
East Bay	593	4	25	10	15	12	4	663
North Bay	298	2	14	6	2	5	2	329
South Bay	680	5	21	9	36	11	4	765
Out of Region	117	8	22	9	0	6	1	163
Total	**2,202**	**27**	**146**	**59**	**98**	**60**	**21**	**2,613**

PM Peak Hour bet. 4 PM & 6 PM Auto Trips — Piers 30-32 and Seawall Lot 330

Auto Trips	Piers 30-32 In	Piers 30-32 Out	Piers 30-32 Total	Seawall Lot 330 In	Seawall Lot 330 Out	Seawall Lot 330 Total
Superdistrict 1	143	10	153	17	11	28
Superdistrict 2	111	20	132	4	8	12
Superdistrict 3	156	27	183	14	16	31
Superdistrict 4	126	18	144	3	8	10
East Bay	599	33	633	13	18	31
North Bay	304	15	319	3	6	9
South Bay	685	30	715	27	24	51
Out of Region	133	18	151	5	6	11
Total	**2,257**	**173**	**2,430**	**85**	**98**	**183**

DRAFT - SUBJECT TO REVIEW

Event Center and Mixed Use Development at Piers 30-32 and Seawall Lot 330

PROJECT TRIP GENERATION - WEEKDAY DAILY AND PM PEAK HOUR BETWEEN 4 AND 6 PM

SUMMARY OF TRIPS WITH BASKETBALL GAME

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total								Piers 30-32			Seawall Lot 330		
Transit Trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	In	Out	Total	In	Out	Total
Superdistrict 1	383	1	5	2	11	1	0	404	2	2	11	4	6	6	2	32	385	2	16	6	17	7	2	436	391	19	410	13	13	26
Superdistrict 2	230	1	7	3	1	2	0	243	4	3	18	7	1	11	5	48	234	3	25	10	2	12	5	291	239	34	273	3	14	17
Superdistrict 3	257	0	7	3	9	2	0	278	4	2	17	7	4	10	4	51	262	3	24	10	13	12	5	328	267	33	300	11	17	28
Superdistrict 4	183	0	3	1	1	1	0	190	3	2	10	4	1	7	3	29	186	2	14	5	2	7	3	219	187	20	208	2	9	11
East Bay	1,233	1	4	2	5	1	0	1,245	6	3	19	8	2	13	6	57	1,239	4	23	9	7	14	6	1,302	1,239	38	1,277	6	19	25
North Bay	217	0	1	0	0	0	0	218	1	1	4	2	0	3	1	12	218	1	5	2	0	3	1	230	218	8	226	1	4	4
South Bay	841	0	2	1	11	1	0	856	3	2	9	4	6	6	3	32	844	2	12	5	17	7	3	888	844	18	863	12	13	25
Out of Region	91	1	7	3	0	2	0	103	0	1	8	3	0	2	1	16	91	2	15	6	0	4	1	119	101	12	113	3	4	6
Total	**3,435**	**4**	**36**	**14**	**38**	**8**	**1**	**3,537**	**24**	**15**	**96**	**39**	**19**	**57**	**25**	**276**	**3,459**	**19**	**132**	**53**	**58**	**66**	**26**	**3,813**	**3,486**	**184**	**3,670**	**51**	**92**	**143**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total								Piers 30-32			Seawall Lot 330		
Bike (Event)	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	In	Out	Total	In	Out	Total
Superdistrict 1	31							31	0							0	31	0	0	0	0	0	0	31	31	0	31	0	0	0
Superdistrict 2	9							9	0							0	9	0	0	0	0	0	0	9	9	0	9	0	0	0
Superdistrict 3	11							11	0							0	11	0	0	0	0	0	0	11	11	0	11	0	0	0
Superdistrict 4	9							9	0							0	9	0	0	0	0	0	0	9	9	0	9	0	0	0
East Bay	11							11	0							0	11	0	0	0	0	0	0	11	11	0	11	0	0	0
North Bay	4							4	0							0	4	0	0	0	0	0	0	4	4	0	4	0	0	0
South Bay	11							11	0							0	11	0	0	0	0	0	0	11	11	0	11	0	0	0
Out of Region	2							2	0							0	2	0	0	0	0	0	0	2	2	0	2	0	0	0
Total	**87**	**0**	**0**	**0**	**0**	**0**	**0**	**87**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**87**	**0**	**0**	**0**	**0**	**0**	**0**	**87**	**87**	**0**	**87**	**0**	**0**	**0**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total								Piers 30-32			Seawall Lot 330		
Taxi/Walk/Other	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	In	Out	Total	In	Out	Total
Superdistrict 1	361	3	22	9	34	5	1	435	3	5	29	12	17	11	4	80	364	8	51	20	52	16	4	515	392	47	440	43	33	76
Superdistrict 2	34	1	6	3	3	1	0	48	0	1	7	3	2	2	0	15	34	2	13	5	5	3	1	63	43	10	53	6	4	10
Superdistrict 3	35	1	4	2	27	1	0	70	0	1	6	2	14	2	1	26	35	2	10	4	41	3	1	97	41	9	50	29	17	46
Superdistrict 4	25	0	2	1	3	1	0	33	0	0	3	1	2	1	0	8	25	1	5	2	5	2	0	41	29	5	33	4	3	7
East Bay	50	1	4	2	1	1	0	59	0	1	5	2	0	2	1	12	51	2	9	4	1	3	1	71	57	8	65	3	3	6
North Bay	20	0	1	1	0	0	0	23	0	1	1	1	0	0	0	3	20	1	3	1	0	1	0	26	22	2	25	1	1	1
South Bay	43	0	2	1	1	0	0	47	0	0	2	1	1	1	0	4	43	1	3	1	2	1	0	52	45	3	48	2	2	4
Out of Region	24	6	12	5	0	3	0	49	0	6	12	5	0	3	0	25	24	11	24	9	0	5	1	74	42	19	61	7	7	13
Total	**592**	**13**	**54**	**22**	**71**	**12**	**2**	**765**	**4**	**15**	**65**	**26**	**36**	**21**	**6**	**173**	**596**	**27**	**119**	**48**	**107**	**33**	**8**	**938**	**671**	**103**	**775**	**94**	**70**	**163**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total								Piers 30-32			Seawall Lot 330		
Total Person Trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	In	Out	Total	In	Out	Total
Superdistrict 1	912	5	31	12	60	7	1	1,029	6	8	46	18	30	19	7	134	918	13	77	31	91	26	8	1,163	957	77	1,034	72	57	129
Superdistrict 2	375	2	20	8	6	4	1	415	7	5	36	15	3	18	7	91	381	7	56	23	9	23	8	506	402	65	467	13	26	39
Superdistrict 3	449	2	18	7	48	4	1	530	8	6	38	15	24	20	8	120	457	8	56	23	73	24	9	650	475	69	544	55	51	105
Superdistrict 4	337	1	10	4	6	2	0	360	5	3	23	9	3	13	5	62	342	4	33	13	9	15	6	422	351	43	393	9	19	29
East Bay	1,884	3	15	6	15	3	1	1,928	10	8	42	17	8	25	11	120	1,894	11	57	23	23	28	11	2,047	1,906	80	1,986	22	40	61
North Bay	538	1	7	3	1	2	0	552	3	3	14	6	1	7	3	36	541	4	21	8	2	9	3	589	548	26	574	4	11	15
South Bay	1,571	2	10	4	37	2	0	1,626	7	5	26	11	18	16	7	90	1,577	7	36	15	55	18	7	1,716	1,585	51	1,636	41	39	80
Out of Region	233	10	29	12	0	7	1	292	1	11	31	13	0	8	2	66	233	21	61	25	0	15	3	357	277	49	327	14	16	31
Total	**6,298**	**26**	**140**	**56**	**174**	**32**	**5**	**6,731**	**46**	**48**	**257**	**103**	**88**	**127**	**50**	**719**	**6,344**	**74**	**397**	**160**	**262**	**159**	**55**	**7,450**	**6,501**	**460**	**6,961**	**230**	**259**	**490**

PM Peak Hour bet. 4 PM & 6 PM	Inbound								Outbound								Total								Piers 30-32			Seawall Lot 330		
Vehicle-Trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	In	Out	Total	In	Out	Total
Superdistrict 1	65	1	2	1	14	0	0	82	8	1	3	1	7	2	1	23	73	1	5	2	21	2	1	106	68	14	81	15	9	24
Superdistrict 2	58	0	3	1	1	1	0	65	4	1	7	3	1	4	2	22	62	1	10	4	2	5	2	87	62	16	78	2	6	8
Superdistrict 3	81	0	3	1	11	1	0	97	5	1	9	4	6	6	2	33	86	2	12	5	17	6	3	130	85	20	105	12	13	25
Superdistrict 4	58	0	2	1	1	0	0	64	4	1	6	2	1	3	1	18	62	1	8	3	2	4	2	82	61	13	75	2	5	7
East Bay	216	0	3	1	9	1	0	231	4	1	6	2	5	3	1	23	220	2	9	4	14	4	1	254	220	14	234	10	9	19
North Bay	117	0	3	1	1	1	0	123	2	1	5	2	1	2	1	13	119	1	7	3	2	3	1	136	121	10	131	2	4	6
South Bay	286	1	2	1	22	1	0	313	6	2	10	4	11	7	3	43	292	3	13	5	33	8	3	356	289	23	313	23	20	43
Out of Region	46	1	3	1	0	1	0	53	1	1	4	2	0	1	0	9	47	3	7	3	0	2	0	62	51	7	58	2	2	4
Total	**927**	**4**	**21**	**9**	**60**	**5**	**1**	**1,027**	**34**	**9**	**51**	**20**	**30**	**29**	**12**	**185**	**961**	**13**	**72**	**29**	**91**	**34**	**13**	**1,212**	**958**	**117**	**1,076**	**69**	**68**	**136**

DRAFT - SUBJECT TO REVIEW

Event Center and Mixed Use Development at Piers 30-32 and Seawall Lot 330

PROJECT TRIP GENERATION - SATURDAY DAILY AND EVENING PEAK HOUR BETWEEN 7 AND 9 PM

SUMMARY OF TRIPS WITH BASKETBALL GAME

Land Use	Piers 30-32 Intensity	Piers 30-32 % of total	Seawall Lot 330 Intensity	Seawall Lot 330 % of total	Total Project Intensity	Total Project Total
Arena	18,064 attend.	100%		0%	18,064 attend.	100%
	925 empl.	100%		0%	925 empl.	100%
Retail	18,000 gsf	45%	22,390 gsf	55%	40,390 gsf	100%
Quick Service Rest.	36,000 gsf	100%	0 gsf	0%	36,000 gsf	100%
Sit-down Restaurant	36,000 gsf	83%	7,464 gsf	17%	43,464 gsf	100%
Residential	0 units	0%	176 units	100%	176 units	100%
Hotel	0 rooms	0%	227 rooms	100%	227 rooms	100%
Office	35,600 gsf	100%	0 gsf	0%	35,600 gsf	100%

Person-trips by Mode — Daily Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	%	Piers 30-32	SWL 330
Auto	14,737	354	1,343	541	552	576	56	18,159	38%	16,742	1,417
Transit	20,646	253	1,221	491	325	460	74	23,470	50%	22,461	1,009
Taxi/Coach (Event)	542							542	1%	542	-
Bike (Event)	795							795	2%	795	-
Walk	1,031	265	900	362	557	461	10	3,586	8%	2,359	1,227
Other	227	92	195	79	45	96	4	737	2%	532	205
Total	**37,978**	**964**	**3,659**	**1,472**	**1,478**	**1,593**	**144**	**47,289**	**100%**	**43,430**	**3,859**
	80%	**2%**	**8%**	**3%**	**3%**	**3%**	**0%**	**100%**			
Vehicle Trips	5,931	171	662	266	511	260	36	7,838		6,926	912
	76%	2%	8%	3%	7%	3%	0%	100%			
Avg. veh. occupancy	*2.58*	*2.06*	*2.03*	*2.03*	*1.08*	*2.21*	*1.54*	*2.39*		*2.50*	*1.55*

Person-trips by Mode — Evening Peak Hour Trips

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	%	Piers 30-32	SWL 330
Auto	4,906	16	312	126	62	72	0	5,493	39%	5,329	164
Transit	6,891	11	284	114	36	79	0	7,416	52%	7,275	141
Taxi/Coach (Event)	190							190	1%	190	-
Bike (Event)	278							278	2%	278	-
Walk	316	12	209	84	62	32	0	716	5%	600	116
Other	63	4	45	18	5	8	0	144	1%	126	18
Total	**12,645**	**43**	**850**	**342**	**166**	**191**	**0**	**14,236**	**100%**	**13,797**	**439**
	89%	**0%**	**6%**	**2%**	**1%**	**1%**	**0%**	**100%**			
Vehicle Trips	1,913	8	154	62	57	40	0	2,234		2,121	113
	86%	0%	7%	3%	3%	2%	0%	100%			
Avg. veh. occupancy	*2.66*	*2.06*	*2.03*	*2.03*	*1.08*	*1.78*	*0.00*	*2.54*		*2.60*	*1.46*

Percent of Daily during Late PM Peak Hour

Person-trips by Mode	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Auto	33.3%	4.5%	23.2%	23.2%	11.2%	12.5%	0.0%	30.3%
Transit	33.4%	4.5%	23.2%	23.2%	11.2%	17.1%	0.0%	31.6%
Taxi/Coach (Event)	35.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	35.0%
Bike (Event)	35.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	35.0%
Walk	30.7%	4.5%	23.2%	23.2%	11.2%	7.0%	0.0%	20.0%
Other	27.9%	4.5%	23.2%	23.2%	11.2%	8.1%	0.0%	19.5%
Total	**33.3%**	**4.5%**	**23.2%**	**23.2%**	**11.2%**	**12.0%**	**0.0%**	**30.1%**
Vehicle Trips	32.2%	4.5%	23.2%	23.2%	11.2%	15.5%	0.0%	28.5%

Saturday Distribution — Evening Peak Hour Person-Trips

Saturday Distribution	Total Daily Person-trip	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Superdistrict 1	6,264	1,403	7	164	66	57	31	0	1,729
Superdistrict 2	2,618	435	4	120	48	6	27	0	640
Superdistrict 3	3,295	525	5	120	48	46	29	0	774
Superdistrict 4	2,065	419	2	70	28	6	18	0	543
East Bay	13,571	4,173	6	122	49	15	34	0	4,399
North Bay	5,237	1,644	2	45	18	1	11	0	1,722
South Bay	11,401	3,541	4	78	31	35	22	0	3,710
Out of Region	2,837	506	12	130	53	0	18	0	719
Total	**47,289**	**12,645**	**43**	**850**	**342**	**166**	**191**	**0**	**14,236**

Saturday Distribution — Evening Peak Hour Transit-Trips

Saturday Distribution	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Superdistrict 1	712	1	34	14	11	8	0	780
Superdistrict 2	259	2	53	21	1	15	0	351
Superdistrict 3	303	2	52	21	8	14	0	401
Superdistrict 4	222	1	29	12	1	9	0	274
East Bay	2,708	2	48	19	5	17	0	2,799
North Bay	625	1	10	4	0	4	0	643
South Bay	1,870	1	25	10	11	8	0	1,924
Out of Region	192	1	33	13	0	5	0	244
Total	**6,891**	**11**	**284**	**114**	**36**	**79**	**0**	**7,416**

Saturday Distribution — Evening Peak Hour Vehicle-Trips

Saturday Distribution	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	%	Avg. Veh. Occ.
Superdistrict 1	136	1	11	4	13	3	0	168	8%	2.22
Superdistrict 2	53	1	22	9	1	6	0	92	4%	2.14
Superdistrict 3	71	1	26	10	11	8	0	126	6%	2.13
Superdistrict 4	64	1	17	7	1	5	0	94	4%	2.26
East Bay	520	1	19	8	9	5	0	562	25%	2.69
North Bay	364	1	16	6	1	4	0	392	18%	2.64
South Bay	598	1	27	11	21	9	0	667	30%	2.58
Out of Region	106	1	16	6	0	2	0	132	6%	2.76
Total	**1,913**	**8**	**154**	**62**	**57**	**40**	**0**	**2,234**	**100%**	**2.54**

Assumptions for Evening Peak Hour bet. 7 PM & 9 PM

	Arena Empl.	Arena Attend.	Retail Work	Retail Non-work	Q.S. Rest. Work	Q.S. Rest. Non-work	Sit-down Rest. Work	Sit-down Rest. Non-work	Residential Work	Residential Non-work	Hotel Work	Hotel Non-work	Office Work	Office Non-work
Inbound	95%	100%	0%	50%	0%	50%	0%	50%	100%	33%	0%	50%	0%	50%
Outbound	5%	0%	100%	50%	100%	50%	100%	50%	0%	67%	100%	50%	100%	50%

Evening Peak Hour bet. 7 PM & 9 PM — Inbound

Evening Peak Hour bet. 7 PM & 9 PM	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Total Person Trips	12,645	15	300	121	110	38	0	13,229
	100%	35%	35%	35%	67%	20%	0%	93%
Transit Trips	6,891	2	77	31	24	10	0	7,036
	100%	21%	27%	27%	67%	12%	0%	95%
Vehicle Trips	1,866	2	45	18	38	6	0	1,975
	98%	29%	30%	30%	67%	14%	0%	88%

Evening Peak Hour bet. 7 PM & 9 PM — Outbound

Evening Peak Hour bet. 7 PM & 9 PM	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Total Person Trips	0	28	550	221	56	153	0	1,007
	0%	65%	65%	65%	34%	80%	0%	7%
Transit Trips	0	9	206	83	12	69	0	380
	0%	79%	73%	73%	34%	88%	0%	5%
Vehicle Trips	47	5	108	44	19	35	0	258
	2%	71%	70%	70%	34%	86%	0%	12%

Evening Peak Hour bet. 7 PM & 9 PM — Total

Evening Peak Hour bet. 7 PM & 9 PM	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Total Person Trips	12,645	43	850	342	166	191	0	14,236
Transit Trips	6,891	11	284	114	36	79	0	7,416
Vehicle Trips	1,913	8	154	62	57	40	0	2,234

Evening Peak Hour bet. 7 PM & 9 PM Auto Trips — Inbound

Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Superdistrict 1	279	1	9	3	9	1	0	302
Superdistrict 2	122	0	13	5	1	2	0	144
Superdistrict 3	166	0	15	6	8	2	0	197
Superdistrict 4	150	0	9	4	1	1	0	165
East Bay	1,365	1	16	6	6	2	0	1,396
North Bay	965	0	11	4	1	1	0	983
South Bay	1,578	1	12	5	15	2	0	1,613
Out of Region	281	2	23	9	0	3	0	317
Total	**4,906**	**5**	**107**	**43**	**41**	**14**	**0**	**5,117**

Evening Peak Hour bet. 7 PM & 9 PM Auto Trips — Outbound

Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Superdistrict 1	0	1	13	5	5	3	0	27
Superdistrict 2	0	1	25	10	0	7	0	43
Superdistrict 3	0	1	32	13	4	10	0	59
Superdistrict 4	0	1	21	8	0	6	0	37
East Bay	0	2	38	15	3	12	0	70
North Bay	0	1	19	8	0	5	0	32
South Bay	0	2	33	13	8	11	0	67
Out of Region	0	2	25	10	0	4	0	41
Total	**0**	**10**	**205**	**82**	**21**	**58**	**0**	**376**

Evening Peak Hour bet. 7 PM & 9 PM Auto Trips — Total

Auto Trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total
Superdistrict 1	279	1	21	9	14	4	0	329
Superdistrict 2	122	1	38	15	1	9	0	187
Superdistrict 3	166	2	47	19	11	12	0	257
Superdistrict 4	150	1	30	12	1	8	0	201
East Bay	1,365	2	53	21	9	14	0	1,466
North Bay	965	1	29	12	1	6	0	1,015
South Bay	1,578	3	46	18	23	13	0	1,680
Out of Region	281	5	47	19	0	7	0	358
Total	**4,906**	**16**	**312**	**126**	**62**	**72**	**0**	**5,493**

Evening Peak Hour bet. 7 PM & 9 PM Auto Trips — Piers 30-32 and Seawall Lot 330

Auto Trips	Piers 30-32 In	Piers 30-32 Out	Piers 30-32 Total	Seawall Lot 330 In	Seawall Lot 330 Out	Seawall Lot 330 Total
Superdistrict 1	290	18	308	11	9	21
Superdistrict 2	140	33	174	4	10	13
Superdistrict 3	186	43	230	11	16	27
Superdistrict 4	162	28	190	3	9	12
East Bay	1,386	51	1,437	10	19	29
North Bay	980	25	1,005	3	7	10
South Bay	1,595	45	1,640	18	22	40
Out of Region	312	34	346	6	7	13
Total	**5,052**	**277**	**5,329**	**65**	**99**	**164**

DRAFT - SUBJECT TO REVIEW

Event Center and Mixed Use Development at Piers 30-32 and Seawall Lot 330

PROJECT TRIP GENERATION - SATURDAY DAILY AND EVENING PEAK HOUR BETWEEN 7 AND 9 PM

SUMMARY OF TRIPS WITH BASKETBALL GAME

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total								Piers 30-32			Seawall Lot 330		
Transit Trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	In	Out	Total	In	Out	Total
Superdistrict 1	712	0	11	5	7	1	0	737	0	1	23	9	4	7	0	43	712	1	34	14	11	8	0	780	727	31	758	9	12	22
Superdistrict 2	259	0	15	6	1	2	0	282	0	2	38	15	0	13	0	68	259	2	53	21	1	15	0	351	279	52	330	4	17	20
Superdistrict 3	303	0	14	6	6	2	0	331	0	1	37	15	3	12	0	69	303	2	52	21	8	14	0	401	323	51	373	9	19	27
Superdistrict 4	222	0	7	3	1	1	0	233	0	1	22	9	0	8	0	40	222	1	29	12	1	9	0	274	231	30	261	2	10	12
East Bay	2,708	0	8	3	3	1	0	2,724	0	2	40	16	2	16	0	75	2,708	2	48	19	5	17	0	2,799	2,719	54	2,773	5	21	26
North Bay	625	0	1	1	0	0	0	628	0	0	8	3	0	3	0	16	625	1	10	4	0	4	0	643	627	11	638	1	4	5
South Bay	1,870	0	5	2	7	1	0	1,885	0	1	20	8	4	7	0	39	1,870	1	25	10	11	8	0	1,924	1,877	27	1,903	8	13	21
Out of Region	192	1	15	6	0	2	0	216	0	1	17	7	0	3	0	28	192	1	33	13	0	5	0	244	213	24	236	3	5	8
Total	**6,891**	**2**	**77**	**31**	**24**	**10**	**0**	**7,036**	**0**	**9**	**206**	**83**	**12**	**69**	**0**	**380**	**6,891**	**11**	**284**	**114**	**36**	**79**	**0**	**7,416**	**6,995**	**279**	**7,275**	**41**	**100**	**141**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total								Piers 30-32			Seawall Lot 330		
Bike (Event)	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	In	Out	Total	In	Out	Total
Superdistrict 1	97							97	0							0	97	0	0	0	0	0	0	97	97	0	97	0	0	0
Superdistrict 2	23							23	0							0	23	0	0	0	0	0	0	23	23	0	23	0	0	0
Superdistrict 3	29							29	0							0	29	0	0	0	0	0	0	29	29	0	29	0	0	0
Superdistrict 4	24							24	0							0	24	0	0	0	0	0	0	24	24	0	24	0	0	0
East Bay	41							41	0							0	41	0	0	0	0	0	0	41	41	0	41	0	0	0
North Bay	19							19	0							0	19	0	0	0	0	0	0	19	19	0	19	0	0	0
South Bay	38							38	0							0	38	0	0	0	0	0	0	38	38	0	38	0	0	0
Out of Region	6							6	0							0	6	0	0	0	0	0	0	6	6	0	6	0	0	0
Total	**278**	**0**	**0**	**0**	**0**	**0**	**0**	**278**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**278**	**0**	**0**	**0**	**0**	**0**	**0**	**278**	**278**	**0**	**278**	**0**	**0**	**0**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total								Piers 30-32			Seawall Lot 330		
Taxi/Walk/Other	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	In	Out	Total	In	Out	Total
Superdistrict 1	314	2	46	19	22	6	0	409	0	3	62	25	11	13	0	114	314	5	108	44	33	19	0	523	377	84	461	32	30	62
Superdistrict 2	30	0	14	6	2	2	0	54	0	0	15	6	1	2	0	25	30	1	29	12	3	4	0	79	49	20	69	5	5	10
Superdistrict 3	27	1	10	4	17	1	0	60	0	1	12	5	9	2	0	29	27	1	22	9	26	4	0	89	40	16	57	20	12	32
Superdistrict 4	23	0	5	2	2	1	0	33	0	0	6	3	1	1	0	11	23	0	11	5	3	2	0	44	30	8	38	3	3	6
East Bay	59	1	9	4	0	1	0	74	0	1	11	4	0	2	0	19	59	1	20	8	1	3	0	92	71	15	86	3	4	6
North Bay	34	0	3	1	0	0	0	39	0	0	3	1	0	1	0	5	34	1	6	2	0	1	0	44	38	4	42	1	1	2
South Bay	55	0	3	1	1	0	0	61	0	0	4	2	0	1	0	7	55	0	7	3	1	1	0	68	59	5	65	2	1	3
Out of Region	27	3	25	10	0	3	0	68	0	3	25	10	0	3	0	42	27	7	50	20	0	6	0	110	62	35	97	7	7	14
Total	**569**	**7**	**115**	**46**	**45**	**15**	**0**	**798**	**0**	**9**	**139**	**56**	**23**	**25**	**0**	**251**	**569**	**16**	**254**	**102**	**67**	**40**	**0**	**1,049**	**726**	**189**	**915**	**72**	**62**	**134**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total								Piers 30-32			Seawall Lot 330		
Total Person Trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	In	Out	Total	In	Out	Total
Superdistrict 1	1,403	3	66	27	38	8	0	1,545	0	5	98	39	19	23	0	184	1,403	7	164	66	57	31	0	1,729	1,492	133	1,625	53	52	104
Superdistrict 2	435	1	42	17	4	5	0	504	0	3	78	31	2	22	0	136	435	4	120	48	6	27	0	640	492	105	597	13	31	43
Superdistrict 3	525	1	39	16	31	5	0	617	0	3	81	33	15	24	0	157	525	5	120	48	46	29	0	774	578	110	688	39	47	86
Superdistrict 4	419	0	21	8	4	3	0	455	0	2	49	20	2	15	0	88	419	2	70	28	6	18	0	543	447	66	513	8	22	30
East Bay	4,173	2	33	13	10	4	0	4,235	0	5	89	36	5	30	0	164	4,173	6	122	49	15	34	0	4,399	4,218	121	4,338	17	43	61
North Bay	1,644	1	15	6	1	2	0	1,668	0	2	30	12	0	9	0	53	1,644	2	45	18	1	11	0	1,722	1,664	41	1,705	4	12	17
South Bay	3,541	1	21	8	23	3	0	3,597	0	3	57	23	12	19	0	113	3,541	4	78	31	35	22	0	3,710	3,569	77	3,646	28	36	64
Out of Region	506	6	63	25	0	8	0	608	0	6	67	27	0	10	0	111	506	12	130	53	0	18	0	719	592	93	685	16	18	34
Total	**12,645**	**15**	**300**	**121**	**110**	**38**	**0**	**13,229**	**0**	**28**	**550**	**221**	**56**	**153**	**0**	**1,007**	**12,645**	**43**	**850**	**342**	**166**	**191**	**0**	**14,236**	**13,051**	**746**	**13,797**	**178**	**262**	**439**

Evening Peak Hour bet. 7 PM & 9 PM	Inbound								Outbound								Total								Piers 30-32			Seawall Lot 330		
Vehicle-Trips	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	Arena	Retail	QS Rest.	Sd Rest.	Resid.	Hotel	Office	Total	In	Out	Total	In	Out	Total
Superdistrict 1	120	0	4	1	9	0	0	134	16	1	7	3	4	2	0	33	136	1	11	4	13	3	0	168	125	26	151	10	7	17
Superdistrict 2	49	0	6	3	1	1	0	60	4	1	16	6	0	5	0	32	53	1	22	9	1	6	0	92	58	25	83	2	7	9
Superdistrict 3	66	0	6	3	7	1	0	83	5	1	19	8	4	7	0	43	71	1	26	10	11	8	0	126	75	31	106	8	12	20
Superdistrict 4	60	0	5	2	1	1	0	68	4	0	12	5	0	4	0	26	64	1	17	7	1	5	0	94	66	21	86	2	6	7
East Bay	513	0	6	3	6	1	0	529	7	1	13	5	3	4	0	33	520	1	19	8	9	5	0	562	522	25	547	7	8	15
North Bay	361	0	6	2	1	1	0	370	3	0	10	4	0	3	0	21	364	1	16	6	1	4	0	392	369	17	386	2	4	6
South Bay	591	0	5	2	14	1	0	614	6	1	22	9	7	8	0	54	598	1	27	11	21	9	0	667	598	36	634	15	18	33
Out of Region	105	1	7	3	0	1	0	117	1	1	9	3	0	2	0	15	106	1	16	6	0	2	0	132	115	13	128	2	3	4
Total	**1,866**	**2**	**45**	**18**	**38**	**6**	**0**	**1,975**	**47**	**5**	**108**	**44**	**19**	**35**	**0**	**258**	**1,913**	**8**	**154**	**62**	**57**	**40**	**0**	**2,234**	**1,927**	**194**	**2,121**	**48**	**64**	**113**

DRAFT - SUBJECT TO REVIEW

OFF-SITE ALTERNATIVE AT PIERS 30/32 & SWL 330
INTERSECTION LOS SUMMARY TABLE

Event Center and Mixed-Use Development at Piers 30-32 and Seawall Lot 330
Existing LOS Table - No Overlapping SF Giants Game

		Existing		Existing		Existing Plus Project		Existing Plus Project		Existing Plus No Event		Existing Plus No Event	
		Weekday 4-6 PM		Weekend 7-9 PM		Weekday 4-6 PM		Weekend 7-9 PM		Weekday 4-6 PM		Weekend 7-9 PM	
Int No	Study Intersection	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Broadway/The Embarcadero	36.7	D	26.1	C	37.4	D	29.2	C	36.9	D	26.4	C
2	Washington/The Embarcadero	30.5	C	31.4	C	38.0	D	33.3	C	31.5	C	31.9	C
3	Mission/The Embarcadero	**79.5**	**E**	12.8	B	**>80 (1.13)**	**F**	12.9	B	**>80 (1.06)**	**F**	13	B
4	Howard/The Embarcadero	**>80 (1.13)**	**F**	38.3	D	**>80 (1.38)**	**F**	**>80 (1.1)**	**F**	**>80 (1.18)**	**F**	46	D
5	Folsom St./The Embarcadero	**61.9**	**E**	21.3	C	**>80 (1.39)**	**F**	54.9	D	**66.8**	**E**	21.2	C
6	Harrison St./The Embarcadero	**71.0**	**E**	21.0	C	**>80 (1.01)**	**F**	25.1	C	**>80 (0.93)**	**F**	23.9	C
7	Bryant St./The Embarcadero	**>80 (1.51)**	**F**	22.9	C	**>80 (1.08)**	**F**	> 80	F	**>80 (2.17)**	**F**	**>80 (1.04)**	**F**
9	Brannan St./The Embarcadero	39.1	D	23.9	C	42.4	D	33.4	C	37.6	D	26.2	C
10	Townsend St./The Embarcadero	**58.1**	**E**	19.1	B	**70.4**	**E**	27.2	C	**62.6**	**E**	23.1	C
11	King St./Second St.	**55.8**	**E**	33.9	C	**63.1**	**E**	39.4	D	**59.6**	**E**	36.8	D
12	King St./Third St.	**72.7**	**E**	**26.6**	**C**	**>80 (0.99)**	**F**	39.8	D	**>80 (0.95)**	**F**	32.5	C
13	King St./Fourth St.	**51.9**	**D**	**22.6**	**C**	**59.5**	**E**	**56.8**	**E**	**56.0**	**E**	30.8	C
14	King/I-280 Ramps/Fifth St.	**59.2**	**E**	**< 10**	**A**	**72.8**	**E**	**< 10**	**A**	**56.0**	**E**	**< 10**	**A**
15	Harrison St/Main St	**>80 (0.91)**	**F**	22.0	C	**>80 (1.07)**	**F**	51.1	D	**>80 (0.93)**	**F**	22.5	C
16	Bryant St/Main St	21.2	C	7.4	A	24.2	C	8.4	A	32.5	C	7	A
17	Mission St/Beale St	33.8	C	12.0	B	41.8	D	13.2	B	37.1	D	12.1	B
18	Bryant St./Beale St.	54.0	D	26.8	C	**>80 (1.15)**	**F**	**63.6**	**E**	**>80 (1.13)**	**F**	50.2	D
19	Harrison St./Fremont St.	32.4	C	18.0	B	38.8	D	34.5	C	34.4	C	17.6	B
20	Folsom St./Fremont St.	53.6	D	30.2	C	**>80 (0.75)**	**F**	54.2	D	54.0	D	30.2	C
21	Harrison St./First St.	**>80 (1.13)**	**F**	28.3	C	**>80 (1.28)**	**F**	**79.4**	**E**	**>80 (1.17)**	**F**	36.3	D
22	Howard St./Fourth St.	52.2	D	28.7	C	54.4	D	29.5	C	53.1	D	28.8	C
23	Harrison St./Fourth St.	41.8	D	21.8	C	44.5	D	23.1	C	42.0	D	21.9	C
24	Bryant St./Fourth St.	**>80 (0.76)**	**F**	27.1	C	**>80 (0.87)**	**F**	32.9	C	**>80 (0.77)**	**F**	27.1	C
25	Harrison St./Fifth St.	**48.4**	**D**	27.1	C	**>80 (1.07)**	**F**	**55.2**	**E**	**60.9**	**E**	29	C
27	Brannan St./Second St.	20.2	C	10.7	B	28.2	C	15.3	B	21.3	C	11.2	B
28	Bryant St./Second St.	**>80 (1.23)**	**F**	25.9	C	**>80 (1.27)**	**F**	38.5	D	**>80 (1.24)**	**F**	28.3	C

	Existing Weekday 4-6 PM	Existing Weekend 7-9 PM	Existing Plus Project Weekday 4-6 PM	Existing Plus Project Weekend 7-9 PM	Existing Plus No Event Weekday 4-6 PM	Existing Plus No Event Weekend 7-9 PM
Intersections at LOS E or LOS F	**13**	**0**	**17**	**6**	**16**	**1**
Project-specific Impacts	--	--	***8***	***6***	***6***	***1***
Contribution to Existing LOS E & F	--	--	***4***	***0***	***2***	***0***
No Contribution to Existing LOS E/F	--	--	5	0	8	0

GSW P30-32 LOS Table_052815_FP.xlsx

DRAFT - SUBJECT TO REVIEW, NOT REVIEWED FOR ACCURACY

OFF-SITE ALTERNATIVE AT PIERS 30/32 & SWL 330
INTERSECTION LEVEL OF SERVICE
EXISTING – WEEKDAY PM PEAK

HCM Signalized Intersection Capacity Analysis
1: The Embarcadero & Broadway
5/28/2015

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	50	293	197	617	4	694	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	3.3	4.0	
Lane Util. Factor	1.00	1.00	0.97	0.95	1.00	0.95	
Frpb, ped/bikes	1.00	0.82	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	1.00	
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1540	1128	2987	3079	1540	3074	
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	1540	1128	2987	3079	1540	3074	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	53	312	210	656	4	738	5
RTOR Reduction (vph)	0	201	0	0	0	1	0
Lane Group Flow (vph)	53	111	210	656	4	742	0
Confl. Peds. (#/hr)		191					110
Parking (#/hr)							10
Turn Type	Perm	Perm	Prot	NA	Prot	NA	
Protected Phases			5		1	6	
Permitted Phases	4	4		2			
Actuated Green, G (s)	36.5	36.5	17.1	48.0	5.9	37.6	
Effective Green, g (s)	39.0	39.0	20.0	50.9	8.8	39.0	
Actuated g/C Ratio	0.35	0.35	0.18	0.46	0.08	0.35	
Clearance Time (s)	6.5	6.5	6.9	6.9	6.2	5.4	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	546	399	543	1424	123	1089	
v/s Ratio Prot			0.07		0.00	c0.24	
v/s Ratio Perm	0.03	c0.10		c0.21			
v/c Ratio	0.10	0.28	0.39	0.46	0.03	0.68	
Uniform Delay, d1	23.7	25.4	39.6	20.2	46.7	30.2	
Progression Factor	1.00	1.00	1.52	1.87	1.00	1.00	
Incremental Delay, d2	0.1	0.4	0.4	0.9	0.5	3.5	
Delay (s)	23.8	25.8	60.4	38.6	47.2	33.7	
Level of Service	C	C	E	D	D	C	
Approach Delay (s)	25.5			43.9		33.7	
Approach LOS	C			D		C	

Intersection Summary			
HCM 2000 Control Delay	36.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	77.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: The Embarcadero & Washington
5/28/2015

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	115	156	117	713	11	938	38
Ideal Flow (vphpl)	1900	1900	1400	1400	1700	1700	1700
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	0.97	0.91	1.00	0.91	
Frpb, ped/bikes	1.00	0.84	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1540	1158	2201	3260	1377	3912	
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	1540	1158	2201	3260	1377	3912	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	170	127	775	12	1020	41
RTOR Reduction (vph)	0	100	0	0	0	4	0
Lane Group Flow (vph)	125	70	127	775	12	1057	0
Confl. Peds. (#/hr)		188	131				131
Turn Type	Perm	Perm	Prot	NA	Prot	NA	
Protected Phases			5	2	1	6	
Permitted Phases	4	4					
Actuated Green, G (s)	41.3	41.3	17.6	39.0	6.5	30.0	
Effective Green, g (s)	45.0	45.0	21.0	42.4	10.6	32.0	
Actuated g/C Ratio	0.41	0.41	0.19	0.39	0.10	0.29	
Clearance Time (s)	7.7	7.7	7.4	7.4	8.1	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	630	473	420	1256	132	1138	
v/s Ratio Prot			0.06	c0.24	0.01	c0.27	
v/s Ratio Perm	c0.08	0.06					
v/c Ratio	0.20	0.15	0.30	0.62	0.09	0.93	
Uniform Delay, d1	20.9	20.4	38.2	27.3	45.3	37.9	
Progression Factor	1.00	1.00	1.14	1.18	1.23	0.45	
Incremental Delay, d2	0.2	0.1	0.2	1.3	1.1	11.9	
Delay (s)	21.1	20.6	43.6	33.5	57.0	29.1	
Level of Service	C	C	D	C	E	C	
Approach Delay (s)	20.8			35.0		29.4	
Approach LOS	C			C		C	

Intersection Summary			
HCM 2000 Control Delay	30.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

DRAFT - SUBJECT TO REVIEW

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	167	71	0	1132	1116	140
Ideal Flow (vphpl)	1900	1900	1600	1600	1600	1600
Total Lost time (s)	4.0	6.4		4.0	4.0	
Lane Util. Factor	1.00	1.00		*0.50	*0.40	
Frpb, ped/bikes	1.00	0.84		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.98	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1540	1157		2047	1584	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	1540	1157		2047	1584	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	178	76	0	1204	1187	149
RTOR Reduction (vph)	0	35	0	0	4	0
Lane Group Flow (vph)	178	41	0	1204	1332	0
Confl. Peds. (#/hr)	307	110				80
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	24.2	24.2		74.2	74.2	
Effective Green, g (s)	26.6	24.2		75.4	75.4	
Actuated g/C Ratio	0.24	0.22		0.69	0.69	
Clearance Time (s)	6.4	6.4		5.2	5.2	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	372	254		1403	1085	
v/s Ratio Prot	c0.12			0.59	c0.84	
v/s Ratio Perm		0.04				
v/c Ratio	0.48	0.16		0.86	1.23	
Uniform Delay, d1	35.8	34.7		13.2	17.3	
Progression Factor	1.00	1.00		2.51	1.01	
Incremental Delay, d2	1.0	0.3		5.0	108.0	
Delay (s)	36.7	35.0		38.1	125.5	
Level of Service	D	C		D	F	
Approach Delay (s)	36.2			38.1	125.5	
Approach LOS	D			D	F	

Intersection Summary			
HCM 2000 Control Delay	79.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Lane Configurations								
Volume (vph)	164	120	1	148	966	2	899	286
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1600	1600
Total Lost time (s)	4.0	7.1		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	*0.80	1.00	*0.76	1.00
Frpb, ped/bikes	1.00	0.93		1.00	1.00	1.00	1.00	0.95
Flpb, ped/bikes	0.91	1.00		0.99	1.00	1.00	1.00	1.00
Frt	1.00	0.85		1.00	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1397	1286		1281	3275	1296	2074	1098
Flt Permitted	0.95	1.00		0.27	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1397	1286		360	3275	1296	2074	1098
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	171	125	1	154	1006	2	936	298
RTOR Reduction (vph)	0	73	0	0	0	0	0	174
Lane Group Flow (vph)	171	52	0	155	1006	2	936	124
Confl. Peds. (#/hr)	120	72		46				46
Turn Type	Perm	Perm	custom	Prot	NA	Prot	NA	custom
Protected Phases				5	2	1	6	
Permitted Phases	4	4	5					6
Actuated Green, G (s)	42.9	42.9		12.1	39.8	7.0	35.6	35.6
Effective Green, g (s)	46.0	42.9		15.0	42.7	9.3	37.0	37.0
Actuated g/C Ratio	0.42	0.39		0.14	0.39	0.08	0.34	0.34
Clearance Time (s)	7.1	7.1		6.9	6.9	6.3	5.4	5.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	584	501		49	1271	109	697	369
v/s Ratio Prot						0.00		
v/s Ratio Perm	c0.12	0.04		c0.43	0.31		c0.45	0.11
v/c Ratio	0.29	0.10		3.16	0.79	0.02	1.34	0.34
Uniform Delay, d1	21.2	21.3		47.5	29.7	46.2	36.5	27.3
Progression Factor	1.00	1.00		0.75	0.57	1.22	0.90	0.89
Incremental Delay, d2	0.3	0.1		1018.0	4.4	0.0	155.2	0.2
Delay (s)	21.5	21.4		1053.8	21.4	56.5	187.9	24.4
Level of Service	C	C		F	C	E	F	C
Approach Delay (s)	21.5				159.2		148.3	
Approach LOS	C				F		F	

Intersection Summary			
HCM 2000 Control Delay	139.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	90.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

Movement	EBL	EBR	NBU	NBL	NBT	SBT	SBR
Lane Configurations							
Volume (vph)	218	173	31	63	897	995	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1700	1700
Lane Width	12	12	11	12	12	12	12
Total Lost time (s)	3.7	3.7		3.4	2.3	2.3	
Lane Util. Factor	0.97	1.00		1.00	0.95	0.95	
Frpb, ped/bikes	1.00	0.78		1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	
Frt	1.00	0.85		1.00	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	
Satd. Flow (prot)	3090	950		1593	2946	2810	
Flt Permitted	0.95	1.00		0.22	1.00	1.00	
Satd. Flow (perm)	3090	950		361	2946	2810	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	229	182	33	66	944	1047	26
RTOR Reduction (vph)	0	107	0	0	0	1	0
Lane Group Flow (vph)	229	75	0	99	944	1072	0
Confl. Peds. (#/hr)	84	266					223
Confl. Bikes (#/hr)							48
Parking (#/hr)		10			10		
Turn Type	Prot	Perm	custom	Prot	NA	NA	
Protected Phases	4			5	2	6	
Permitted Phases		4	5				
Actuated Green, G (s)	42.3	42.3		15.6	55.7	33.7	
Effective Green, g (s)	45.3	45.3		18.6	58.7	36.7	
Actuated g/C Ratio	0.41	0.41		0.17	0.53	0.33	
Clearance Time (s)	6.7	6.7		6.4	5.3	5.3	
Lane Grp Cap (vph)	1272	391		61	1572	937	
v/s Ratio Prot	0.07				0.32	c0.38	
v/s Ratio Perm		c0.08		c0.27			
v/c Ratio	0.18	0.19		1.62	0.60	1.14	
Uniform Delay, d1	20.6	20.7		45.7	17.6	36.6	
Progression Factor	1.00	1.00		0.83	1.96	0.17	
Incremental Delay, d2	0.3	1.1		334.8	1.4	66.0	
Delay (s)	20.9	21.7		372.9	36.0	72.1	
Level of Service	C	C		F	D	E	
Approach Delay (s)	21.3				68.0	72.1	
Approach LOS	C				E	E	

Intersection Summary			
HCM 2000 Control Delay	62.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.4
Intersection Capacity Utilization	95.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	170	214	0	821	1007	192
Ideal Flow (vphpl)	1900	1900	1900	1900	1600	1600
Total Lost time (s)	6.8	6.8		5.4	5.4	
Lane Util. Factor	1.00	1.00		*0.90	*0.80	
Frpb, ped/bikes	1.00	0.96		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.98	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1540	1318		2917	2085	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	1540	1318		2917	2085	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	185	233	0	892	1095	209
RTOR Reduction (vph)	0	18	0	0	11	0
Lane Group Flow (vph)	185	215	0	892	1293	0
Confl. Peds. (#/hr)	73	40				140
Confl. Bikes (#/hr)						117
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	41.2	41.2		56.6	56.6	
Effective Green, g (s)	41.2	41.2		56.6	56.6	
Actuated g/C Ratio	0.37	0.37		0.51	0.51	
Clearance Time (s)	6.8	6.8		5.4	5.4	
Lane Grp Cap (vph)	576	493		1500	1072	
v/s Ratio Prot	0.12			0.31	c0.62	
v/s Ratio Perm		c0.16				
v/c Ratio	0.32	0.44		0.59	1.21	
Uniform Delay, d1	24.5	25.7		18.7	26.7	
Progression Factor	1.00	1.00		1.82	0.62	
Incremental Delay, d2	1.5	2.8		1.0	93.6	
Delay (s)	25.9	28.5		35.0	110.1	
Level of Service	C	C		C	F	
Approach Delay (s)	27.4			35.0	110.1	
Approach LOS	C			C	F	

Intersection Summary			
HCM 2000 Control Delay	71.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	34	4	227	7	9	4	1	190	763	0	17	1128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1600	1600	1600	1600	1600
Total Lost time (s)	6.9	6.9			6.9			6.5	6.5		5.9	5.2
Lane Util. Factor	1.00	1.00			1.00			1.00	0.95		*0.90	*0.90
Frpb, ped/bikes	1.00	0.97			0.99			1.00	1.00		1.00	1.00
Flpb, ped/bikes	0.96	1.00			1.00			1.00	1.00		1.00	1.00
Frt	1.00	0.85			0.98			1.00	1.00		1.00	1.00
Flt Protected	0.95	1.00			0.98			0.95	1.00		0.95	1.00
Satd. Flow (prot)	1481	1334			1531			1296	2593		1167	2456
Flt Permitted	0.74	1.00			0.85			0.21	1.00		0.95	1.00
Satd. Flow (perm)	1159	1334			1325			291	2593		1167	2456
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	4	247	8	10	4	1	207	829	0	18	1226
RTOR Reduction (vph)	0	201	0	0	3	0	0	0	0	0	0	0
Lane Group Flow (vph)	37	50	0	0	19	0	0	208	829	0	18	1226
Confl. Peds. (#/hr)	45		24	24		45				173		
Confl. Bikes (#/hr)			2							52		
Turn Type	Perm	NA		Perm	NA		custom	Prot	NA		Prot	NA
Protected Phases		4			8			5	2		1	6
Permitted Phases	4			8			5					
Actuated Green, G (s)	20.4	20.4			20.4			20.5	41.5		28.8	50.5
Effective Green, g (s)	20.4	20.4			20.4			20.5	41.5		28.8	50.5
Actuated g/C Ratio	0.19	0.19			0.19			0.19	0.38		0.26	0.46
Clearance Time (s)	6.9	6.9			6.9			6.5	6.5		5.9	5.2
Vehicle Extension (s)	3.0	3.0			3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	214	247			245			54	978		305	1127
v/s Ratio Prot		c0.04							0.32		0.02	c0.50
v/s Ratio Perm	0.03				0.01			c0.71				
v/c Ratio	0.17	0.20			0.08			3.85	0.85		0.06	1.09
Uniform Delay, d1	37.7	37.9			37.0			44.8	31.4		30.4	29.8
Progression Factor	1.00	1.00			1.00			0.77	0.81		1.42	1.26
Incremental Delay, d2	0.4	0.4			0.1			1315.2	6.8		0.0	41.2
Delay (s)	38.1	38.3			37.2			1349.6	32.3		43.2	78.8
Level of Service	D	D			D			F	C		D	E
Approach Delay (s)		38.3			37.2				296.5			76.1
Approach LOS		D			D				F			E

Intersection Summary			
HCM 2000 Control Delay	157.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.52		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.3
Intersection Capacity Utilization	101.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBR
Lane Configurations	
Volume (vph)	76
Ideal Flow (vphpl)	1600
Total Lost time (s)	5.2
Lane Util. Factor	*0.90
Frpb, ped/bikes	0.88
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	917
Flt Permitted	1.00
Satd. Flow (perm)	917
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	83
RTOR Reduction (vph)	45
Lane Group Flow (vph)	38
Confl. Peds. (#/hr)	77
Confl. Bikes (#/hr)	80
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Actuated Green, G (s)	50.5
Effective Green, g (s)	50.5
Actuated g/C Ratio	0.46
Clearance Time (s)	5.2
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	420
v/s Ratio Prot	
v/s Ratio Perm	0.04
v/c Ratio	0.09
Uniform Delay, d1	16.8
Progression Factor	2.58
Incremental Delay, d2	0.0
Delay (s)	43.3
Level of Service	D
Approach Delay (s)	
Approach LOS	

Intersection Summary

DRAFT - SUBJECT TO REVIEW

HCM Unsignalized Intersection Capacity Analysis
8: SWL 330 Lot & Bryant St
5/28/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	296	2	2	174	6	47
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	333	2	2	196	7	53
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	183			131		
pX, platoon unblocked						
vC, conflicting volume			335		534	167
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			335		534	167
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		99	94
cM capacity (veh/h)			1221		475	847

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	222	113	198	60
Volume Left	0	0	2	7
Volume Right	0	2	0	53
cSH	1700	1700	1221	778
Volume to Capacity	0.13	0.07	0.00	0.08
Queue Length 95th (ft)	0	0	0	6
Control Delay (s)	0.0	0.0	0.1	10.0
Lane LOS			A	B
Approach Delay (s)	0.0		0.1	10.0
Approach LOS				B

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	22.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
9: The Embarcadero & Brannan St.
5/28/2015

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	98	39	42	851	5	939	419
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.9	6.9	6.6	5.2	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.95	1.00	1.00	1.00	1.00	0.70
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	1314	1540	3079	1540	3079	971
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1540	1314	1540	3079	1540	3079	971
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	105	42	45	915	5	1010	451
RTOR Reduction (vph)	0	26	0	0	0	0	161
Lane Group Flow (vph)	105	16	45	915	5	1010	290
Confl. Peds. (#/hr)	36	40					133
Confl. Bikes (#/hr)							92
Turn Type	Prot	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	4		5	2	1	6	
Permitted Phases		4					6
Actuated Green, G (s)	38.1	38.1	15.4	43.8	10.0	37.0	37.0
Effective Green, g (s)	38.1	38.1	15.4	43.8	10.0	37.0	37.0
Actuated g/C Ratio	0.35	0.35	0.14	0.40	0.09	0.34	0.34
Clearance Time (s)	6.9	6.9	6.6	5.2	6.0	6.0	6.0
Lane Grp Cap (vph)	533	455	215	1226	140	1035	326
v/s Ratio Prot	c0.07		0.03	c0.30	0.00	c0.33	
v/s Ratio Perm		0.01					0.30
v/c Ratio	0.20	0.03	0.21	0.75	0.04	0.98	0.89
Uniform Delay, d1	25.2	23.8	41.9	28.3	45.6	36.1	34.6
Progression Factor	1.00	1.00	0.54	0.86	0.89	0.91	1.48
Incremental Delay, d2	0.8	0.1	1.3	2.5	0.1	10.4	10.7
Delay (s)	26.0	23.9	23.9	26.8	40.5	43.1	61.9
Level of Service	C	C	C	C	D	D	E
Approach Delay (s)	25.4			26.7		48.9	
Approach LOS	C			C		D	

Intersection Summary			
HCM 2000 Control Delay	39.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	105	6	20	4	5	6	10	35	782	5	2	809
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1600	1600	1600	1600	1600	1600
Total Lost time (s)		7.0			7.0			7.0	7.0		5.8	5.4
Lane Util. Factor		1.00			1.00			1.00	0.95		1.00	0.95
Frpb, ped/bikes		0.95			0.87			1.00	1.00		1.00	0.94
Flpb, ped/bikes		0.76			0.94			1.00	1.00		1.00	1.00
Frt		0.98			0.95			1.00	1.00		1.00	0.97
Flt Protected		0.96			0.99			0.95	1.00		0.95	1.00
Satd. Flow (prot)		1096			1230			1296	2583		1296	2386
Flt Permitted		0.76			0.94			0.95	1.00		0.95	1.00
Satd. Flow (perm)		865			1176			1296	2583		1296	2386
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	113	6	22	4	5	6	11	38	841	5	2	870
RTOR Reduction (vph)	0	6	0	0	4	0	0	0	1	0	0	15
Lane Group Flow (vph)	0	135	0	0	11	0	0	49	845	0	2	1035
Confl. Peds. (#/hr)	400		400	400		400				400		
Confl. Bikes (#/hr)			30			30				30		
Turn Type	Perm	NA		Perm	NA		Prot	Prot	NA		Prot	NA
Protected Phases		4			8		5	5	2		1	6
Permitted Phases	4			8								
Actuated Green, G (s)		33.6			33.6			15.0	43.0		13.6	42.0
Effective Green, g (s)		33.6			33.6			15.0	43.0		13.6	42.0
Actuated g/C Ratio		0.31			0.31			0.14	0.39		0.12	0.38
Clearance Time (s)		7.0			7.0			7.0	7.0		5.8	5.4
Vehicle Extension (s)		3.0			3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		264			359			176	1009		160	911
v/s Ratio Prot								0.04	c0.33		0.00	c0.43
v/s Ratio Perm		c0.16			0.01							
v/c Ratio		0.51			0.03			0.28	0.84		0.01	1.14
Uniform Delay, d1		31.4			26.8			42.6	30.3		42.3	34.0
Progression Factor		1.00			1.00			0.82	0.67		1.97	0.65
Incremental Delay, d2		1.7			0.0			2.7	5.9		0.0	66.5
Delay (s)		33.1			26.8			37.8	26.3		83.6	88.5
Level of Service		C			C			D	C		F	F
Approach Delay (s)		33.1			26.8				27.0			88.5
Approach LOS		C			C				C			F

Intersection Summary			
HCM 2000 Control Delay	58.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.8
Intersection Capacity Utilization	92.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBR
Lane Configurations	
Volume (vph)	167
Ideal Flow (vphpl)	1600
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.93
Adj. Flow (vph)	180
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	400
Confl. Bikes (#/hr)	30
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

DRAFT - SUBJECT TO REVIEW

Movement	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations							
Volume (vph)	196	791	5	813	25	19	285
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	6.6	5.2	6.6	6.6		6.8	6.8
Lane Util. Factor	1.00	0.95	1.00	*0.90		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.99		1.00	0.68
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	1296	2593	1296	2422		1296	784
Flt Permitted	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	1296	2593	1296	2422		1296	784
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	202	815	5	838	26	20	294
RTOR Reduction (vph)	0	0	0	2	0	0	192
Lane Group Flow (vph)	202	815	5	862	0	20	102
Confl. Peds. (#/hr)					400	400	400
Confl. Bikes (#/hr)					10		30
Parking (#/hr)					10		
Turn Type	Prot	NA	Prot	NA		Prot	Perm
Protected Phases	5	2	1	6		4	
Permitted Phases							4
Actuated Green, G (s)	15.4	44.8	8.4	36.4		38.2	38.2
Effective Green, g (s)	15.4	44.8	8.4	36.4		38.2	38.2
Actuated g/C Ratio	0.14	0.41	0.08	0.33		0.35	0.35
Clearance Time (s)	6.6	5.2	6.6	6.6		6.8	6.8
Lane Grp Cap (vph)	181	1056	98	801		450	272
v/s Ratio Prot	c0.16	0.31	0.00	c0.36		0.02	
v/s Ratio Perm							c0.13
v/c Ratio	1.12	0.77	0.05	1.08		0.04	0.38
Uniform Delay, d1	47.3	28.2	47.1	36.8		23.8	26.9
Progression Factor	0.84	1.46	0.65	0.54		1.00	1.00
Incremental Delay, d2	94.2	4.4	0.1	36.9		0.2	3.9
Delay (s)	133.7	45.6	30.8	56.7		24.0	30.9
Level of Service	F	D	C	E		C	C
Approach Delay (s)		63.1		56.6		30.4	
Approach LOS		E		E		C	

Intersection Summary			
HCM 2000 Control Delay	55.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	93.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	872	732	12	135	927	36	53	948	255	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Lane Util. Factor	0.94	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.68			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00			
Frt	1.00	1.00		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4342	3057		2515	2547			5469	941			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4342	3057		2515	2547			5469	941			
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	899	755	12	139	956	37	55	977	263	0	0	0
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	183	0	0	0
Lane Group Flow (vph)	899	766	0	139	992	0	0	1032	80	0	0	0
Confl. Peds. (#/hr)			400			400	400		400			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.2	42.9		13.2	39.4			33.5	33.5			
Effective Green, g (s)	18.2	42.9		13.2	39.4			33.5	33.5			
Actuated g/C Ratio	0.17	0.39		0.12	0.36			0.30	0.30			
Clearance Time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	718	1192		301	912			1665	286			
v/s Ratio Prot	c0.21	0.25		0.06	c0.39							
v/s Ratio Perm								0.19	0.09			
v/c Ratio	1.25	0.64		0.46	1.09			0.62	0.28			
Uniform Delay, d1	45.9	27.3		45.1	35.3			32.8	29.1			
Progression Factor	1.38	1.65		1.50	1.01			1.00	1.00			
Incremental Delay, d2	121.0	1.7		0.3	46.0			0.7	0.5			
Delay (s)	184.3	46.8		68.1	81.7			33.5	29.6			
Level of Service	F	D		E	F			C	C			
Approach Delay (s)		121.0			80.1			32.7			0.0	
Approach LOS		F			F			C			A	

Intersection Summary			
HCM 2000 Control Delay	81.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	102.5%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

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HCM Signalized Intersection Capacity Analysis
13: Fourth St. & King St.
5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	151	1521	25	24	907	19	5	60	61	34	250	301
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	0.64	1.00	0.82	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00	0.67	1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85	1.00	0.95	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	4385		1296	2553			1579	858	1038	2295	581
Flt Permitted	0.95	1.00		0.95	1.00			0.97	1.00	0.71	1.00	1.00
Satd. Flow (perm)	1540	4385		1296	2553			1533	858	780	2295	581
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	154	1552	26	24	926	19	5	61	62	35	255	307
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	40	0	53	113
Lane Group Flow (vph)	154	1577	0	24	944	0	0	66	22	35	334	62
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.4	45.9		6.0	35.9			38.2	38.2	39.2	39.2	39.2
Effective Green, g (s)	14.4	45.9		6.0	35.9			38.2	38.2	39.2	39.2	39.2
Actuated g/C Ratio	0.13	0.42		0.05	0.33			0.35	0.35	0.36	0.36	0.36
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	201	1829		70	833			532	297	277	817	207
v/s Ratio Prot	0.10	c0.36		0.02	c0.37						c0.15	
v/s Ratio Perm								0.04	0.03	0.04		0.11
v/c Ratio	0.77	0.86		0.34	1.13			0.12	0.07	0.13	0.41	0.30
Uniform Delay, d1	46.2	29.2		50.1	37.0			24.5	24.0	23.9	26.7	25.5
Progression Factor	0.58	1.18		0.90	0.93			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.6	0.5		0.3	61.4			0.1	0.1	0.2	0.3	0.8
Delay (s)	28.4	34.9		45.4	95.7			24.6	24.1	24.1	27.0	26.3
Level of Service	C	C		D	F			C	C	C	C	C
Approach Delay (s)		34.3			94.5			24.4			26.6	
Approach LOS		C			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	49.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	115.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
14: Fifth St. & I-280 Ramps/King St.
5/28/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1689	138	0	1243	86	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3037			3079	1540	1357
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3037			3079	1540	1357
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1759	144	0	1295	90	8
RTOR Reduction (vph)	6	0	0	0	0	5
Lane Group Flow (vph)	1897	0	0	1295	90	3
Confl. Peds. (#/hr)		37	37		1	3
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	1714			1738	512	451
v/s Ratio Prot	c0.62			0.42	c0.06	
v/s Ratio Perm						0.00
v/c Ratio	1.11			0.75	0.18	0.01
Uniform Delay, d1	23.9			18.0	26.0	24.5
Progression Factor	1.00			0.54	1.00	1.00
Incremental Delay, d2	57.3			1.1	0.7	0.0
Delay (s)	81.2			10.8	26.8	24.6
Level of Service	F			B	C	C
Approach Delay (s)	81.2			10.8	26.6	
Approach LOS	F			B	C	

Intersection Summary			
HCM 2000 Control Delay	51.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	96.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

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HCM Signalized Intersection Capacity Analysis
15: Main St & Harrison St
5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	125	74	5	561	54	118	236	14	2	91	253
Ideal Flow (vphpl)	1900	1900	1900	1100	1100	1100	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.0		4.5	4.5			4.5	4.5
Lane Util. Factor		1.00			*0.40		1.00	1.00			1.00	1.00
Frpb, ped/bikes		0.95			0.98		1.00	1.00			1.00	0.92
Flpb, ped/bikes		1.00			1.00		0.94	1.00			1.00	1.00
Frt		0.96			0.99		1.00	0.99			1.00	0.85
Flt Protected		0.99			1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)		1633			1212		1608	1778			1797	1197
Flt Permitted		0.74			0.94		0.69	1.00			1.00	1.00
Satd. Flow (perm)		1210			1137		1170	1778			1791	1197
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	26	137	81	5	616	59	130	259	15	2	100	278
RTOR Reduction (vph)	0	30	0	0	7	0	0	3	0	0	0	48
Lane Group Flow (vph)	0	214	0	0	673	0	130	271	0	0	102	230
Confl. Peds. (#/hr)			100	100		100	100		100	100		100
Parking (#/hr)			10			10			10			10
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		25.0			25.5		26.0	26.0			26.0	26.0
Effective Green, g (s)		25.0			25.5		26.0	26.0			26.0	26.0
Actuated g/C Ratio		0.42			0.42		0.43	0.43			0.43	0.43
Clearance Time (s)		4.5			4.0		4.5	4.5			4.5	4.5
Lane Grp Cap (vph)		504			483		507	770			776	518
v/s Ratio Prot								0.15				
v/s Ratio Perm		0.18			c0.59		0.11				0.06	c0.19
v/c Ratio		0.43			1.39		0.26	0.35			0.13	0.44
Uniform Delay, d1		12.4			17.2		10.8	11.4			10.2	11.9
Progression Factor		0.79			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		2.5			189.4		1.2	1.3			0.4	2.7
Delay (s)		12.3			206.7		12.1	12.6			10.6	14.7
Level of Service		B			F		B	B			B	B
Approach Delay (s)		12.3			206.7			12.4			13.6	
Approach LOS		B			F			B			B	

Intersection Summary			
HCM 2000 Control Delay	90.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	75.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
16: Bryant St & Main St
5/28/2015

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	174	169	97	178	96	79
Ideal Flow (vphpl)	1500	1500	1500	1500	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	4.0
Lane Util. Factor	*0.40	*0.40	*0.40	*0.40	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.96	1.00	0.89
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	486	435	512	418	1540	1043
Flt Permitted	0.59	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	304	435	512	418	1540	1043
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	193	188	108	198	107	88
RTOR Reduction (vph)	0	0	0	45	0	76
Lane Group Flow (vph)	193	188	108	153	107	12
Confl. Peds. (#/hr)				52		31
Parking (#/hr)		10				10
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		6	2		8	
Permitted Phases	6			2		8
Actuated Green, G (s)	77.3	77.3	77.3	77.3	13.7	13.7
Effective Green, g (s)	77.3	77.3	77.3	77.3	13.7	13.7
Actuated g/C Ratio	0.77	0.77	0.77	0.77	0.14	0.14
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	234	336	395	323	210	142
v/s Ratio Prot		0.43	0.21		c0.07	
v/s Ratio Perm	c0.64			0.37		0.01
v/c Ratio	0.82	0.56	0.27	0.47	0.51	0.08
Uniform Delay, d1	7.1	4.5	3.3	4.1	40.0	37.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	27.0	6.6	1.7	4.9	1.9	0.3
Delay (s)	34.1	11.1	5.0	9.0	42.0	37.9
Level of Service	C	B	A	A	D	D
Approach Delay (s)		22.8	7.6		40.2	
Approach LOS		C	A		D	

Intersection Summary			
HCM 2000 Control Delay	21.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

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HCM Signalized Intersection Capacity Analysis
17: Beale St & Mission St

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	417	165	77	297	0	0	0	0	62	806	92
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1200	1200	1200
Total Lost time (s)		5.0		5.0	5.0					5.0	5.0	
Lane Util. Factor		0.95		1.00	1.00					1.00	0.91	
Frt		0.96		1.00	1.00					1.00	0.98	
Flt Protected		1.00		0.95	1.00					0.95	1.00	
Satd. Flow (prot)		2948		1296	1365					972	2751	
Flt Permitted		1.00		0.37	1.00					0.95	1.00	
Satd. Flow (perm)		2948		500	1365					972	2751	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	0	474	188	88	338	0	0	0	0	70	916	105
RTOR Reduction (vph)	0	17	0	0	0	0	0	0	0	0	23	0
Lane Group Flow (vph)	0	645	0	88	338	0	0	0	0	70	998	0
Parking (#/hr)			10									10
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		2			6						4	
Permitted Phases				6						4		
Actuated Green, G (s)		29.0		29.0	29.0					21.0	21.0	
Effective Green, g (s)		29.0		29.0	29.0					21.0	21.0	
Actuated g/C Ratio		0.48		0.48	0.48					0.35	0.35	
Clearance Time (s)		5.0		5.0	5.0					5.0	5.0	
Lane Grp Cap (vph)		1424		241	659					340	962	
v/s Ratio Prot		0.22			c0.25						c0.36	
v/s Ratio Perm				0.18						0.07		
v/c Ratio		0.45		0.37	0.51					0.21	1.04	
Uniform Delay, d1		10.3		9.7	10.6					13.7	19.5	
Progression Factor		1.00		1.00	1.00					1.00	1.00	
Incremental Delay, d2		1.0		4.2	2.8					1.4	39.0	
Delay (s)		11.3		14.0	13.5					15.0	58.5	
Level of Service		B		B	B					B	E	
Approach Delay (s)		11.3			13.6			0.0			55.7	
Approach LOS		B			B			A			E	

Intersection Summary			
HCM 2000 Control Delay	34.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
18: Delancey St. & Beale St. & Bryant St.

5/28/2015

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	30	94	13	8	9	61	62	48	8	2	9	26
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		5.0					5.0				5.0	
Lane Util. Factor		1.00					1.00				1.00	
Frpb, ped/bikes		0.93					0.97				0.96	
Flpb, ped/bikes		0.99					0.86				0.93	
Frt		0.98					0.96				0.92	
Flt Protected		0.99					0.98				0.99	
Satd. Flow (prot)		1367					1036				1065	
Flt Permitted		0.91					0.84				0.92	
Satd. Flow (perm)		1256					882				992	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	102	14	9	10	66	67	52	9	2	10	28
RTOR Reduction (vph)	0	0	0	0	0	0	15	0	0	0	16	0
Lane Group Flow (vph)	0	158	0	0	0	0	180	0	0	0	33	0
Confl. Peds. (#/hr)	51		86	200	86	200		51	200	200		66
Confl. Bikes (#/hr)			3	3								11
Parking (#/hr)					10	10	10	10	10	10	10	10
Turn Type	Perm	NA			Perm	Perm	NA		Perm	Perm	NA	
Protected Phases		2					6				8	
Permitted Phases	2				6	6			8	8		
Actuated Green, G (s)		27.0					27.0				38.0	
Effective Green, g (s)		27.0					27.0				38.0	
Actuated g/C Ratio		0.30					0.30				0.42	
Clearance Time (s)		5.0					5.0				5.0	
Vehicle Extension (s)		3.0					3.0				3.0	
Lane Grp Cap (vph)		376					264				418	
v/s Ratio Prot												
v/s Ratio Perm		0.13					c0.20				0.03	
v/c Ratio		0.42					0.68				0.08	
Uniform Delay, d1		25.2					27.7				15.5	
Progression Factor		1.00					1.00				1.00	
Incremental Delay, d2		3.4					7.1				0.1	
Delay (s)		28.7					34.8				15.6	
Level of Service		C					C				B	
Approach Delay (s)		28.7					34.8				15.6	
Approach LOS		C					C				B	

Intersection Summary			
HCM 2000 Control Delay	42.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	96.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

DRAFT - SUBJECT TO REVIEW

Movement	SBL	SBT	SBR	SBR2	NEL2	NEL	NER	NER2
Lane Configurations								
Volume (vph)	81	16	174	207	5	59	97	8
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1900	1800	1800
Total Lost time (s)		5.0		5.0		3.5	3.5	
Lane Util. Factor		0.95		0.95		1.00	1.00	
Frpb, ped/bikes		0.64		0.69		1.00	0.60	
Flpb, ped/bikes		1.00		1.00		0.77	1.00	
Frt		0.90		0.85		1.00	0.85	
Flt Protected		0.99		1.00		0.95	1.00	
Satd. Flow (prot)		830		853		1186	784	
Flt Permitted		0.90		1.00		0.95	1.00	
Satd. Flow (perm)		759		853		1186	784	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	88	17	189	225	5	64	105	9
RTOR Reduction (vph)	0	3	0	83	0	0	74	0
Lane Group Flow (vph)	0	314	0	119	0	69	40	0
Confl. Peds. (#/hr)			200	200		51		86
Confl. Bikes (#/hr)			12	12				
Parking (#/hr)								
Turn Type	Perm	NA		Perm	Perm	Prot	Perm	
Protected Phases		4				5		
Permitted Phases	4			4	5		5	
Actuated Green, G (s)		38.0		38.0		11.5	11.5	
Effective Green, g (s)		38.0		38.0		11.5	11.5	
Actuated g/C Ratio		0.42		0.42		0.13	0.13	
Clearance Time (s)		5.0		5.0		3.5	3.5	
Vehicle Extension (s)		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		320		360		151	100	
v/s Ratio Prot								
v/s Ratio Perm		c0.41		0.14		0.06	0.05	
v/c Ratio		0.98		0.33		0.46	0.40	
Uniform Delay, d1		25.7		17.5		36.4	36.1	
Progression Factor		1.00		1.00		1.00	1.00	
Incremental Delay, d2		45.1		0.5		9.6	11.4	
Delay (s)		70.7		18.0		46.0	47.5	
Level of Service		E		B		D	D	
Approach Delay (s)		50.2				46.9		
Approach LOS		D				D		

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	51	98	0	0	887	45	63	153	121	4	0	214
Ideal Flow (vphpl)	1800	1800	1800	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0			5.0	
Lane Util. Factor		1.00			*0.80	1.00	1.00	0.95			1.00	
Frpb, ped/bikes		1.00			1.00	0.96	1.00	0.99			1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00			1.00	
Frt		1.00			1.00	0.85	1.00	0.93			0.87	
Flt Protected		0.98			1.00	1.00	0.95	1.00			1.00	
Satd. Flow (prot)		1281			2047	698	1459	2687			1330	
Flt Permitted		0.60			1.00	1.00	0.62	1.00			0.99	
Satd. Flow (perm)		781			2047	698	957	2687			1324	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	54	103	0	0	934	47	66	161	127	4	0	225
RTOR Reduction (vph)	0	0	0	0	0	0	0	76	0	0	0	0
Lane Group Flow (vph)	0	157	0	0	934	47	66	212	0	0	229	0
Confl. Peds. (#/hr)	32					32			8	8		
Confl. Bikes (#/hr)						10						
Parking (#/hr)	10	10										
Turn Type	Perm	NA			NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2					6	8			4		
Actuated Green, G (s)		26.0			26.0	26.0	24.0	24.0			24.0	
Effective Green, g (s)		26.0			26.0	26.0	24.0	24.0			24.0	
Actuated g/C Ratio		0.43			0.43	0.43	0.40	0.40			0.40	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0			5.0	
Lane Grp Cap (vph)		338			887	302	382	1074			529	
v/s Ratio Prot					c0.46			0.08				
v/s Ratio Perm		0.20				0.07	0.07				c0.17	
v/c Ratio		0.46			1.05	0.16	0.17	0.20			0.43	
Uniform Delay, d1		12.1			17.0	10.3	11.6	11.7			13.1	
Progression Factor		0.58			1.27	1.17	1.00	1.00			1.00	
Incremental Delay, d2		4.3			27.0	0.1	1.0	0.4			2.6	
Delay (s)		11.3			48.7	12.2	12.6	12.1			15.6	
Level of Service		B			D	B	B	B			B	
Approach Delay (s)		11.3			47.0			12.2			15.6	
Approach LOS		B			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	32.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	96.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

DRAFT - SUBJECT TO REVIEW

HCM Signalized Intersection Capacity Analysis
20: Fremont St. & Folsom St. & I-80 WB Off-Ramp

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR2	NBT	NBR	SEL	SER
Lane Configurations										
Volume (vph)	177	238	154	12	105	108	171	78	190	52
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	3.0			2.0		2.0		6.0	
Lane Util. Factor	1.00	0.95			1.00		1.00		0.97	
Frpb, ped/bikes	1.00	0.94			0.91		0.99		1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00		1.00	
Frt	1.00	0.94			0.94		0.96		0.97	
Flt Protected	0.95	1.00			1.00		1.00		0.96	
Satd. Flow (prot)	1459	2399			1309		1451		2774	
Flt Permitted	0.95	1.00			0.97		1.00		0.96	
Satd. Flow (perm)	1459	2399			1275		1451		2774	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	184	248	160	12	109	112	178	81	198	54
RTOR Reduction (vph)	0	105	0	0	137	0	18	0	0	0
Lane Group Flow (vph)	184	303	0	0	96	0	241	0	252	0
Confl. Peds. (#/hr)			152			154		25		
Confl. Bikes (#/hr)			30							
Parking (#/hr)		10	10							
Turn Type	Prot	NA		Perm	NA		NA		Prot	
Protected Phases	5	2			6		8		4	
Permitted Phases				6						
Actuated Green, G (s)	6.0	25.0			15.0		20.0		19.0	
Effective Green, g (s)	8.0	28.0			17.0		23.0		19.0	
Actuated g/C Ratio	0.10	0.35			0.21		0.28		0.23	
Clearance Time (s)	6.0	6.0			4.0		5.0		6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0	
Lane Grp Cap (vph)	144	829			267		412		650	
v/s Ratio Prot	c0.13	c0.13					c0.17		c0.09	
v/s Ratio Perm					0.07					
v/c Ratio	1.28	0.37			0.36		0.59		0.39	
Uniform Delay, d1	36.5	19.9			27.3		24.9		26.1	
Progression Factor	1.00	1.00			1.00		1.00		1.00	
Incremental Delay, d2	167.8	0.3			0.8		2.1		0.4	
Delay (s)	204.3	20.1			28.2		27.0		26.5	
Level of Service	F	C			C		C		C	
Approach Delay (s)		77.4			28.2		27.0		26.5	
Approach LOS		E			C		C		C	

Intersection Summary			
HCM 2000 Control Delay	49.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	81.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	92.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
21: Freeway & First St. & Harrison St.

5/28/2015

Movement	EBT	EBR	WBL	WBT	NBR	SBL	SBT	SBR	SBR2
Lane Configurations									
Volume (vph)	84	65	696	468	23	42	0	1171	253
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1600	1600	1600	1600
Total Lost time (s)	3.0		5.0	3.0	3.0		3.0	5.0	3.0
Lane Util. Factor	1.00		0.91	0.91	1.00		1.00	0.88	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00		1.00	1.00	1.00		0.92	1.00	1.00
Frt	0.94		1.00	1.00	0.86		1.00	0.85	0.85
Flt Protected	1.00		0.95	0.98	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1445		1327	2533	1328		1192	2042	1132
Flt Permitted	1.00		0.58	0.74	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1445		811	1916	1328		1192	2042	1132
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	85	66	703	473	23	42	0	1183	256
RTOR Reduction (vph)	0	0	0	0	18	0	0	0	145
Lane Group Flow (vph)	151	0	380	796	5	0	42	1183	111
Confl. Peds. (#/hr)					70	70			17
Parking (#/hr)				10		10			
Turn Type	NA		pm+pt	NA	Over	Perm	NA	Perm	custom
Protected Phases	2		1	6	1		4		
Permitted Phases			6			4		4	6
Actuated Green, G (s)	8.0		24.0	24.0	11.0		26.0	26.0	24.0
Effective Green, g (s)	10.0		24.0	26.0	13.0		28.0	26.0	26.0
Actuated g/C Ratio	0.17		0.40	0.43	0.22		0.47	0.43	0.43
Clearance Time (s)	5.0		5.0	5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	240		419	963	287		556	884	490
v/s Ratio Prot	0.10		0.17	c0.18	0.00				
v/s Ratio Perm			c0.20	0.18			0.04	c0.58	0.10
v/c Ratio	0.63		0.91	0.83	0.02		0.08	1.34	0.23
Uniform Delay, d1	23.3		16.9	15.0	18.5		8.8	17.0	10.7
Progression Factor	1.00		1.36	1.31	1.00		1.00	1.00	1.00
Incremental Delay, d2	11.9		13.6	3.7	0.1		0.3	159.9	1.1
Delay (s)	35.2		36.6	23.2	18.6		9.1	176.9	11.8
Level of Service	D		D	C	B		A	F	B
Approach Delay (s)	35.2			27.6			143.6		
Approach LOS	D			C			F		

Intersection Summary			
HCM 2000 Control Delay	88.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	100.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

HCM Signalized Intersection Capacity Analysis
22: Fourth St. & Howard St.

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↰	↰↑↑↑						↑↑↑↱	↱
Volume (vph)	0	0	0	697	1429	0	0	0	0	0	1133	460
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1900	1900	1900
Total Lost time (s)				2.5	2.5						2.0	2.0
Lane Util. Factor				0.81	0.81						0.81	0.81
Frpb, ped/bikes				1.00	1.00						0.95	0.66
Flpb, ped/bikes				1.00	1.00						1.00	1.00
Frt				1.00	1.00						0.98	0.85
Flt Protected				0.95	0.99						1.00	1.00
Satd. Flow (prot)				1181	4933						4885	732
Flt Permitted				0.95	0.99						1.00	1.00
Satd. Flow (perm)				1181	4933						4885	732
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	711	1458	0	0	0	0	0	1156	469
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	419	1750	0	0	0	0	0	1334	291
Confl. Peds. (#/hr)				195		399	495		657	657		495
Confl. Bikes (#/hr)			30			30			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	5	0
Turn Type				Split	NA						NA	Perm
Protected Phases				6	6						4	
Permitted Phases												4
Actuated Green, G (s)				32.0	32.0						26.0	26.0
Effective Green, g (s)				33.5	33.5						28.0	28.0
Actuated g/C Ratio				0.37	0.37						0.31	0.31
Clearance Time (s)				4.0	4.0						4.0	4.0
Lane Grp Cap (vph)				439	1836						1519	227
v/s Ratio Prot				c0.35	0.35						0.27	
v/s Ratio Perm												c0.40
v/c Ratio				0.95	0.95						0.88	1.28
Uniform Delay, d1				27.5	27.5						29.4	31.0
Progression Factor				1.00	1.00						1.00	1.00
Incremental Delay, d2				32.9	12.5						7.5	156.2
Delay (s)				60.5	40.0						36.9	187.2
Level of Service				E	D						D	F
Approach Delay (s)		0.0			44.0			0.0			63.8	
Approach LOS		A			D			A			E	

Intersection Summary			
HCM 2000 Control Delay	52.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	6.5
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
23: I-80 WB On-Ramp & Fourth St. & Harrison St.

5/28/2015

Movement	WBL2	WBL	WBT	SBT	SBR	SBR2
Lane Configurations	↰		↰↑↑↑	↑↱	↱	↱
Volume (vph)	172	738	1141	544	951	288
Ideal Flow (vphpl)	1600	1600	1800	1600	1600	1600
Total Lost time (s)	2.4		2.4	5.7	2.7	2.7
Lane Util. Factor	0.81		0.81	0.91	0.91	1.00
Frpb, ped/bikes	1.00		1.00	0.99	0.98	0.97
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	0.93	0.85	0.85
Flt Protected	0.95		0.98	1.00	1.00	1.00
Satd. Flow (prot)	1050		4853	2120	1038	1126
Flt Permitted	0.95		0.98	1.00	1.00	1.00
Satd. Flow (perm)	1050		4853	2120	1038	1126
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	176	753	1164	555	970	294
RTOR Reduction (vph)	0	0	0	0	0	14
Lane Group Flow (vph)	158	0	1935	1040	485	280
Confl. Peds. (#/hr)						21
Confl. Bikes (#/hr)					10	10
Bus Blockages (#/hr)	0	0	5	0	0	0
Parking (#/hr)				10		
Turn Type	Perm	Perm	NA	NA	Perm	Perm
Protected Phases			6	4		
Permitted Phases	6	6			4	4
Actuated Green, G (s)	35.6		35.6	43.3	43.3	43.3
Effective Green, g (s)	38.6		38.6	43.3	46.3	46.3
Actuated g/C Ratio	0.43		0.43	0.48	0.51	0.51
Clearance Time (s)	5.4		5.4	5.7	5.7	5.7
Lane Grp Cap (vph)	450		2081	1019	533	579
v/s Ratio Prot				c0.49		
v/s Ratio Perm	0.15		0.40		0.47	0.25
v/c Ratio	0.35		1.32dl	1.09dr	0.91	0.48
Uniform Delay, d1	17.3		24.4	23.4	19.9	14.1
Progression Factor	1.00		1.00	1.66	1.86	2.05
Incremental Delay, d2	2.1		8.9	23.3	10.9	1.2
Delay (s)	19.4		33.3	62.0	48.1	30.1
Level of Service	B		C	E	D	C
Approach Delay (s)			32.3	53.1		
Approach LOS			C	D		

Intersection Summary			
HCM 2000 Control Delay	42.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.1
Intersection Capacity Utilization	112.4%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

24: Fourth St. & Bryant St. & I-80 EB Off-Ramp

Movement	EBT	EBR	SBL	SBT	SEL	SER
Lane Configurations						
Volume (vph)	724	113	132	584	136	14
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.5		4.2	4.2	4.5	4.5
Lane Util. Factor	0.81		1.00	1.00	0.94	0.86
Frpb, ped/bikes	0.98		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	5767		1459	1305	4118	1122
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	5767		1459	1305	4118	1122
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	770	120	140	621	145	15
RTOR Reduction (vph)	31	0	95	0	0	0
Lane Group Flow (vph)	859	0	45	621	147	13
Confl. Peds. (#/hr)		143	776			
Confl. Bikes (#/hr)		10				
Parking (#/hr)	10	10		10		
Turn Type	NA		Split	NA	Prot	Perm
Protected Phases	2		7	7	4	
Permitted Phases						4
Actuated Green, G (s)	23.5		26.8	26.8	19.5	19.5
Effective Green, g (s)	25.5		28.8	28.8	23.5	23.5
Actuated g/C Ratio	0.28		0.32	0.32	0.26	0.26
Clearance Time (s)	5.5		6.2	6.2	8.5	8.5
Lane Grp Cap (vph)	1633		466	417	1075	292
v/s Ratio Prot	c0.15		0.03	c0.48	c0.04	
v/s Ratio Perm						0.01
v/c Ratio	0.53		0.10	1.49	0.14	0.04
Uniform Delay, d1	27.2		21.5	30.6	25.5	24.9
Progression Factor	1.00		0.94	0.78	1.00	1.00
Incremental Delay, d2	1.2		0.2	226.7	0.3	0.3
Delay (s)	28.4		20.5	250.7	25.7	25.1
Level of Service	C		C	F	C	C
Approach Delay (s)	28.4			208.4	25.7	
Approach LOS	C			F	C	

Intersection Summary			
HCM 2000 Control Delay	103.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	77.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

25: Fifth St. & I-80 WB Off-Ramp & Harrison St.

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	272	1171	161	52	302	537	219	192	722	265
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		2.0			2.0	2.0			2.0	2.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.99	0.87
Flpb, ped/bikes		0.99			1.00	1.00			0.84	1.00
Frt		0.98			1.00	0.96			1.00	0.85
Flt Protected		0.99			0.99	1.00			0.95	1.00
Satd. Flow (prot)		5749			2857	2464			3416	978
Flt Permitted		0.99			0.66	1.00			0.95	1.00
Satd. Flow (perm)		5749			1899	2464			3416	978
Peak-hour factor, PHF	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93
Adj. Flow (vph)	296	1259	173	56	325	577	235	209	776	285
RTOR Reduction (vph)	0	22	0	0	0	4	0	0	0	0
Lane Group Flow (vph)	0	1706	0	0	381	808	0	0	1014	256
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Perm	Prot	Perm
Protected Phases		6			4	4			7	
Permitted Phases	6			4				7		7
Actuated Green, G (s)		27.0			25.0	25.0			24.0	24.0
Effective Green, g (s)		29.0			28.0	28.0			27.0	27.0
Actuated g/C Ratio		0.32			0.31	0.31			0.30	0.30
Clearance Time (s)		4.0			5.0	5.0			5.0	5.0
Lane Grp Cap (vph)		1852			590	766			1024	293
v/s Ratio Prot						c0.33				
v/s Ratio Perm		0.30			0.20				0.30	0.26
v/c Ratio		0.92			0.65	1.05			0.99	0.87
Uniform Delay, d1		29.4			26.7	31.0			31.4	29.9
Progression Factor		1.48			1.00	1.00			1.00	1.00
Incremental Delay, d2		6.6			5.4	47.9			25.9	28.4
Delay (s)		50.1			32.1	78.9			57.2	58.2
Level of Service		D			C	E			E	E
Approach Delay (s)		50.1			32.1	78.9			57.4	
Approach LOS		D			C	E			E	

Intersection Summary			
HCM 2000 Control Delay	56.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	108.9%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

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HCM Unsignalized Intersection Capacity Analysis
26: Delancey St & Brannan St
5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	112	87	29	15	307	19	23	3	3	4	4	195
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	129	100	33	17	353	22	26	3	3	5	5	224

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	262	392	33	233
Volume Left (vph)	129	17	26	5
Volume Right (vph)	33	22	3	224
Hadj (s)	0.06	0.01	0.13	-0.54
Departure Headway (s)	5.2	5.0	6.2	5.1
Degree Utilization, x	0.38	0.55	0.06	0.33
Capacity (veh/h)	644	686	484	640
Control Delay (s)	11.4	13.9	9.5	10.6
Approach Delay (s)	11.4	13.9	9.5	10.6
Approach LOS	B	B	A	B

Intersection Summary			
Delay	12.2		
Level of Service	B		
Intersection Capacity Utilization	60.0%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
27: Second St. & Brannan St.
5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	525	93	168	204	81	44	338	73	38	308	215
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)		2.0			2.0			2.0			3.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		0.93			0.95			0.95			0.89	
Flpb, ped/bikes		0.99			0.94			0.99			0.99	
Frt		0.98			0.97			0.98			0.94	
Flt Protected		1.00			0.98			1.00			1.00	
Satd. Flow (prot)		2154			2044			2348			1956	
Flt Permitted		0.89			0.61			0.87			0.90	
Satd. Flow (perm)		1931			1262			2056			1771	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	53	553	98	177	215	85	46	356	77	40	324	226
RTOR Reduction (vph)	0	17	0	0	15	0	0	9	0	0	24	0
Lane Group Flow (vph)	0	687	0	0	462	0	0	470	0	0	566	0
Confl. Peds. (#/hr)	400		400	400		400	400		400	400		400
Confl. Bikes (#/hr)			20			6			3			23
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	0	0	5	0
Parking (#/hr)		10	10		10	10					10	10
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		25.0			25.0			25.0			25.0	
Effective Green, g (s)		28.0			28.0			28.0			27.0	
Actuated g/C Ratio		0.47			0.47			0.47			0.45	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Lane Grp Cap (vph)		901			588			959			796	
v/s Ratio Prot												
v/s Ratio Perm		0.36			c0.37			0.23			c0.32	
v/c Ratio		0.76			1.11dl			0.49			0.71	
Uniform Delay, d1		13.3			13.5			11.1			13.3	
Progression Factor		1.00			1.00			1.00			1.53	
Incremental Delay, d2		6.1			10.1			1.8			4.3	
Delay (s)		19.3			23.6			12.9			24.7	
Level of Service		B			C			B			C	
Approach Delay (s)		19.3			23.6			12.9			24.7	
Approach LOS		B			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	20.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	106.6%	ICU Level of Service	G
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	354	561	48	0	0	0	0	512	177	12	521	0
Ideal Flow (vphpl)	1050	1050	1050	1800	1800	1800	1050	1050	1050	1600	1600	1600
Total Lost time (s)	2.0	2.0						2.0	2.0		2.0	
Lane Util. Factor	*0.50	*0.50						*0.50	0.91		0.95	
Frpb, ped/bikes	1.00	0.98						0.99	0.71		1.00	
Flpb, ped/bikes	1.00	1.00						1.00	1.00		1.00	
Frt	1.00	0.99						0.99	0.85		1.00	
Flt Protected	0.95	1.00						1.00	1.00		1.00	
Satd. Flow (prot)	787	1234						883	493		2391	
Flt Permitted	0.95	1.00						1.00	1.00		0.93	
Satd. Flow (perm)	787	1234						883	493		2225	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	381	603	52	0	0	0	0	551	190	13	560	0
RTOR Reduction (vph)	0	8	0	0	0	0	0	2	9	0	0	0
Lane Group Flow (vph)	381	647	0	0	0	0	0	568	162	0	573	0
Confl. Peds. (#/hr)			400						400	400		
Confl. Bikes (#/hr)			1						17			
Parking (#/hr)	10	10	10								10	
Turn Type	Split	NA						NA	Perm	Perm	NA	
Protected Phases	2	2						4			4	
Permitted Phases									4	4		
Actuated Green, G (s)	27.0	27.0						26.0	26.0		26.0	
Effective Green, g (s)	28.5	28.5						27.5	27.5		27.5	
Actuated g/C Ratio	0.48	0.48						0.46	0.46		0.46	
Clearance Time (s)	3.5	3.5						3.5	3.5		3.5	
Lane Grp Cap (vph)	373	586						404	225		1019	
v/s Ratio Prot	0.48	c0.52						c0.64				
v/s Ratio Perm									0.33		0.26	
v/c Ratio	1.02	1.10						1.41	0.72		0.56	
Uniform Delay, d1	15.8	15.8						16.2	13.1		11.9	
Progression Factor	1.00	1.00						0.73	0.70		1.00	
Incremental Delay, d2	52.2	69.0						196.0	17.0		2.2	
Delay (s)	67.9	84.8						207.9	26.2		14.1	
Level of Service	E	F						F	C		B	
Approach Delay (s)		78.6			0.0			165.9			14.1	
Approach LOS		E			A			F			B	

Intersection Summary			
HCM 2000 Control Delay	90.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

DRAFT - SUBJECT TO REVIEW

OFF-SITE ALTERNATIVE AT PIERS 30/32 & SWL 330
INTERSECTION LEVEL OF SERVICE
EXISTING – SATURDAY EVENING

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	52	206	162	507	0	644	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	0.97	0.95		0.95	
Frpb, ped/bikes	1.00	0.82	1.00	1.00		1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00	
Frt	1.00	0.85	1.00	1.00		0.99	
Flt Protected	0.95	1.00	0.95	1.00		1.00	
Satd. Flow (prot)	1540	1128	2987	3079		3046	
Flt Permitted	0.95	1.00	0.95	1.00		1.00	
Satd. Flow (perm)	1540	1128	2987	3079		3046	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	57	226	178	557	0	708	31
RTOR Reduction (vph)	0	146	0	0	0	3	0
Lane Group Flow (vph)	57	80	178	557	0	736	0
Confl. Peds. (#/hr)		191					110
Parking (#/hr)							10
Turn Type	Perm	Perm	Prot	NA	Prot	NA	
Protected Phases			5		1	6	
Permitted Phases	4	4		2			
Actuated Green, G (s)	36.5	36.5	17.1	48.4		37.6	
Effective Green, g (s)	39.0	39.0	20.0	51.3		39.0	
Actuated g/C Ratio	0.35	0.35	0.18	0.47		0.35	
Clearance Time (s)	6.5	6.5	6.9	6.9		5.4	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	546	399	543	1435		1079	
v/s Ratio Prot			0.06			c0.24	
v/s Ratio Perm	0.04	c0.07		c0.18			
v/c Ratio	0.10	0.20	0.33	0.39		0.68	
Uniform Delay, d1	23.8	24.7	39.2	19.1		30.2	
Progression Factor	1.00	1.00	0.88	0.70		1.00	
Incremental Delay, d2	0.1	0.2	0.3	0.8		3.5	
Delay (s)	23.9	24.9	35.0	14.1		33.7	
Level of Service	C	C	C	B		C	
Approach Delay (s)	24.7			19.1		33.7	
Approach LOS	C			B		C	

Intersection Summary			
HCM 2000 Control Delay	26.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	138	99	142	519	12	775	63
Ideal Flow (vphpl)	1900	1900	1400	1400	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.1	4.0	
Lane Util. Factor	1.00	1.00	0.97	0.91	1.00	0.91	
Frpb, ped/bikes	1.00	0.84	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1540	1158	2201	3260	1540	4324	
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	1540	1158	2201	3260	1540	4324	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	142	102	146	535	12	799	65
RTOR Reduction (vph)	0	60	0	0	0	9	0
Lane Group Flow (vph)	142	42	146	535	12	855	0
Confl. Peds. (#/hr)		188	131				131
Turn Type	Perm	Perm	Prot	NA	Prot	NA	
Protected Phases			5	2	1	6	
Permitted Phases	4	4					
Actuated Green, G (s)	41.3	41.3	17.6	39.0	6.5	30.0	
Effective Green, g (s)	45.0	45.0	21.0	42.4	10.5	32.0	
Actuated g/C Ratio	0.41	0.41	0.19	0.39	0.10	0.29	
Clearance Time (s)	7.7	7.7	7.4	7.4	8.1	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	630	473	420	1256	147	1257	
v/s Ratio Prot			0.07	c0.16	0.01	c0.20	
v/s Ratio Perm	c0.09	0.04					
v/c Ratio	0.23	0.09	0.35	0.43	0.08	0.68	
Uniform Delay, d1	21.2	19.9	38.6	24.9	45.4	34.5	
Progression Factor	1.00	1.00	1.18	1.20	0.54	0.87	
Incremental Delay, d2	0.2	0.1	0.5	1.0	0.9	2.4	
Delay (s)	21.3	20.0	46.0	30.9	25.5	32.3	
Level of Service	C	C	D	C	C	C	
Approach Delay (s)	20.8			34.1		32.3	
Approach LOS	C			C		C	

Intersection Summary			
HCM 2000 Control Delay	31.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.8
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

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Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	130	99	0	572	794	64
Ideal Flow (vphpl)	1900	1900	1600	1600	1600	1600
Total Lost time (s)	4.0	6.4		4.0	4.0	
Lane Util. Factor	1.00	1.00		0.91	*0.80	
Frpb, ped/bikes	1.00	0.89		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1540	1223		3726	3208	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	1540	1223		3726	3208	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	149	114	0	657	913	74
RTOR Reduction (vph)	0	55	0	0	7	0
Lane Group Flow (vph)	149	59	0	657	980	0
Confl. Peds. (#/hr)	307	110				80
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	35.6	35.6		62.8	62.8	
Effective Green, g (s)	38.0	35.6		64.0	64.0	
Actuated g/C Ratio	0.35	0.32		0.58	0.58	
Clearance Time (s)	6.4	6.4		5.2	5.2	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	532	395		2167	1866	
v/s Ratio Prot	c0.10			0.18	c0.31	
v/s Ratio Perm		0.05				
v/c Ratio	0.28	0.15		0.30	0.53	
Uniform Delay, d1	26.1	26.4		11.7	13.8	
Progression Factor	1.00	1.00		1.48	0.37	
Incremental Delay, d2	0.3	0.2		0.3	0.9	
Delay (s)	26.4	26.6		17.7	6.0	
Level of Service	C	C		B	A	
Approach Delay (s)	26.5			17.7	6.0	
Approach LOS	C			B	A	

Intersection Summary			
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	67	49	181	501	4	718	171
Ideal Flow (vphpl)	1900	1900	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	7.1	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.91	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.93	1.00	1.00	1.00	1.00	0.95
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	1286	1459	4191	1459	2917	1235
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1540	1286	1459	4191	1459	2917	1235
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	76	56	206	569	5	816	194
RTOR Reduction (vph)	0	34	0	0	0	0	125
Lane Group Flow (vph)	76	22	206	569	5	816	69
Confl. Peds. (#/hr)	120	72	46				46
Turn Type	Prot	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	4		5	2	1	6	
Permitted Phases		4					6
Actuated Green, G (s)	42.9	42.9	10.1	39.8	7.0	37.6	37.6
Effective Green, g (s)	46.0	42.9	13.0	42.7	9.3	39.0	39.0
Actuated g/C Ratio	0.42	0.39	0.12	0.39	0.08	0.35	0.35
Clearance Time (s)	7.1	7.1	6.9	6.9	6.3	5.4	5.4
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	644	501	172	1626	123	1034	437
v/s Ratio Prot	c0.05		c0.14	0.14	0.00	c0.28	
v/s Ratio Perm		0.02					0.06
v/c Ratio	0.12	0.04	1.20	0.35	0.04	0.79	0.16
Uniform Delay, d1	19.6	20.8	48.5	23.8	46.3	31.8	24.3
Progression Factor	1.00	1.00	0.70	0.71	1.62	0.64	1.13
Incremental Delay, d2	0.1	0.0	131.0	0.6	0.5	5.4	0.7
Delay (s)	19.7	20.9	165.1	17.6	75.4	25.9	28.2
Level of Service	B	C	F	B	E	C	C
Approach Delay (s)	20.2			56.8		26.6	
Approach LOS	C			E		C	

Intersection Summary			
HCM 2000 Control Delay	38.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

HCM Signalized Intersection Capacity Analysis
5: The Embarcadero & Folsom St.

5/28/2015

Movement	EBL	EBR	NBU	NBL	NBT	SBT	SBR
Lane Configurations							
Volume (vph)	172	56	23	176	510	751	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1600	1600
Lane Width	12	12	11	12	12	12	12
Total Lost time (s)	3.7	3.7		3.4	2.3	2.3	
Lane Util. Factor	0.97	1.00		1.00	0.95	0.95	
Frpb, ped/bikes	1.00	0.78		1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	
Frt	1.00	0.85		1.00	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	
Satd. Flow (prot)	3090	950		1593	2946	2650	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	
Satd. Flow (perm)	3090	950		1593	2946	2650	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	181	59	24	185	537	791	17
RTOR Reduction (vph)	0	35	0	0	0	1	0
Lane Group Flow (vph)	181	24	0	209	537	807	0
Confl. Peds. (#/hr)	84	266					223
Confl. Bikes (#/hr)							48
Parking (#/hr)		10			10		
Turn Type	Prot	Perm	Prot	Prot	NA	NA	
Protected Phases	4		5	5	2	6	
Permitted Phases		4					
Actuated Green, G (s)	42.3	42.3		12.6	55.7	36.7	
Effective Green, g (s)	45.3	45.3		15.6	58.7	39.7	
Actuated g/C Ratio	0.41	0.41		0.14	0.53	0.36	
Clearance Time (s)	6.7	6.7		6.4	5.3	5.3	
Lane Grp Cap (vph)	1272	391		225	1572	956	
v/s Ratio Prot	c0.06			c0.13	0.18	c0.30	
v/s Ratio Perm		0.03					
v/c Ratio	0.14	0.06		0.93	0.34	0.84	
Uniform Delay, d1	20.2	19.5		46.7	14.6	32.3	
Progression Factor	1.00	1.00		1.60	0.21	0.08	
Incremental Delay, d2	0.2	0.3		42.6	0.6	6.1	
Delay (s)	20.4	19.8		117.2	3.7	8.8	
Level of Service	C	B		F	A	A	
Approach Delay (s)	20.3				35.5	8.8	
Approach LOS	C				D	A	

Intersection Summary			
HCM 2000 Control Delay	21.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	10.4
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: The Embarcadero & Harrison St.

5/28/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	99	107	0	610	627	203
Ideal Flow (vphpl)	1900	1900	1900	1900	1600	1600
Total Lost time (s)	6.8	6.8		5.4	5.4	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.96		1.00	0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.96	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1540	1318		3079	2415	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	1540	1318		3079	2415	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	102	110	0	629	646	209
RTOR Reduction (vph)	0	63	0	0	28	0
Lane Group Flow (vph)	102	47	0	629	827	0
Confl. Peds. (#/hr)	73	40				140
Confl. Bikes (#/hr)						117
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	41.2	41.2		56.6	56.6	
Effective Green, g (s)	41.2	41.2		56.6	56.6	
Actuated g/C Ratio	0.37	0.37		0.51	0.51	
Clearance Time (s)	6.8	6.8		5.4	5.4	
Lane Grp Cap (vph)	576	493		1584	1242	
v/s Ratio Prot	c0.07			0.20	c0.34	
v/s Ratio Perm		0.04				
v/c Ratio	0.18	0.10		0.40	0.67	
Uniform Delay, d1	23.0	22.3		16.3	19.7	
Progression Factor	1.00	1.00		1.56	0.77	
Incremental Delay, d2	0.7	0.4		0.7	1.6	
Delay (s)	23.7	22.7		26.1	16.8	
Level of Service	C	C		C	B	
Approach Delay (s)	23.2			26.1	16.8	
Approach LOS	C			C	B	

Intersection Summary			
HCM 2000 Control Delay	21.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

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HCM Signalized Intersection Capacity Analysis
7: The Embarcadero & Bryant St./Pier 30

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	49	3	100	1	1	6	78	555	4	21	645	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1600	1600	1600
Total Lost time (s)	6.9	6.9			6.9		6.5	6.5		5.9	5.2	5.2
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.97			0.96		1.00	1.00		1.00	1.00	0.87
Flpb, ped/bikes	0.96	1.00			1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.85			0.90		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00			0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1480	1339			1390		1540	3070		1296	2593	1004
Flt Permitted	0.75	1.00			0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1172	1339			1374		1540	3070		1296	2593	1004
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	52	3	106	1	1	6	83	590	4	22	686	72
RTOR Reduction (vph)	0	69	0	0	4	0	0	1	0	0	0	48
Lane Group Flow (vph)	52	40	0	0	4	0	83	593	0	22	686	24
Confl. Peds. (#/hr)	45		24	24		45			173			77
Confl. Bikes (#/hr)			2						52			80
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								6
Actuated Green, G (s)	38.1	38.1			38.1		16.5	41.5		11.1	36.8	36.8
Effective Green, g (s)	38.1	38.1			38.1		16.5	41.5		11.1	36.8	36.8
Actuated g/C Ratio	0.35	0.35			0.35		0.15	0.38		0.10	0.33	0.33
Clearance Time (s)	6.9	6.9			6.9		6.5	6.5		5.9	5.2	5.2
Lane Grp Cap (vph)	405	463			475		231	1158		130	867	335
v/s Ratio Prot		0.03					0.05	c0.19		0.02	c0.26	
v/s Ratio Perm	c0.04				0.00							0.02
v/c Ratio	0.13	0.09			0.01		0.36	0.51		0.17	0.79	0.07
Uniform Delay, d1	24.6	24.2			23.6		42.0	26.4		45.2	33.1	25.0
Progression Factor	1.00	1.00			1.00		0.42	0.36		1.19	0.80	1.06
Incremental Delay, d2	0.7	0.4			0.0		3.8	1.4		2.3	6.0	0.3
Delay (s)	25.2	24.6			23.6		21.6	10.9		56.2	32.4	26.9
Level of Service	C	C			C		C	B		E	C	C
Approach Delay (s)		24.8			23.6			12.3			32.6	
Approach LOS		C			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	23.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.3
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
8: SWL 330 Lot & Bryant St

5/28/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	276	0	31	131	5	15
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	358	0	40	170	6	19
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	183			131		
pX, platoon unblocked					0.99	
vC, conflicting volume			358		609	179
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			358		603	179
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		98	98
cM capacity (veh/h)			1197		413	833

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	239	119	210	26
Volume Left	0	0	40	6
Volume Right	0	0	0	19
cSH	1700	1700	1197	664
Volume to Capacity	0.14	0.07	0.03	0.04
Queue Length 95th (ft)	0	0	3	3
Control Delay (s)	0.0	0.0	1.8	10.6
Lane LOS			A	B
Approach Delay (s)	0.0		1.8	10.6
Approach LOS				B

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	31.4%	ICU Level of Service	A
Analysis Period (min)	15		

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HCM Signalized Intersection Capacity Analysis
9: The Embarcadero & Brannan St.

5/28/2015

Movement	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Lane Configurations								
Volume (vph)	42	30	5	143	594	1	656	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.9	6.9		6.6	5.2	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	0.95	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.95		1.00	1.00	1.00	1.00	0.71
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85		1.00	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	1314		1540	3079	1540	3079	982
Flt Permitted	0.95	1.00		0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1540	1314		1540	3079	1540	3079	982
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	46	33	5	157	653	1	721	98
RTOR Reduction (vph)	0	22	0	0	0	0	0	49
Lane Group Flow (vph)	46	11	0	162	653	1	721	49
Confl. Peds. (#/hr)	36	40						133
Confl. Bikes (#/hr)								92
Turn Type	Prot	Perm	Prot	Prot	NA	Prot	NA	Perm
Protected Phases	4		5	5	2	1	6	
Permitted Phases		4						6
Actuated Green, G (s)	38.1	38.1		11.4	43.8	10.0	41.0	41.0
Effective Green, g (s)	38.1	38.1		11.4	43.8	10.0	41.0	41.0
Actuated g/C Ratio	0.35	0.35		0.10	0.40	0.09	0.37	0.37
Clearance Time (s)	6.9	6.9		6.6	5.2	6.0	6.0	6.0
Lane Grp Cap (vph)	533	455		159	1226	140	1147	366
v/s Ratio Prot	c0.03			c0.11	0.21	0.00	c0.23	
v/s Ratio Perm		0.01						0.05
v/c Ratio	0.09	0.03		1.02	0.53	0.01	0.63	0.13
Uniform Delay, d1	24.2	23.7		49.3	25.3	45.5	28.3	22.8
Progression Factor	1.00	1.00		0.44	0.67	0.90	0.52	0.45
Incremental Delay, d2	0.3	0.1		67.6	1.3	0.1	1.9	0.5
Delay (s)	24.5	23.8		89.4	18.2	40.8	16.6	10.8
Level of Service	C	C		F	B	D	B	B
Approach Delay (s)	24.2				32.4		15.9	
Approach LOS	C				C		B	

Intersection Summary			
HCM 2000 Control Delay	24.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: The Embarcadero & Townsend St./Pier 40

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	26	2	45	1	6	2	16	54	714	10	3	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1600
Total Lost time (s)		7.0			7.0			7.0	7.0			5.8
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frpb, ped/bikes		0.80			0.94			1.00	0.99			1.00
Flpb, ped/bikes		0.89			0.97			1.00	1.00			1.00
Frt		0.92			0.97			1.00	1.00			1.00
Flt Protected		0.98			1.00			0.95	1.00			0.95
Satd. Flow (prot)		1039			1426			1540	3050			1296
Flt Permitted		0.91			0.99			0.95	1.00			0.43
Satd. Flow (perm)		964			1415			1540	3050			593
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	2	49	1	7	2	17	59	776	11	3	1
RTOR Reduction (vph)	0	32	0	0	1	0	0	0	1	0	0	0
Lane Group Flow (vph)	0	47	0	0	9	0	0	76	786	0	0	4
Confl. Peds. (#/hr)	400		400	400		400				400		
Confl. Bikes (#/hr)			30			30				30		
Turn Type	Perm	NA		Perm	NA		Prot	Prot	NA		custom	Prot
Protected Phases		4			8		5	5	2			1
Permitted Phases	4			8							1	
Actuated Green, G (s)		38.0			38.0			15.0	43.0			9.2
Effective Green, g (s)		38.0			38.0			15.0	43.0			9.2
Actuated g/C Ratio		0.35			0.35			0.14	0.39			0.08
Clearance Time (s)		7.0			7.0			7.0	7.0			5.8
Lane Grp Cap (vph)		333			488			210	1192			49
v/s Ratio Prot								0.05	c0.26			
v/s Ratio Perm		c0.05			0.01							0.01
v/c Ratio		0.14			0.02			0.36	0.66			0.08
Uniform Delay, d1		24.8			23.7			43.2	27.5			46.5
Progression Factor		1.00			1.00			0.75	0.70			1.56
Incremental Delay, d2		0.9			0.1			3.6	2.2			2.6
Delay (s)		25.7			23.8			36.0	21.3			74.9
Level of Service		C			C			D	C			E
Approach Delay (s)		25.7			23.8				22.6			
Approach LOS		C			C				C			

Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.8
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

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Movement	SBT	SBR
Lane Configurations		
Volume (vph)	628	59
Ideal Flow (vphpl)	1600	1600
Total Lost time (s)	5.4	
Lane Util. Factor	0.95	
Frpb, ped/bikes	0.97	
Flpb, ped/bikes	1.00	
Frt	0.99	
Flt Protected	1.00	
Satd. Flow (prot)	2488	
Flt Permitted	1.00	
Satd. Flow (perm)	2488	
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	683	64
RTOR Reduction (vph)	7	0
Lane Group Flow (vph)	740	0
Confl. Peds. (#/hr)		400
Confl. Bikes (#/hr)		30
Turn Type	NA	
Protected Phases	6	
Permitted Phases		
Actuated Green, G (s)	37.6	
Effective Green, g (s)	37.6	
Actuated g/C Ratio	0.34	
Clearance Time (s)	5.4	
Lane Grp Cap (vph)	850	
v/s Ratio Prot	c0.30	
v/s Ratio Perm		
v/c Ratio	0.87	
Uniform Delay, d1	33.9	
Progression Factor	0.13	
Incremental Delay, d2	9.8	
Delay (s)	14.1	
Level of Service	B	
Approach Delay (s)	14.4	
Approach LOS	B	

Intersection Summary

Movement	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations							
Volume (vph)	123	778	4	630	56	24	209
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1900	1900
Total Lost time (s)	6.6	5.2	6.6	6.6		6.8	6.8
Lane Util. Factor	1.00	0.95	1.00	0.95		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.97		1.00	0.68
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	1540	3079	1540	2494		1540	931
Flt Permitted	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	1540	3079	1540	2494		1540	931
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	132	837	4	677	60	26	225
RTOR Reduction (vph)	0	0	0	6	0	0	147
Lane Group Flow (vph)	132	837	4	731	0	26	78
Confl. Peds. (#/hr)					400	400	400
Confl. Bikes (#/hr)					10		30
Parking (#/hr)					10		
Turn Type	Prot	NA	Prot	NA		Prot	Perm
Protected Phases	5	2	1	6		4	
Permitted Phases							4
Actuated Green, G (s)	15.4	44.8	8.4	36.4		38.2	38.2
Effective Green, g (s)	15.4	44.8	8.4	36.4		38.2	38.2
Actuated g/C Ratio	0.14	0.41	0.08	0.33		0.35	0.35
Clearance Time (s)	6.6	5.2	6.6	6.6		6.8	6.8
Lane Grp Cap (vph)	215	1253	117	825		534	323
v/s Ratio Prot	0.09	c0.27	0.00	c0.29		0.02	
v/s Ratio Perm							c0.08
v/c Ratio	0.61	0.67	0.03	0.89		0.05	0.24
Uniform Delay, d1	44.5	26.5	47.0	34.8		23.8	25.6
Progression Factor	0.71	1.36	0.74	0.62		1.00	1.00
Incremental Delay, d2	10.6	2.4	0.3	8.1		0.2	1.8
Delay (s)	42.3	38.6	34.9	29.5		24.0	27.4
Level of Service	D	D	C	C		C	C
Approach Delay (s)		39.1		29.5		27.0	
Approach LOS		D		C		C	

Intersection Summary			
HCM 2000 Control Delay	33.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

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HCM Signalized Intersection Capacity Analysis
12: Third St. & King St.

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰↰	↑↱		↰↰	↑↱			↰↑↑↑	↱			
Volume (vph)	634	750	58	140	619	80	43	451	151	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Lane Util. Factor	0.94	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.98		1.00	0.96			1.00	0.68			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.97	1.00			
Frt	1.00	0.99		1.00	0.98			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4342	2977		2515	2453			5401	937			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4342	2977		2515	2453			5401	937			
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	704	833	64	156	688	89	48	501	168	0	0	0
RTOR Reduction (vph)	0	4	0	0	3	0	0	0	139	0	0	0
Lane Group Flow (vph)	704	893	0	156	774	0	0	549	29	0	0	0
Confl. Peds. (#/hr)			400			400	400		400			
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.3	56.6		13.9	53.7			19.1	19.1			
Effective Green, g (s)	18.3	56.6		13.9	53.7			19.1	19.1			
Actuated g/C Ratio	0.17	0.51		0.13	0.49			0.17	0.17			
Clearance Time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	722	1531		317	1197			937	162			
v/s Ratio Prot	c0.16	0.30		0.06	c0.32							
v/s Ratio Perm								0.10	0.03			
v/c Ratio	0.98	0.58		0.49	0.65			0.59	0.18			
Uniform Delay, d1	45.6	18.5		44.8	21.1			41.8	38.8			
Progression Factor	0.75	0.91		1.40	0.68			1.00	1.00			
Incremental Delay, d2	17.5	0.8		0.8	0.8			0.9	0.5			
Delay (s)	51.6	17.6		63.4	15.2			42.8	39.3			
Level of Service	D	B		E	B			D	D			
Approach Delay (s)		32.6			23.2			41.9			0.0	
Approach LOS		C			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	32.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
13: Fourth St. & King St.

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑↱		↰	↑↱			↰↑	↱	↰	↑↱	↱
Volume (vph)	152	1357	79	56	557	49	7	47	25	60	204	97
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.98		1.00	0.95			1.00	0.64	1.00	0.98	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.95	1.00	0.67	1.00	1.00
Frt	1.00	0.99		1.00	0.99			1.00	0.85	1.00	0.99	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	4295		1296	2432			1535	858	1032	2862	581
Flt Permitted	0.95	1.00		0.95	1.00			0.96	1.00	0.72	1.00	1.00
Satd. Flow (perm)	1540	4295		1296	2432			1482	858	782	2862	581
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	162	1444	84	60	593	52	7	50	27	64	217	103
RTOR Reduction (vph)	0	6	0	0	6	0	0	0	18	0	3	60
Lane Group Flow (vph)	162	1522	0	60	639	0	0	57	9	64	224	33
Confl. Peds. (#/hr)			761			695	1648		678	678		1648
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.4	40.0		11.9	35.9			38.2	38.2	39.2	39.2	39.2
Effective Green, g (s)	14.4	40.0		11.9	35.9			38.2	38.2	39.2	39.2	39.2
Actuated g/C Ratio	0.13	0.36		0.11	0.33			0.35	0.35	0.36	0.36	0.36
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	201	1561		140	793			514	297	278	1019	207
v/s Ratio Prot	0.11	c0.35		0.05	c0.26						0.08	
v/s Ratio Perm								0.04	0.01	c0.08		0.06
v/c Ratio	0.81	0.98		0.43	0.81			0.11	0.03	0.23	0.22	0.16
Uniform Delay, d1	46.4	34.5		45.9	33.9			24.4	23.7	24.8	24.7	24.2
Progression Factor	0.65	0.75		0.75	0.62			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.5	6.6		1.6	4.7			0.1	0.0	0.4	0.1	0.4
Delay (s)	35.8	32.4		36.1	25.9			24.5	23.7	25.2	24.8	24.5
Level of Service	D	C		D	C			C	C	C	C	C
Approach Delay (s)		32.7			26.7			24.2			24.8	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	111.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

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HCM Signalized Intersection Capacity Analysis
14: Fifth St. & I-280 Ramps/King St.
5/28/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1533	80	0	661	30	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.99
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3051			3079	1540	1357
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3051			3079	1540	1357
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	1685	88	0	726	33	60
RTOR Reduction (vph)	3	0	0	0	0	10
Lane Group Flow (vph)	1770	0	0	726	33	50
Confl. Peds. (#/hr)		37	37		1	3
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	1722			1738	512	451
v/s Ratio Prot	c0.58			0.24	0.02	
v/s Ratio Perm						c0.04
v/c Ratio	1.03			0.42	0.06	0.11
Uniform Delay, d1	23.9			13.6	25.0	25.4
Progression Factor	1.00			0.56	1.00	1.00
Incremental Delay, d2	29.1			0.5	0.2	0.5
Delay (s)	53.0			8.2	25.3	25.9
Level of Service	D			A	C	C
Approach Delay (s)	53.0			8.2	25.7	
Approach LOS	D			A	C	

Intersection Summary			
HCM 2000 Control Delay	39.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	90.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
15: Main St & Harrison St
5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	156	50	10	315	69	72	275	20	3	22	71
Ideal Flow (vphpl)	1900	1900	1900	1100	1100	1100	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0			4.0	4.0
Lane Util. Factor		1.00			*0.40		1.00	1.00			1.00	1.00
Frpb, ped/bikes		0.96			0.96		1.00	0.99			1.00	0.88
Flpb, ped/bikes		1.00			1.00		0.89	1.00			0.99	1.00
Frt		0.97			0.97		1.00	0.99			1.00	0.85
Flt Protected		0.99			1.00		0.95	1.00			0.99	1.00
Satd. Flow (prot)		1662			1170		1525	1768			1778	1142
Flt Permitted		0.84			0.93		0.74	1.00			0.97	1.00
Satd. Flow (perm)		1408			1092		1188	1768			1741	1142
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	31	173	56	11	350	77	80	306	22	3	24	79
RTOR Reduction (vph)	0	16	0	0	16	0	0	5	0	0	0	45
Lane Group Flow (vph)	0	244	0	0	422	0	80	323	0	0	27	34
Confl. Peds. (#/hr)			100	100		100	100		100	100		100
Parking (#/hr)			10			10			10			10
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		26.0			26.0		26.0	26.0			26.0	26.0
Effective Green, g (s)		26.0			26.0		26.0	26.0			26.0	26.0
Actuated g/C Ratio		0.43			0.43		0.43	0.43			0.43	0.43
Clearance Time (s)		4.0			4.0		4.0	4.0			4.0	4.0
Lane Grp Cap (vph)		610			473		514	766			754	494
v/s Ratio Prot								c0.18				
v/s Ratio Perm		0.17			c0.39		0.07				0.02	0.03
v/c Ratio		0.40			0.89		0.16	0.42			0.04	0.07
Uniform Delay, d1		11.6			15.7		10.3	11.8			9.8	9.9
Progression Factor		1.12			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		1.8			21.8		0.6	1.7			0.1	0.3
Delay (s)		14.9			37.5		11.0	13.5			9.9	10.2
Level of Service		B			D		B	B			A	B
Approach Delay (s)		14.9			37.5			13.0			10.1	
Approach LOS		B			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	22.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

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Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	179	112	100	47	40	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.94	1.00	0.93
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1540	1378	1621	1289	1540	1083
Flt Permitted	0.68	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1107	1378	1621	1289	1540	1083
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	206	129	115	54	46	71
RTOR Reduction (vph)	0	0	0	15	0	61
Lane Group Flow (vph)	206	129	115	39	46	10
Confl. Peds. (#/hr)				52		31
Parking (#/hr)		10				10
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		6	2		8	
Permitted Phases	6			2		8
Actuated Green, G (s)	46.4	46.4	46.4	46.4	9.6	9.6
Effective Green, g (s)	46.4	46.4	46.4	46.4	9.6	9.6
Actuated g/C Ratio	0.71	0.71	0.71	0.71	0.15	0.15
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	790	983	1157	920	227	159
v/s Ratio Prot		0.09	0.07		c0.03	
v/s Ratio Perm	c0.19			0.03		0.01
v/c Ratio	0.26	0.13	0.10	0.04	0.20	0.07
Uniform Delay, d1	3.3	2.9	2.9	2.7	24.3	23.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.3	0.2	0.1	0.4	0.2
Delay (s)	4.1	3.2	3.0	2.8	24.8	24.0
Level of Service	A	A	A	A	C	C
Approach Delay (s)		3.7	3.0		24.3	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	38.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	350	94	19	153	0	0	0	0	10	147	34
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1200	1200	1200
Total Lost time (s)		5.0		5.0	5.0					5.0	5.0	
Lane Util. Factor		0.95		1.00	1.00					1.00	0.91	
Frt		0.97		1.00	1.00					1.00	0.97	
Flt Protected		1.00		0.95	1.00					0.95	1.00	
Satd. Flow (prot)		2982		1296	1365					972	2716	
Flt Permitted		1.00		0.46	1.00					0.95	1.00	
Satd. Flow (perm)		2982		631	1365					972	2716	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	385	103	21	168	0	0	0	0	11	162	37
RTOR Reduction (vph)	0	40	0	0	0	0	0	0	0	0	22	0
Lane Group Flow (vph)	0	448	0	21	168	0	0	0	0	11	177	0
Parking (#/hr)			10									10
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		2			6						4	
Permitted Phases				6						4		
Actuated Green, G (s)		26.0		26.0	26.0					24.0	24.0	
Effective Green, g (s)		26.0		26.0	26.0					24.0	24.0	
Actuated g/C Ratio		0.43		0.43	0.43					0.40	0.40	
Clearance Time (s)		5.0		5.0	5.0					5.0	5.0	
Lane Grp Cap (vph)		1292		273	591					388	1086	
v/s Ratio Prot		c0.15			0.12						c0.07	
v/s Ratio Perm				0.03						0.01		
v/c Ratio		0.35		0.08	0.28					0.03	0.16	
Uniform Delay, d1		11.3		10.0	11.0					10.9	11.6	
Progression Factor		1.00		1.00	1.00					1.00	1.00	
Incremental Delay, d2		0.7		0.5	1.2					0.1	0.3	
Delay (s)		12.1		10.5	12.2					11.1	11.9	
Level of Service		B		B	B					B	B	
Approach Delay (s)		12.1			12.0			0.0			11.8	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	35.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

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HCM Signalized Intersection Capacity Analysis
18: Delancey St. & Beale St. & Bryant St.

5/28/2015

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	51	181	2	14	15	14	27	80	4	10	16	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		5.0					5.0				5.0	
Lane Util. Factor		1.00					1.00				1.00	
Frpb, ped/bikes		0.97					0.94				0.99	
Flpb, ped/bikes		0.99					0.94				0.83	
Frt		0.99					0.92				0.98	
Flt Protected		0.99					0.99				0.98	
Satd. Flow (prot)		1438					1047				1031	
Flt Permitted		0.91					0.89				0.89	
Satd. Flow (perm)		1318					946				932	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	60	213	2	16	18	16	32	94	5	12	19	5
RTOR Reduction (vph)	0	0	0	0	0	0	60	0	0	0	3	0
Lane Group Flow (vph)	0	291	0	0	0	0	100	0	0	0	38	0
Confl. Peds. (#/hr)	51		86	200	86	200		51	200	200		66
Confl. Bikes (#/hr)			3	3								11
Parking (#/hr)					10	10	10	10	10	10	10	10
Turn Type	Perm	NA			Perm	Perm	NA		Perm	Perm	NA	
Protected Phases		2					6				8	
Permitted Phases	2				6	6			8	8		
Actuated Green, G (s)		27.3					27.3				23.2	
Effective Green, g (s)		27.3					27.3				23.2	
Actuated g/C Ratio		0.36					0.36				0.31	
Clearance Time (s)		5.0					5.0				5.0	
Vehicle Extension (s)		3.0					3.0				3.0	
Lane Grp Cap (vph)		479					344				288	
v/s Ratio Prot												
v/s Ratio Perm		c0.22					0.11				0.04	
v/c Ratio		0.61					0.29				0.13	
Uniform Delay, d1		19.5					17.0				18.6	
Progression Factor		1.00					1.00				1.00	
Incremental Delay, d2		5.6					0.5				0.2	
Delay (s)		25.1					17.4				18.8	
Level of Service		C					B				B	
Approach Delay (s)		25.1					17.4				18.8	
Approach LOS		C					B				B	

Intersection Summary			
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
18: Delancey St. & Beale St. & Bryant St.

5/28/2015

Movement	SBL	SBT	SBR	SBR2	NEL2	NEL	NER
Lane Configurations							
Volume (vph)	78	15	11	103	35	91	13
Ideal Flow (vphpl)	1800	1800	1800	1800	1900	1900	1900
Total Lost time (s)		5.0		5.0		3.5	3.5
Lane Util. Factor		0.95		0.95		1.00	1.00
Frpb, ped/bikes		0.90		0.72		1.00	1.00
Flpb, ped/bikes		1.00		1.00		0.81	1.00
Frt		0.97		0.85		1.00	0.85
Flt Protected		0.97		1.00		0.95	1.00
Satd. Flow (prot)		1237		888		1245	1378
Flt Permitted		0.78		1.00		0.95	1.00
Satd. Flow (perm)		1003		888		1245	1378
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	92	18	13	121	41	107	15
RTOR Reduction (vph)	0	6	0	75	0	0	0
Lane Group Flow (vph)	0	129	0	34	0	148	15
Confl. Peds. (#/hr)			200	200		51	
Confl. Bikes (#/hr)			12	12			
Parking (#/hr)							
Turn Type	Perm	NA		Perm	Perm	Prot	Perm
Protected Phases		4				5	
Permitted Phases	4			4	5		5
Actuated Green, G (s)		23.2		23.2		11.0	11.0
Effective Green, g (s)		23.2		23.2		11.0	11.0
Actuated g/C Ratio		0.31		0.31		0.15	0.15
Clearance Time (s)		5.0		5.0		3.5	3.5
Vehicle Extension (s)		3.0		3.0		3.0	3.0
Lane Grp Cap (vph)		310		274		182	202
v/s Ratio Prot							
v/s Ratio Perm		c0.13		0.04		0.12	0.01
v/c Ratio		0.42		0.12		0.81	0.07
Uniform Delay, d1		20.5		18.6		31.0	27.6
Progression Factor		1.00		1.00		1.00	1.00
Incremental Delay, d2		0.9		0.2		23.4	0.2
Delay (s)		21.5		18.8		54.4	27.8
Level of Service		C		B		D	C
Approach Delay (s)		20.3				52.0	
Approach LOS		C				D	

Intersection Summary

DRAFT - SUBJECT TO REVIEW

HCM Signalized Intersection Capacity Analysis
19: Fremont St. & Harrison St./I-80 WB Off-Ramp

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	133	91	0	0	423	35	128	138	139	4	0	63
Ideal Flow (vphpl)	1800	1800	1800	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0			5.0	
Lane Util. Factor		1.00			*0.80	1.00	1.00	0.95			1.00	
Frpb, ped/bikes		1.00			1.00	0.96	1.00	0.98			1.00	
Flpb, ped/bikes		0.99			1.00	1.00	1.00	1.00			1.00	
Frt		1.00			1.00	0.85	1.00	0.92			0.87	
Flt Protected		0.97			1.00	1.00	0.95	1.00			1.00	
Satd. Flow (prot)		1259			2047	697	1459	2656			1335	
Flt Permitted		0.56			1.00	1.00	0.71	1.00			0.98	
Satd. Flow (perm)		720			2047	697	1091	2656			1316	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	141	97	0	0	450	37	136	147	148	4	0	67
RTOR Reduction (vph)	0	0	0	0	0	0	0	89	0	0	0	0
Lane Group Flow (vph)	0	238	0	0	450	37	136	206	0	0	71	0
Confl. Peds. (#/hr)	32					32			8	8		
Confl. Bikes (#/hr)						10						
Parking (#/hr)	10	10										
Turn Type	Perm	NA			NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2					6	8			4		
Actuated Green, G (s)		26.0			26.0	26.0	24.0	24.0			24.0	
Effective Green, g (s)		26.0			26.0	26.0	24.0	24.0			24.0	
Actuated g/C Ratio		0.43			0.43	0.43	0.40	0.40			0.40	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0			5.0	
Lane Grp Cap (vph)		312			887	302	436	1062			526	
v/s Ratio Prot					0.22			0.08				
v/s Ratio Perm		c0.33				0.05	c0.12				0.05	
v/c Ratio		0.76			0.51	0.12	0.31	0.19			0.13	
Uniform Delay, d1		14.4			12.3	10.2	12.3	11.7			11.4	
Progression Factor		1.54			1.02	0.88	1.00	1.00			1.00	
Incremental Delay, d2		15.7			1.5	0.6	1.9	0.4			0.5	
Delay (s)		37.9			14.1	9.5	14.2	12.1			11.9	
Level of Service		D			B	A	B	B			B	
Approach Delay (s)		37.9			13.7			12.8			11.9	
Approach LOS		D			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
20: Fremont St. & Folsom St. & I-80 WB Off-Ramp

5/28/2015

Movement	EBL	EBT	EBR	WBT	WBR2	NBT	NBR	SEL	SER	SER2
Lane Configurations										
Volume (vph)	100	257	13	15	112	213	93	179	52	3
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	3.0		2.0		2.0		6.0		
Lane Util. Factor	1.00	0.95		1.00		1.00		0.97		
Frpb, ped/bikes	1.00	0.99		0.84		0.99		0.99		
Flpb, ped/bikes	1.00	1.00		1.00		1.00		1.00		
Frt	1.00	0.99		0.88		0.96		0.97		
Flt Protected	0.95	1.00		1.00		1.00		0.96		
Satd. Flow (prot)	1459	2660		1142		1454		2735		
Flt Permitted	0.95	1.00		1.00		1.00		0.96		
Satd. Flow (perm)	1459	2660		1142		1454		2735		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	112	289	15	17	126	239	104	201	58	3
RTOR Reduction (vph)	0	5	0	114	0	17	0	114	0	0
Lane Group Flow (vph)	112	299	0	29	0	326	0	148	0	0
Confl. Peds. (#/hr)			152		154		25			15
Confl. Bikes (#/hr)			30							
Parking (#/hr)		10	10							
Turn Type	Prot	NA		NA		NA		Prot		
Protected Phases	5	2		6		8		4		
Permitted Phases										
Actuated Green, G (s)	6.0	24.0		14.0		20.0		19.0		
Effective Green, g (s)	8.0	27.0		16.0		23.0		19.0		
Actuated g/C Ratio	0.10	0.34		0.20		0.29		0.24		
Clearance Time (s)	6.0	6.0		4.0		5.0		6.0		
Vehicle Extension (s)	3.0	3.0		3.0		3.0		3.0		
Lane Grp Cap (vph)	145	897		228		418		649		
v/s Ratio Prot	c0.08	c0.11		0.03		c0.22		c0.05		
v/s Ratio Perm										
v/c Ratio	0.77	0.33		0.13		0.78		0.23		
Uniform Delay, d1	35.1	19.8		26.3		26.2		24.6		
Progression Factor	1.00	1.00		1.00		1.00		1.00		
Incremental Delay, d2	22.1	0.2		0.2		8.9		0.2		
Delay (s)	57.2	20.0		26.5		35.1		24.8		
Level of Service	E	C		C		D		C		
Approach Delay (s)		30.0		26.5		35.1		24.8		
Approach LOS		C		C		D		C		

Intersection Summary			
HCM 2000 Control Delay	29.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

HCM Signalized Intersection Capacity Analysis
21: Freeway & First St. & Harrison St.
5/28/2015

Movement	EBT	EBR	WBL2	WBL	WBT	NBR	SBL	SBT	SBR	SBR2
Lane Configurations										
Volume (vph)	106	14	12	263	339	45	44	29	941	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0			5.0	3.0	3.0		3.0	5.0	3.0
Lane Util. Factor	1.00			0.91	0.91	1.00		1.00	0.88	1.00
Frpb, ped/bikes	1.00			1.00	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00			1.00	1.00	1.00		0.95	1.00	1.00
Frt	0.98			1.00	1.00	0.86		1.00	0.85	0.85
Flt Protected	1.00			0.95	0.99	1.00		0.97	1.00	1.00
Satd. Flow (prot)	1595			1401	2701	1402		1498	2424	1344
Flt Permitted	1.00			0.62	0.89	1.00		0.97	1.00	1.00
Satd. Flow (perm)	1595			909	2432	1402		1498	2424	1344
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	119	16	13	296	381	51	49	33	1057	257
RTOR Reduction (vph)	0	0	0	0	0	40	0	0	0	146
Lane Group Flow (vph)	135	0	0	214	476	11	0	82	1057	111
Confl. Peds. (#/hr)						70	70			17
Parking (#/hr)					10		10			
Turn Type	NA		pm+pt	pm+pt	NA	Over	Perm	NA	Perm	custom
Protected Phases	2		1	1	6	1		4		
Permitted Phases			6	6			4		4	6
Actuated Green, G (s)	8.0			24.0	24.0	11.0		26.0	26.0	24.0
Effective Green, g (s)	10.0			24.0	26.0	13.0		28.0	26.0	26.0
Actuated g/C Ratio	0.17			0.40	0.43	0.22		0.47	0.43	0.43
Clearance Time (s)	5.0			5.0	5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	265			453	1112	303		699	1050	582
v/s Ratio Prot	c0.08			0.09	c0.09	0.01				
v/s Ratio Perm				0.10	0.09			0.05	c0.44	0.08
v/c Ratio	0.51			0.47	0.43	0.04		0.12	1.01	0.19
Uniform Delay, d1	22.8			14.6	11.8	18.6		9.0	17.0	10.5
Progression Factor	1.00			0.62	0.63	1.00		1.00	1.00	1.00
Incremental Delay, d2	6.8			3.3	1.1	0.2		0.3	29.4	0.7
Delay (s)	29.6			12.3	8.6	18.8		9.4	46.4	11.2
Level of Service	C			B	A	B		A	D	B
Approach Delay (s)	29.6				9.7			37.8		
Approach LOS	C				A			D		

Intersection Summary			
HCM 2000 Control Delay	28.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	64.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
22: Fourth St. & Howard St.
5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	400	671	0	0	0	0	0	504	392
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)				2.5	2.5						2.0	2.0
Lane Util. Factor				0.81	0.81						0.81	0.81
Frpb, ped/bikes				1.00	1.00						0.91	0.66
Flpb, ped/bikes				1.00	1.00						1.00	1.00
Frt				1.00	1.00						0.96	0.85
Flt Protected				0.95	0.99						1.00	1.00
Satd. Flow (prot)				1181	4920						4294	700
Flt Permitted				0.95	0.99						1.00	1.00
Satd. Flow (perm)				1181	4920						4294	700
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	0	412	692	0	0	0	0	0	520	404
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	214	890	0	0	0	0	0	722	202
Confl. Peds. (#/hr)				195		399	495		657	657		495
Confl. Bikes (#/hr)			30			30			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	5	0
Turn Type				Split	NA						NA	Perm
Protected Phases				6	6						4	
Permitted Phases												4
Actuated Green, G (s)				30.0	30.0						28.0	28.0
Effective Green, g (s)				31.5	31.5						30.0	30.0
Actuated g/C Ratio				0.35	0.35						0.33	0.33
Clearance Time (s)				4.0	4.0						4.0	4.0
Lane Grp Cap (vph)				413	1722						1431	233
v/s Ratio Prot				c0.18	0.18						0.17	
v/s Ratio Perm												c0.29
v/c Ratio				0.52	0.52						0.50	0.87
Uniform Delay, d1				23.2	23.2						24.0	28.1
Progression Factor				1.00	1.00						1.00	1.00
Incremental Delay, d2				4.6	1.1						1.3	32.6
Delay (s)				27.8	24.3						25.3	60.7
Level of Service				C	C						C	E
Approach Delay (s)		0.0			25.0			0.0			33.1	
Approach LOS		A			C			A			C	

Intersection Summary			
HCM 2000 Control Delay	28.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	6.5
Intersection Capacity Utilization	60.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

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Movement	WBL2	WBL	WBT	SBT	SBR	SBR2
Lane Configurations						
Volume (vph)	71	497	361	217	551	104
Ideal Flow (vphpl)	1600	1600	1800	1600	1600	1600
Total Lost time (s)		5.4	2.4	5.7	2.7	2.7
Lane Util. Factor		0.81	0.81	0.91	0.91	1.00
Frpb, ped/bikes		1.00	1.00	0.99	0.98	0.97
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00
Frt		1.00	1.00	0.92	0.85	0.85
Flt Protected		0.95	0.98	1.00	1.00	1.00
Satd. Flow (prot)		1050	4843	2085	1039	1127
Flt Permitted		0.95	0.98	1.00	1.00	1.00
Satd. Flow (perm)		1050	4843	2085	1039	1127
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	74	518	376	226	574	108
RTOR Reduction (vph)	0	0	0	0	0	49
Lane Group Flow (vph)	0	297	671	513	287	59
Confl. Peds. (#/hr)						21
Confl. Bikes (#/hr)					10	10
Bus Blockages (#/hr)	0	0	5	0	0	0
Parking (#/hr)				10		
Turn Type	Perm	Perm	NA	NA	Perm	Perm
Protected Phases			6	4		
Permitted Phases	6	6			4	4
Actuated Green, G (s)		32.6	32.6	46.3	46.3	46.3
Effective Green, g (s)		32.6	35.6	46.3	49.3	49.3
Actuated g/C Ratio		0.36	0.40	0.51	0.55	0.55
Clearance Time (s)		5.4	5.4	5.7	5.7	5.7
Lane Grp Cap (vph)		380	1915	1072	569	617
v/s Ratio Prot				0.25		
v/s Ratio Perm		c0.28	0.14		c0.28	0.05
v/c Ratio		0.78	0.35	0.48	0.50	0.10
Uniform Delay, d1		25.5	19.1	14.1	12.7	9.7
Progression Factor		1.00	1.00	1.07	1.11	2.36
Incremental Delay, d2		14.7	0.5	1.3	2.8	0.3
Delay (s)		40.3	19.6	16.4	16.9	23.2
Level of Service		D	B	B	B	C
Approach Delay (s)			25.9	17.4		
Approach LOS			C	B		

Intersection Summary			
HCM 2000 Control Delay	21.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.1
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	SBL	SBT	SEL	SER
Lane Configurations						
Volume (vph)	351	92	68	220	343	52
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.5		4.2	4.2	4.5	4.5
Lane Util. Factor	0.81		1.00	1.00	0.94	0.86
Frpb, ped/bikes	0.96		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	5625		1459	1305	4117	1122
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	5625		1459	1305	4117	1122
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	399	105	77	250	390	59
RTOR Reduction (vph)	53	0	52	0	0	0
Lane Group Flow (vph)	451	0	25	250	396	53
Confl. Peds. (#/hr)		143	776			
Confl. Bikes (#/hr)		10				
Parking (#/hr)	10	10		10		
Turn Type	NA		Split	NA	Prot	Perm
Protected Phases	2		7	7	4	
Permitted Phases						4
Actuated Green, G (s)	23.5		26.8	26.8	19.5	19.5
Effective Green, g (s)	25.5		28.8	28.8	23.5	23.5
Actuated g/C Ratio	0.28		0.32	0.32	0.26	0.26
Clearance Time (s)	5.5		6.2	6.2	8.5	8.5
Lane Grp Cap (vph)	1593		466	417	1074	292
v/s Ratio Prot	c0.08		0.02	c0.19	c0.10	
v/s Ratio Perm						0.05
v/c Ratio	0.28		0.05	0.60	0.37	0.18
Uniform Delay, d1	25.1		21.2	25.7	27.2	25.8
Progression Factor	1.00		1.59	0.96	1.00	1.00
Incremental Delay, d2	0.4		0.2	5.5	1.0	1.4
Delay (s)	25.6		33.8	30.1	28.2	27.2
Level of Service	C		C	C	C	C
Approach Delay (s)	25.6			31.0	28.0	
Approach LOS	C			C	C	

Intersection Summary			
HCM 2000 Control Delay	27.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	79	381	44	34	166	356	188	134	443	262
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.5			2.0	2.0			2.5	2.5
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.98	0.86
Flpb, ped/bikes		0.99			0.99	1.00			0.84	1.00
Frt		0.99			1.00	0.95			0.98	0.85
Flt Protected		0.99			0.99	1.00			0.96	1.00
Satd. Flow (prot)		6090			3003	2565			3515	1021
Flt Permitted		0.99			0.83	1.00			0.96	1.00
Satd. Flow (perm)		6090			2521	2565			3515	1021
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	81	393	45	35	171	367	194	138	457	270
RTOR Reduction (vph)	0	23	0	0	0	35	0	0	0	0
Lane Group Flow (vph)	0	496	0	0	206	526	0	0	665	200
Confl. Peds. (#/hr)	50		100	100			100	50	100	100
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Perm	Prot	Perm
Protected Phases		6			4	4			7	
Permitted Phases	6			4				7		7
Actuated Green, G (s)		20.5			22.0	22.0			14.5	14.5
Effective Green, g (s)		23.5			26.0	26.0			18.5	18.5
Actuated g/C Ratio		0.31			0.35	0.35			0.25	0.25
Clearance Time (s)		5.5			6.0	6.0			6.5	6.5
Lane Grp Cap (vph)		1908			873	889			867	251
v/s Ratio Prot						c0.20				
v/s Ratio Perm		0.08			0.08				0.19	c0.20
v/c Ratio		0.26			0.24	0.59			0.77	0.80
Uniform Delay, d1		19.3			17.4	20.1			26.2	26.5
Progression Factor		1.00			1.00	1.00			1.00	1.00
Incremental Delay, d2		0.3			0.6	2.9			6.4	22.6
Delay (s)		19.6			18.1	23.0			32.7	49.0
Level of Service		B			B	C			C	D
Approach Delay (s)		19.6			18.1	23.0			36.5	
Approach LOS		B			B	C			D	

Intersection Summary			
HCM 2000 Control Delay	27.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	122	95	50	9	166	80	19	4	6	12	8	86
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	134	104	55	10	182	88	21	4	7	13	9	95

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	293	280	32	116
Volume Left (vph)	134	10	21	13
Volume Right (vph)	55	88	7	95
Hadj (s)	0.01	-0.15	0.04	-0.43
Departure Headway (s)	4.6	4.5	5.4	4.8
Degree Utilization, x	0.38	0.35	0.05	0.16
Capacity (veh/h)	742	767	570	662
Control Delay (s)	10.4	9.9	8.7	8.7
Approach Delay (s)	10.4	9.9	8.7	8.7
Approach LOS	B	A	A	A

Intersection Summary			
Delay	9.8		
Level of Service	A		
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		

DRAFT - SUBJECT TO REVIEW

HCM Signalized Intersection Capacity Analysis
27: Second St. & Brannan St.

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰↑↱			↰↑↱			↰↑↱			↰↑↱	
Volume (vph)	198	128	57	24	148	141	22	275	36	68	284	94
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		2.0			2.0			2.0			3.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		0.92			0.86			0.97			0.94	
Flpb, ped/bikes		0.90			0.98			0.99			0.97	
Frt		0.98			0.93			0.98			0.97	
Flt Protected		0.97			1.00			1.00			0.99	
Satd. Flow (prot)		2144			2110			2713			2342	
Flt Permitted		0.68			0.91			0.92			0.86	
Satd. Flow (perm)		1491			1937			2497			2018	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	206	133	59	25	154	147	23	286	38	71	296	98
RTOR Reduction (vph)	0	24	0	0	26	0	0	16	0	0	21	0
Lane Group Flow (vph)	0	374	0	0	300	0	0	332	0	0	444	0
Confl. Peds. (#/hr)	400		400	400		400	400		400	400		400
Confl. Bikes (#/hr)			20			6			3			23
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	0	0	5	0
Parking (#/hr)		10	10		10	10					10	10
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		23.0			23.0			27.0			27.0	
Effective Green, g (s)		26.0			26.0			30.0			29.0	
Actuated g/C Ratio		0.43			0.43			0.50			0.48	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Lane Grp Cap (vph)		646			839			1248			975	
v/s Ratio Prot												
v/s Ratio Perm		c0.25			0.15			0.13			c0.22	
v/c Ratio		0.58			0.36			0.27			0.46	
Uniform Delay, d1		12.9			11.4			8.6			10.3	
Progression Factor		1.00			1.00			1.00			0.39	
Incremental Delay, d2		3.8			1.2			0.5			1.4	
Delay (s)		16.6			12.6			9.2			5.4	
Level of Service		B			B			A			A	
Approach Delay (s)		16.6			12.6			9.2			5.4	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
28: Second St. & Bryant St.

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰↰	↑↑↑↱						↑↑↱	↱		↑↑	
Volume (vph)	157	469	56	0	0	0	0	224	234	22	379	0
Ideal Flow (vphpl)	1000	1000	1000	1800	1800	1800	1000	1000	1000	1800	1800	1800
Total Lost time (s)	2.0	2.0						2.0	2.0		2.0	
Lane Util. Factor	*0.60	*0.60						*0.60	0.91		0.95	
Frpb, ped/bikes	1.00	0.97						0.92	0.71		1.00	
Flpb, ped/bikes	1.00	1.00						1.00	1.00		0.99	
Frt	1.00	0.98						0.96	0.85		1.00	
Flt Protected	0.95	1.00						1.00	1.00		1.00	
Satd. Flow (prot)	899	1393						898	470		2669	
Flt Permitted	0.95	1.00						1.00	1.00		0.92	
Satd. Flow (perm)	899	1393						898	470		2451	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	185	552	66	0	0	0	0	264	275	26	446	0
RTOR Reduction (vph)	0	14	0	0	0	0	0	11	11	0	0	0
Lane Group Flow (vph)	185	604	0	0	0	0	0	360	157	0	472	0
Confl. Peds. (#/hr)			400						400	400		
Confl. Bikes (#/hr)			1						17			
Parking (#/hr)	10	10	10								10	
Turn Type	Split	NA						NA	Perm	Perm	NA	
Protected Phases	2	2						4			4	
Permitted Phases									4	4		
Actuated Green, G (s)	27.0	27.0						26.0	26.0		26.0	
Effective Green, g (s)	28.5	28.5						27.5	27.5		27.5	
Actuated g/C Ratio	0.48	0.48						0.46	0.46		0.46	
Clearance Time (s)	3.5	3.5						3.5	3.5		3.5	
Lane Grp Cap (vph)	427	661						411	215		1123	
v/s Ratio Prot	0.21	c0.43						c0.40				
v/s Ratio Perm									0.33		0.19	
v/c Ratio	0.43	0.91						0.88	0.73		0.42	
Uniform Delay, d1	10.4	14.6						14.7	13.2		10.9	
Progression Factor	1.00	1.00						0.92	0.90		1.00	
Incremental Delay, d2	3.2	19.2						21.0	18.4		1.2	
Delay (s)	13.6	33.9						34.5	30.4		12.1	
Level of Service	B	C						C	C		B	
Approach Delay (s)		29.2			0.0			33.2			12.1	
Approach LOS		C			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	25.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

DRAFT - SUBJECT TO REVIEW

OFF-SITE ALTERNATIVE AT PIERS 30/32 & SWL 330
INTERSECTION LEVEL OF SERVICE
EXISTING PLUS NO EVENT – WEEKDAY PM PEAK

HCM Signalized Intersection Capacity Analysis
1: The Embarcadero & Broadway

5/28/2015

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	50	297	201	629	4	707	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	3.3	4.0	
Lane Util. Factor	1.00	1.00	0.97	0.95	1.00	0.95	
Frpb, ped/bikes	1.00	0.80	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	0.98	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	1.00	
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1512	1103	2987	3079	1540	3074	
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	1512	1103	2987	3079	1540	3074	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	53	316	214	669	4	752	5
RTOR Reduction (vph)	0	204	0	0	0	1	0
Lane Group Flow (vph)	53	112	214	669	4	756	0
Confl. Peds. (#/hr)	20	211	20				130
Parking (#/hr)							10
Turn Type	Perm	Perm	Prot	NA	Prot	NA	
Protected Phases			5		1	6	
Permitted Phases	4	4		2			
Actuated Green, G (s)	36.5	36.5	17.1	48.0	5.9	37.6	
Effective Green, g (s)	39.0	39.0	20.0	50.9	8.8	39.0	
Actuated g/C Ratio	0.35	0.35	0.18	0.46	0.08	0.35	
Clearance Time (s)	6.5	6.5	6.9	6.9	6.2	5.4	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	536	391	543	1424	123	1089	
v/s Ratio Prot			0.07		0.00	c0.25	
v/s Ratio Perm	0.04	c0.10		c0.22			
v/c Ratio	0.10	0.29	0.39	0.47	0.03	0.69	
Uniform Delay, d1	23.7	25.5	39.7	20.3	46.7	30.4	
Progression Factor	1.00	1.00	1.51	1.86	1.00	1.00	
Incremental Delay, d2	0.1	0.4	0.4	0.9	0.5	3.7	
Delay (s)	23.8	25.9	60.4	38.7	47.2	34.1	
Level of Service	C	C	E	D	D	C	
Approach Delay (s)	25.6			44.0		34.1	
Approach LOS	C			D		C	

Intersection Summary			
HCM 2000 Control Delay	36.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: The Embarcadero & Washington

5/28/2015

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	115	156	115	730	11	955	38
Ideal Flow (vphpl)	1900	1900	1400	1400	1700	1700	1700
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	0.97	0.91	1.00	0.91	
Frpb, ped/bikes	1.00	0.83	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	0.98	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1515	1137	2201	3260	1377	3910	
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	1515	1137	2201	3260	1377	3910	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	170	125	793	12	1038	41
RTOR Reduction (vph)	0	100	0	0	0	4	0
Lane Group Flow (vph)	125	70	125	793	12	1075	0
Confl. Peds. (#/hr)	20	208	151				151
Turn Type	Perm	Perm	Prot	NA	Prot	NA	
Protected Phases			5	2	1	6	
Permitted Phases	4	4					
Actuated Green, G (s)	41.3	41.3	17.6	39.0	6.5	30.0	
Effective Green, g (s)	45.0	45.0	21.0	42.4	10.6	32.0	
Actuated g/C Ratio	0.41	0.41	0.19	0.39	0.10	0.29	
Clearance Time (s)	7.7	7.7	7.4	7.4	8.1	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	619	465	420	1256	132	1137	
v/s Ratio Prot			0.06	c0.24	0.01	c0.28	
v/s Ratio Perm	c0.08	0.06					
v/c Ratio	0.20	0.15	0.30	0.63	0.09	0.95	
Uniform Delay, d1	20.9	20.5	38.2	27.5	45.3	38.2	
Progression Factor	1.00	1.00	1.13	1.18	1.23	0.46	
Incremental Delay, d2	0.2	0.1	0.2	1.4	1.1	13.7	
Delay (s)	21.1	20.6	43.5	33.8	56.8	31.2	
Level of Service	C	C	D	C	E	C	
Approach Delay (s)	20.8			35.1		31.4	
Approach LOS	C			D		C	

Intersection Summary			
HCM 2000 Control Delay	31.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	74.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

DRAFT - SUBJECT TO REVIEW

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	167	72	0	1147	1133	140
Ideal Flow (vphpl)	1900	1900	1600	1600	1600	1600
Total Lost time (s)	4.0	6.4		4.0	4.0	
Lane Util. Factor	1.00	1.00		*0.50	*0.40	
Frpb, ped/bikes	1.00	0.77		1.00	0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.98	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1540	1064		2047	1555	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	1540	1064		2047	1555	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	178	77	0	1220	1205	149
RTOR Reduction (vph)	0	21	0	0	4	0
Lane Group Flow (vph)	178	56	0	1220	1350	0
Confl. Peds. (#/hr)	327	160	110			190
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	24.2	24.2		74.2	74.2	
Effective Green, g (s)	26.6	24.2		75.4	75.4	
Actuated g/C Ratio	0.24	0.22		0.69	0.69	
Clearance Time (s)	6.4	6.4		5.2	5.2	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	372	234		1403	1065	
v/s Ratio Prot	c0.12			0.60	c0.87	
v/s Ratio Perm		0.05				
v/c Ratio	0.48	0.24		0.87	1.27	
Uniform Delay, d1	35.8	35.3		13.5	17.3	
Progression Factor	1.00	1.00		2.49	1.03	
Incremental Delay, d2	1.0	0.5		5.4	125.3	
Delay (s)	36.7	35.9		38.9	143.1	
Level of Service	D	D		D	F	
Approach Delay (s)	36.5			38.9	143.1	
Approach LOS	D			D	F	

Intersection Summary			
HCM 2000 Control Delay	88.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Lane Configurations								
Volume (vph)	164	120	1	158	981	2	917	286
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1600	1600
Total Lost time (s)	4.0	7.1		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	*0.80	1.00	*0.76	1.00
Frpb, ped/bikes	1.00	0.92		1.00	1.00	1.00	1.00	0.90
Flpb, ped/bikes	0.89	1.00		0.98	1.00	1.00	1.00	1.00
Frt	1.00	0.85		1.00	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1374	1265		1266	3275	1296	2074	1045
Flt Permitted	0.95	1.00		0.27	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1374	1265		355	3275	1296	2074	1045
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	171	125	1	165	1022	2	955	298
RTOR Reduction (vph)	0	23	0	0	0	0	0	171
Lane Group Flow (vph)	171	102	0	166	1022	2	955	127
Confl. Peds. (#/hr)	140	92		96				96
Turn Type	Perm	Perm	custom	Prot	NA	Prot	NA	custom
Protected Phases				5		1		
Permitted Phases	4	4	5		2		6	6
Actuated Green, G (s)	42.9	42.9		12.1	39.8	7.0	35.6	35.6
Effective Green, g (s)	46.0	42.9		15.0	42.7	9.3	37.0	37.0
Actuated g/C Ratio	0.42	0.39		0.14	0.39	0.08	0.34	0.34
Clearance Time (s)	7.1	7.1		6.9	6.9	6.3	5.4	5.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	574	493		48	1271	109	697	351
v/s Ratio Prot						0.00		
v/s Ratio Perm	c0.12	0.08		c0.47	0.31		c0.46	0.12
v/c Ratio	0.30	0.21		3.46	0.80	0.02	1.37	0.36
Uniform Delay, d1	21.3	22.3		47.5	29.9	46.2	36.5	27.6
Progression Factor	1.00	1.00		0.73	0.55	1.23	0.90	0.88
Incremental Delay, d2	0.3	0.2		1149.7	4.7	0.0	167.4	0.3
Delay (s)	21.6	22.5		1184.3	21.2	56.7	200.3	24.4
Level of Service	C	C		F	C	E	F	C
Approach Delay (s)	21.9				183.8		158.3	
Approach LOS	C				F		F	

Intersection Summary			
HCM 2000 Control Delay	154.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	92.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

HCM Signalized Intersection Capacity Analysis
5: The Embarcadero & Folsom St.

5/28/2015

Movement	EBL	EBR	NBU	NBL	NBT	SBT	SBR
Lane Configurations							
Volume (vph)	218	195	31	63	922	1013	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1700	1700
Lane Width	12	12	11	12	12	12	12
Total Lost time (s)	3.7	3.7		3.4	2.3	2.3	
Lane Util. Factor	0.97	1.00		1.00	0.95	0.95	
Frpb, ped/bikes	1.00	0.76		1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00		0.99	1.00	1.00	
Frt	1.00	0.85		1.00	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	
Satd. Flow (prot)	3090	923		1571	2946	2805	
Flt Permitted	0.95	1.00		0.22	1.00	1.00	
Satd. Flow (perm)	3090	923		356	2946	2805	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	229	205	33	66	971	1066	26
RTOR Reduction (vph)	0	64	0	0	0	1	0
Lane Group Flow (vph)	229	141	0	99	971	1091	0
Confl. Peds. (#/hr)	114	296		50			273
Confl. Bikes (#/hr)							48
Parking (#/hr)		10			10		
Turn Type	Prot	Perm	custom	Prot	NA	NA	
Protected Phases	4			5	2	6	
Permitted Phases		4	5				
Actuated Green, G (s)	42.3	42.3		15.6	55.7	33.7	
Effective Green, g (s)	45.3	45.3		18.6	58.7	36.7	
Actuated g/C Ratio	0.41	0.41		0.17	0.53	0.33	
Clearance Time (s)	6.7	6.7		6.4	5.3	5.3	
Lane Grp Cap (vph)	1272	380		60	1572	935	
v/s Ratio Prot	0.07				0.33	c0.39	
v/s Ratio Perm		c0.15		c0.28			
v/c Ratio	0.18	0.37		1.65	0.62	1.17	
Uniform Delay, d1	20.6	22.5		45.7	17.8	36.6	
Progression Factor	1.00	1.00		0.83	1.95	0.20	
Incremental Delay, d2	0.3	2.8		346.1	1.5	76.1	
Delay (s)	20.9	25.3		383.8	36.3	83.3	
Level of Service	C	C		F	D	F	
Approach Delay (s)	22.9				68.4	83.3	
Approach LOS	C				E	F	

Intersection Summary			
HCM 2000 Control Delay	67.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.4
Intersection Capacity Utilization	95.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: The Embarcadero & Harrison St.

5/28/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	170	224	0	846	1030	209
Ideal Flow (vphpl)	1900	1900	1900	1900	1600	1600
Total Lost time (s)	6.8	6.8		5.4	5.4	
Lane Util. Factor	1.00	1.00		*0.90	*0.80	
Frpb, ped/bikes	1.00	0.92		1.00	0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.97	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1540	1264		2917	2072	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	1540	1264		2917	2072	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	185	243	0	920	1120	227
RTOR Reduction (vph)	0	14	0	0	12	0
Lane Group Flow (vph)	185	229	0	920	1335	0
Confl. Peds. (#/hr)	123	90	40			180
Confl. Bikes (#/hr)						117
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	41.2	41.2		56.6	56.6	
Effective Green, g (s)	41.2	41.2		56.6	56.6	
Actuated g/C Ratio	0.37	0.37		0.51	0.51	
Clearance Time (s)	6.8	6.8		5.4	5.4	
Lane Grp Cap (vph)	576	473		1500	1066	
v/s Ratio Prot	0.12			0.32	c0.64	
v/s Ratio Perm		c0.18				
v/c Ratio	0.32	0.48		0.61	1.25	
Uniform Delay, d1	24.5	26.3		18.9	26.7	
Progression Factor	1.00	1.00		1.82	0.58	
Incremental Delay, d2	1.5	3.5		1.0	114.2	
Delay (s)	25.9	29.8		35.4	129.9	
Level of Service	C	C		D	F	
Approach Delay (s)	28.1			35.4	129.9	
Approach LOS	C			D	F	

Intersection Summary			
HCM 2000 Control Delay	81.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	92.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	38	0	229	0	0	0	45	263	788	0	0	1170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1600	1600	1600	1600	1600
Total Lost time (s)	6.9	6.9						6.5	6.5			5.2
Lane Util. Factor	1.00	1.00						1.00	0.95			*0.90
Frpb, ped/bikes	1.00	0.93						1.00	1.00			1.00
Flpb, ped/bikes	0.86	1.00						0.99	1.00			1.00
Frt	1.00	0.85						1.00	1.00			1.00
Flt Protected	0.95	1.00						0.95	1.00			1.00
Satd. Flow (prot)	1320	1283						1288	2593			2456
Flt Permitted	0.76	1.00						0.20	1.00			1.00
Satd. Flow (perm)	1052	1283						276	2593			2456
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	41	0	249	0	0	0	49	286	857	0	0	1272
RTOR Reduction (vph)	0	157	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	41	92	0	0	0	0	0	335	857	0	0	1272
Confl. Peds. (#/hr)	165		64	64		165		40		1113	940	
Confl. Bikes (#/hr)			2							52		
Turn Type	Perm	NA					custom	Prot	NA		Prot	NA
Protected Phases		4			8			5	2		1	6
Permitted Phases	4			8			5					
Actuated Green, G (s)	20.4	20.4						20.5	41.5			50.5
Effective Green, g (s)	20.4	20.4						20.5	41.5			50.5
Actuated g/C Ratio	0.19	0.19						0.19	0.38			0.46
Clearance Time (s)	6.9	6.9						6.5	6.5			5.2
Vehicle Extension (s)	3.0	3.0						3.0	3.0			3.0
Lane Grp Cap (vph)	195	237						51	978			1127
v/s Ratio Prot		c0.07							0.33			c0.52
v/s Ratio Perm	0.04							c1.22				
v/c Ratio	0.21	0.39						6.57	0.88			1.13
Uniform Delay, d1	38.0	39.3						44.8	31.9			29.8
Progression Factor	1.00	1.00						0.86	0.89			1.25
Incremental Delay, d2	0.5	1.1						2536.8	8.5			59.1
Delay (s)	38.5	40.4						2575.1	36.9			96.4
Level of Service	D	D						F	D			F
Approach Delay (s)		40.1			0.0				750.2			92.6
Approach LOS		D			A				F			F

Intersection Summary			
HCM 2000 Control Delay	362.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	2.19		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.3
Intersection Capacity Utilization	112.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBR
Lane Configurations	
Volume (vph)	84
Ideal Flow (vphpl)	1600
Total Lost time (s)	5.2
Lane Util. Factor	*0.90
Frpb, ped/bikes	0.84
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	879
Flt Permitted	1.00
Satd. Flow (perm)	879
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	91
RTOR Reduction (vph)	49
Lane Group Flow (vph)	42
Confl. Peds. (#/hr)	117
Confl. Bikes (#/hr)	80
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Actuated Green, G (s)	50.5
Effective Green, g (s)	50.5
Actuated g/C Ratio	0.46
Clearance Time (s)	5.2
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	403
v/s Ratio Prot	
v/s Ratio Perm	0.05
v/c Ratio	0.10
Uniform Delay, d1	16.9
Progression Factor	2.31
Incremental Delay, d2	0.0
Delay (s)	39.2
Level of Service	D
Approach Delay (s)	
Approach LOS	

Intersection Summary

DRAFT - SUBJECT TO REVIEW

HCM Unsignalized Intersection Capacity Analysis
8: SWL 330 Lot & Bryant St

5/28/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	358	0	0	252	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	402	0	0	283	0	0
Pedestrians	20			20	20	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	2			2	2	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	183			131		
pX, platoon unblocked						
vC, conflicting volume			422		725	241
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			422		725	241
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1116		349	737

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	268	134	283	0
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	1116	1700
Volume to Capacity	0.16	0.08	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS				A
Approach Delay (s)	0.0		0.0	0.0
Approach LOS				A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	29.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
9: The Embarcadero & Brannan St.

5/28/2015

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	101	39	42	880	56	954	434
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.9	6.9	6.6	5.2	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.84	1.00	1.00	1.00	1.00	0.68
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	1162	1540	3079	1540	3079	935
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1540	1162	1540	3079	1540	3079	935
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	109	42	45	946	60	1026	467
RTOR Reduction (vph)	0	25	0	0	0	0	164
Lane Group Flow (vph)	109	17	45	946	60	1026	303
Confl. Peds. (#/hr)	56	170	20				153
Confl. Bikes (#/hr)							92
Turn Type	Prot	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	4		5	2	1	6	
Permitted Phases		4					6
Actuated Green, G (s)	38.1	38.1	15.4	43.8	10.0	37.0	37.0
Effective Green, g (s)	38.1	38.1	15.4	43.8	10.0	37.0	37.0
Actuated g/C Ratio	0.35	0.35	0.14	0.40	0.09	0.34	0.34
Clearance Time (s)	6.9	6.9	6.6	5.2	6.0	6.0	6.0
Lane Grp Cap (vph)	533	402	215	1226	140	1035	314
v/s Ratio Prot	c0.07		0.03	c0.31	0.04	c0.33	
v/s Ratio Perm		0.01					0.32
v/c Ratio	0.20	0.04	0.21	0.77	0.43	0.99	0.97
Uniform Delay, d1	25.3	23.8	41.9	28.8	47.3	36.3	35.9
Progression Factor	1.00	1.00	0.53	0.87	0.90	0.89	1.42
Incremental Delay, d2	0.9	0.2	1.2	2.6	0.9	6.6	9.1
Delay (s)	26.2	24.0	23.6	27.8	43.3	39.1	60.0
Level of Service	C	C	C	C	D	D	E
Approach Delay (s)	25.6			27.6		45.6	
Approach LOS	C			C		D	

Intersection Summary			
HCM 2000 Control Delay	37.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	105	6	20	4	5	6	10	35	811	5	2	824
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1600	1600	1600	1600	1600	1600
Total Lost time (s)		7.0			7.0			7.0	7.0		5.8	5.4
Lane Util. Factor		1.00			1.00			1.00	0.95		1.00	0.95
Frpb, ped/bikes		0.95			0.87			1.00	1.00		1.00	0.94
Flpb, ped/bikes		0.75			0.93			1.00	1.00		1.00	1.00
Frt		0.98			0.95			1.00	1.00		1.00	0.97
Flt Protected		0.96			0.99			0.95	1.00		0.95	1.00
Satd. Flow (prot)		1087			1225			1296	2583		1296	2387
Flt Permitted		0.76			0.94			0.95	1.00		0.95	1.00
Satd. Flow (perm)		857			1170			1296	2583		1296	2387
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	113	6	22	4	5	6	11	38	872	5	2	886
RTOR Reduction (vph)	0	6	0	0	4	0	0	0	1	0	0	14
Lane Group Flow (vph)	0	135	0	0	11	0	0	49	876	0	2	1052
Confl. Peds. (#/hr)	440		440	440		440		30		520	120	
Confl. Bikes (#/hr)			30			30				30		
Turn Type	Perm	NA		Perm	NA		Prot	Prot	NA		Prot	NA
Protected Phases		4			8		5	5	2		1	6
Permitted Phases	4			8								
Actuated Green, G (s)		33.6			33.6			15.0	43.0		13.6	42.0
Effective Green, g (s)		33.6			33.6			15.0	43.0		13.6	42.0
Actuated g/C Ratio		0.31			0.31			0.14	0.39		0.12	0.38
Clearance Time (s)		7.0			7.0			7.0	7.0		5.8	5.4
Vehicle Extension (s)		3.0			3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		261			357			176	1009		160	911
v/s Ratio Prot								0.04	c0.34		0.00	c0.44
v/s Ratio Perm		c0.16			0.01							
v/c Ratio		0.52			0.03			0.28	0.87		0.01	1.15
Uniform Delay, d1		31.5			26.8			42.6	30.9		42.3	34.0
Progression Factor		1.00			1.00			0.85	0.71		1.87	0.65
Incremental Delay, d2		1.7			0.0			2.6	7.1		0.0	73.9
Delay (s)		33.2			26.8			39.0	28.9		79.1	95.9
Level of Service		C			C			D	C		E	F
Approach Delay (s)		33.2			26.8				29.5			95.9
Approach LOS		C			C				C			F

Intersection Summary			
HCM 2000 Control Delay	62.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.8
Intersection Capacity Utilization	92.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBR
Lane Configurations	
Volume (vph)	167
Ideal Flow (vphpl)	1600
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.93
Adj. Flow (vph)	180
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	430
Confl. Bikes (#/hr)	30
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

DRAFT - SUBJECT TO REVIEW

HCM Signalized Intersection Capacity Analysis
11: King St. & Second St.

5/28/2015

Movement	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations							
Volume (vph)	196	817	5	828	25	11	285
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	6.6	5.2	6.6	6.6		6.8	6.8
Lane Util. Factor	1.00	0.95	1.00	*0.90		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.99		1.00	0.67
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	1296	2593	1296	2422		1296	774
Flt Permitted	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	1296	2593	1296	2422		1296	774
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	202	842	5	854	26	11	294
RTOR Reduction (vph)	0	0	0	2	0	0	192
Lane Group Flow (vph)	202	842	5	878	0	11	102
Confl. Peds. (#/hr)	30				430	430	450
Confl. Bikes (#/hr)					10		30
Parking (#/hr)					10		
Turn Type	Prot	NA	Prot	NA		Prot	Perm
Protected Phases	5	2	1	6		4	
Permitted Phases							4
Actuated Green, G (s)	15.4	44.8	8.4	36.4		38.2	38.2
Effective Green, g (s)	15.4	44.8	8.4	36.4		38.2	38.2
Actuated g/C Ratio	0.14	0.41	0.08	0.33		0.35	0.35
Clearance Time (s)	6.6	5.2	6.6	6.6		6.8	6.8
Lane Grp Cap (vph)	181	1056	98	801		450	268
v/s Ratio Prot	c0.16	0.32	0.00	c0.36		0.01	
v/s Ratio Perm							c0.13
v/c Ratio	1.12	0.80	0.05	1.10		0.02	0.38
Uniform Delay, d1	47.3	28.6	47.1	36.8		23.6	27.0
Progression Factor	0.83	1.46	0.65	0.54		1.00	1.00
Incremental Delay, d2	93.5	4.9	0.1	45.4		0.1	4.1
Delay (s)	132.8	46.6	30.7	65.4		23.7	31.1
Level of Service	F	D	C	E		C	C
Approach Delay (s)		63.3		65.2		30.8	
Approach LOS		E		E		C	

Intersection Summary			
HCM 2000 Control Delay	59.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	94.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
12: Third St. & King St.

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	872	759	12	140	937	36	53	951	257	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Lane Util. Factor	0.94	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.68			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00			
Frt	1.00	1.00		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4342	3057		2515	2547			5468	934			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4342	3057		2515	2547			5468	934			
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	899	782	12	144	966	37	55	980	265	0	0	0
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	184	0	0	0
Lane Group Flow (vph)	899	793	0	144	1002	0	0	1035	81	0	0	0
Confl. Peds. (#/hr)	30		430	30		430	430		430	30		30
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.2	42.8		13.2	39.3			33.6	33.6			
Effective Green, g (s)	18.2	42.8		13.2	39.3			33.6	33.6			
Actuated g/C Ratio	0.17	0.39		0.12	0.36			0.31	0.31			
Clearance Time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	718	1189		301	909			1670	285			
v/s Ratio Prot	c0.21	0.26		0.06	c0.39							
v/s Ratio Perm								0.19	0.09			
v/c Ratio	1.25	0.67		0.48	1.10			0.62	0.28			
Uniform Delay, d1	45.9	27.7		45.2	35.4			32.7	29.1			
Progression Factor	1.38	1.64		1.50	1.02			1.00	1.00			
Incremental Delay, d2	120.8	1.9		0.3	51.4			0.7	0.6			
Delay (s)	184.2	47.4		68.2	87.3			33.4	29.6			
Level of Service	F	D		E	F			C	C			
Approach Delay (s)		120.0			84.9			32.6			0.0	
Approach LOS		F			F			C			A	

Intersection Summary			
HCM 2000 Control Delay	82.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	102.9%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

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HCM Signalized Intersection Capacity Analysis
13: Fourth St. & King St.
5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑↑↱		↰	↑↑↱			↰↑	↱	↰	↑↱	↱
Volume (vph)	151	1548	25	24	947	19	5	60	61	34	254	301
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	0.63	1.00	0.82	0.47
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00	0.67	1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85	1.00	0.95	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	4386		1296	2554			1579	851	1031	2297	575
Flt Permitted	0.95	1.00		0.95	1.00			0.97	1.00	0.71	1.00	1.00
Satd. Flow (perm)	1540	4386		1296	2554			1533	851	775	2297	575
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	154	1580	26	24	966	19	5	61	62	35	259	307
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	40	0	52	113
Lane Group Flow (vph)	154	1605	0	24	984	0	0	66	22	35	339	62
Confl. Peds. (#/hr)	30		791	30		725	1678		708	708		1678
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.4	45.9		6.0	35.9			38.2	38.2	39.2	39.2	39.2
Effective Green, g (s)	14.4	45.9		6.0	35.9			38.2	38.2	39.2	39.2	39.2
Actuated g/C Ratio	0.13	0.42		0.05	0.33			0.35	0.35	0.36	0.36	0.36
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	201	1830		70	833			532	295	276	818	204
v/s Ratio Prot	0.10	c0.37		0.02	c0.39						c0.15	
v/s Ratio Perm								0.04	0.03	0.05		0.11
v/c Ratio	0.77	0.88		0.34	1.18			0.12	0.07	0.13	0.41	0.31
Uniform Delay, d1	46.2	29.5		50.1	37.0			24.5	24.0	23.9	26.7	25.6
Progression Factor	0.58	1.18		0.89	0.93			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.6	0.6		0.3	82.6			0.1	0.1	0.2	0.3	0.9
Delay (s)	28.3	35.5		45.0	117.0			24.6	24.1	24.1	27.1	26.4
Level of Service	C	D		D	F			C	C	C	C	C
Approach Delay (s)		34.8			115.2			24.4			26.7	
Approach LOS		C			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	56.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	116.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
14: Fifth St. & I-280 Ramps/King St.
5/28/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↱			↑↑	↰	↱
Volume (vph)	1716	138	0	1253	86	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.97
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3035			3079	1540	1333
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3035			3079	1540	1333
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1788	144	0	1305	90	8
RTOR Reduction (vph)	5	0	0	0	0	5
Lane Group Flow (vph)	1927	0	0	1305	90	3
Confl. Peds. (#/hr)		57	57		21	23
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	1713			1738	512	443
v/s Ratio Prot	c0.63			0.42	c0.06	
v/s Ratio Perm						0.00
v/c Ratio	1.12			0.75	0.18	0.01
Uniform Delay, d1	23.9			18.1	26.0	24.5
Progression Factor	1.00			0.53	1.00	1.00
Incremental Delay, d2	64.4			0.7	0.7	0.0
Delay (s)	88.4			10.3	26.8	24.6
Level of Service	F			B	C	C
Approach Delay (s)	88.4			10.3	26.6	
Approach LOS	F			B	C	

Intersection Summary			
HCM 2000 Control Delay	56.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	97.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

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HCM Signalized Intersection Capacity Analysis
15: Main St & Harrison St

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	135	91	5	561	54	127	262	14	2	96	253
Ideal Flow (vphpl)	1900	1900	1900	1100	1100	1100	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.0		4.5	4.5			4.5	4.5
Lane Util. Factor		1.00			*0.40		1.00	1.00			1.00	1.00
Frpb, ped/bikes		0.94			0.98		1.00	1.00			1.00	0.87
Flpb, ped/bikes		1.00			1.00		0.90	1.00			1.00	1.00
Frt		0.95			0.99		1.00	0.99			1.00	0.85
Flt Protected		1.00			1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)		1602			1208		1537	1778			1797	1135
Flt Permitted		0.75			0.94		0.69	1.00			1.00	1.00
Satd. Flow (perm)		1210			1134		1113	1778			1791	1135
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	26	148	100	5	616	59	140	288	15	2	105	278
RTOR Reduction (vph)	0	34	0	0	7	0	0	3	0	0	0	42
Lane Group Flow (vph)	0	240	0	0	673	0	140	300	0	0	107	236
Confl. Peds. (#/hr)	20		120	120		120	170		130	130		170
Parking (#/hr)			10			10			10			10
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		25.0			25.5		26.0	26.0			26.0	26.0
Effective Green, g (s)		25.0			25.5		26.0	26.0			26.0	26.0
Actuated g/C Ratio		0.42			0.42		0.43	0.43			0.43	0.43
Clearance Time (s)		4.5			4.0		4.5	4.5			4.5	4.5
Lane Grp Cap (vph)		504			481		482	770			776	491
v/s Ratio Prot								0.17				
v/s Ratio Perm		0.20			c0.59		0.13				0.06	c0.21
v/c Ratio		0.48			1.40		0.29	0.39			0.14	0.48
Uniform Delay, d1		12.7			17.2		11.0	11.6			10.2	12.2
Progression Factor		0.89			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		3.1			192.0		1.5	1.5			0.4	3.3
Delay (s)		14.3			209.2		12.5	13.1			10.6	15.5
Level of Service		B			F		B	B			B	B
Approach Delay (s)		14.3			209.2			12.9			14.2	
Approach LOS		B			F			B			B	

Intersection Summary			
HCM 2000 Control Delay	88.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	77.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
16: Bryant St & Main St

5/28/2015

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	187	169	149	196	96	96
Ideal Flow (vphpl)	1500	1500	1500	1500	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	4.0
Lane Util. Factor	*0.40	*0.40	*0.40	*0.40	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.95	1.00	0.80
Flpb, ped/bikes	0.99	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	482	435	512	414	1540	942
Flt Permitted	0.51	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	257	435	512	414	1540	942
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	208	188	166	218	107	107
RTOR Reduction (vph)	0	0	0	49	0	92
Lane Group Flow (vph)	208	188	166	169	107	15
Confl. Peds. (#/hr)	20			72	70	61
Parking (#/hr)		10				10
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		6	2		8	
Permitted Phases	6			2		8
Actuated Green, G (s)	77.3	77.3	77.3	77.3	13.7	13.7
Effective Green, g (s)	77.3	77.3	77.3	77.3	13.7	13.7
Actuated g/C Ratio	0.77	0.77	0.77	0.77	0.14	0.14
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	198	336	395	320	210	129
v/s Ratio Prot		0.43	0.32		c0.07	
v/s Ratio Perm	c0.81			0.41		0.02
v/c Ratio	1.05	0.56	0.42	0.53	0.51	0.11
Uniform Delay, d1	11.4	4.5	3.8	4.3	40.0	37.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	77.9	6.6	3.3	6.1	1.9	0.4
Delay (s)	89.2	11.1	7.1	10.4	42.0	38.2
Level of Service	F	B	A	B	D	D
Approach Delay (s)		52.2	9.0		40.1	
Approach LOS		D	A		D	

Intersection Summary			
HCM 2000 Control Delay	32.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	87.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

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HCM Signalized Intersection Capacity Analysis
17: Beale St & Mission St
5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	418	167	77	301	0	0	0	0	62	818	92
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1200	1200	1200
Total Lost time (s)		5.0		5.0	5.0					5.0	5.0	
Lane Util. Factor		0.95		1.00	1.00					1.00	0.91	
Frpb, ped/bikes		0.99		1.00	1.00					1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00					0.97	1.00	
Frt		0.96		1.00	1.00					1.00	0.98	
Flt Protected		1.00		0.95	1.00					0.95	1.00	
Satd. Flow (prot)		2927		1290	1365					945	2738	
Flt Permitted		1.00		0.36	1.00					0.95	1.00	
Satd. Flow (perm)		2927		495	1365					945	2738	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	0	475	190	88	342	0	0	0	0	70	930	105
RTOR Reduction (vph)	0	13	0	0	0	0	0	0	0	0	23	0
Lane Group Flow (vph)	0	652	0	88	342	0	0	0	0	70	1012	0
Confl. Peds. (#/hr)	20		20	20		20	20		20	20		20
Parking (#/hr)			10									10
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		2			6						4	
Permitted Phases				6						4		
Actuated Green, G (s)		29.0		29.0	29.0					21.0	21.0	
Effective Green, g (s)		29.0		29.0	29.0					21.0	21.0	
Actuated g/C Ratio		0.48		0.48	0.48					0.35	0.35	
Clearance Time (s)		5.0		5.0	5.0					5.0	5.0	
Lane Grp Cap (vph)		1414		239	659					330	958	
v/s Ratio Prot		0.22			c0.25						c0.37	
v/s Ratio Perm				0.18						0.07		
v/c Ratio		0.46		0.37	0.52					0.21	1.06	
Uniform Delay, d1		10.3		9.7	10.7					13.7	19.5	
Progression Factor		1.00		1.00	1.00					1.00	1.00	
Incremental Delay, d2		1.1		4.3	2.9					1.5	45.2	
Delay (s)		11.4		14.1	13.6					15.2	64.7	
Level of Service		B		B	B					B	E	
Approach Delay (s)		11.4			13.7			0.0			61.6	
Approach LOS		B			B			A			E	

Intersection Summary			
HCM 2000 Control Delay	37.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
18: Delancey St. & Beale St. & Bryant St.
5/28/2015

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	30	98	24	8	52	61	90	48	23	19	9	76
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		5.0					5.0				5.0	
Lane Util. Factor		1.00					1.00				1.00	
Frpb, ped/bikes		0.90					0.97				0.95	
Flpb, ped/bikes		0.99					0.84				0.91	
Frt		0.97					0.97				0.92	
Flt Protected		0.99					0.98				0.98	
Satd. Flow (prot)		1309					1015				1011	
Flt Permitted		0.91					0.74				0.82	
Satd. Flow (perm)		1206					772				838	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	107	26	9	57	66	98	52	25	21	10	83
RTOR Reduction (vph)	0	0	0	0	0	0	9	0	0	0	48	0
Lane Group Flow (vph)	0	175	0	0	0	0	264	0	0	0	91	0
Confl. Peds. (#/hr)	71		106	220	106	220		71	220	220		86
Confl. Bikes (#/hr)			3	3								11
Parking (#/hr)					10	10	10	10	10	10	10	10
Turn Type	Perm	NA			Perm	Perm	NA		Perm	Perm	NA	
Protected Phases		2					6				8	
Permitted Phases	2				6	6			8	8		
Actuated Green, G (s)		27.0					27.0				38.0	
Effective Green, g (s)		27.0					27.0				38.0	
Actuated g/C Ratio		0.30					0.30				0.42	
Clearance Time (s)		5.0					5.0				5.0	
Vehicle Extension (s)		3.0					3.0				3.0	
Lane Grp Cap (vph)		361					231				353	
v/s Ratio Prot												
v/s Ratio Perm		0.15					c0.34				0.11	
v/c Ratio		0.48					1.14				0.26	
Uniform Delay, d1		25.8					31.5				16.9	
Progression Factor		1.00					1.00				1.00	
Incremental Delay, d2		4.6					103.0				0.4	
Delay (s)		30.4					134.5				17.2	
Level of Service		C					F				B	
Approach Delay (s)		30.4					134.5				17.2	
Approach LOS		C					F				B	

Intersection Summary			
HCM 2000 Control Delay	68.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	111.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

HCM Signalized Intersection Capacity Analysis
18: Delancey St. & Beale St. & Bryant St.
5/28/2015

Movement	SBL	SBT	SBR	SBR2	NEL	NER	NER2
Lane Configurations							
Volume (vph)	86	35	174	207	59	97	17
Ideal Flow (vphpl)	1800	1800	1800	1800	1900	1800	1800
Total Lost time (s)		5.0		5.0	3.5	3.5	
Lane Util. Factor		0.95		0.95	1.00	1.00	
Frpb, ped/bikes		0.66		0.66	1.00	0.51	
Flpb, ped/bikes		1.00		1.00	1.00	1.00	
Frt		0.91		0.85	1.00	0.85	
Flt Protected		0.99		1.00	0.95	1.00	
Satd. Flow (prot)		861		818	1540	669	
Flt Permitted		0.88		1.00	0.95	1.00	
Satd. Flow (perm)		764		818	1540	669	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	93	38	189	225	64	105	18
RTOR Reduction (vph)	0	3	0	76	0	74	0
Lane Group Flow (vph)	0	340	0	126	64	49	0
Confl. Peds. (#/hr)	20		220	220	71		106
Confl. Bikes (#/hr)			12	12			
Parking (#/hr)							
Turn Type	Perm	NA		Perm	Prot	Perm	
Protected Phases		4			5		
Permitted Phases	4			4		5	
Actuated Green, G (s)		38.0		38.0	11.5	11.5	
Effective Green, g (s)		38.0		38.0	11.5	11.5	
Actuated g/C Ratio		0.42		0.42	0.13	0.13	
Clearance Time (s)		5.0		5.0	3.5	3.5	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)		322		345	196	85	
v/s Ratio Prot					0.04		
v/s Ratio Perm		c0.45		0.15		c0.07	
v/c Ratio		1.06		0.37	0.33	0.57	
Uniform Delay, d1		26.0		17.8	35.7	36.9	
Progression Factor		1.00		1.00	1.00	1.00	
Incremental Delay, d2		65.7		0.7	4.4	25.3	
Delay (s)		91.7		18.4	40.1	62.2	
Level of Service		F		B	D	E	
Approach Delay (s)		64.6			54.7		
Approach LOS		E			D		

Intersection Summary

HCM Signalized Intersection Capacity Analysis
19: Fremont St. & Harrison St./I-80 WB Off-Ramp
5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	51	98	0	0	896	45	63	153	149	4	0	214
Ideal Flow (vphpl)	1800	1800	1800	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0			5.0	
Lane Util. Factor		1.00			*0.80	1.00	1.00	0.95			1.00	
Frpb, ped/bikes		1.00			1.00	0.95	1.00	0.97			0.97	
Flpb, ped/bikes		1.00			1.00	1.00	0.99	1.00			1.00	
Frt		1.00			1.00	0.85	1.00	0.93			0.87	
Flt Protected		0.98			1.00	1.00	0.95	1.00			1.00	
Satd. Flow (prot)		1279			2047	689	1442	2624			1293	
Flt Permitted		0.60			1.00	1.00	0.62	1.00			0.99	
Satd. Flow (perm)		777			2047	689	946	2624			1287	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	54	103	0	0	943	47	66	161	157	4	0	225
RTOR Reduction (vph)	0	0	0	0	0	0	0	94	0	0	0	0
Lane Group Flow (vph)	0	157	0	0	943	47	66	224	0	0	229	0
Confl. Peds. (#/hr)	52		20	20		52	20		28	28		20
Confl. Bikes (#/hr)						10						
Parking (#/hr)	10	10										
Turn Type	Perm	NA			NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2					6	8			4		
Actuated Green, G (s)		26.0			26.0	26.0	24.0	24.0			24.0	
Effective Green, g (s)		26.0			26.0	26.0	24.0	24.0			24.0	
Actuated g/C Ratio		0.43			0.43	0.43	0.40	0.40			0.40	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0			5.0	
Lane Grp Cap (vph)		336			887	298	378	1049			514	
v/s Ratio Prot					c0.46			0.09				
v/s Ratio Perm		0.20				0.07	0.07				c0.18	
v/c Ratio		0.47			1.06	0.16	0.17	0.21			0.45	
Uniform Delay, d1		12.1			17.0	10.3	11.6	11.8			13.1	
Progression Factor		1.00			1.25	1.15	1.00	1.00			1.00	
Incremental Delay, d2		4.5			31.2	0.1	1.0	0.5			2.8	
Delay (s)		16.6			52.5	12.0	12.6	12.3			15.9	
Level of Service		B			D	B	B	B			B	
Approach Delay (s)		16.6			50.6			12.3			15.9	
Approach LOS		B			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	34.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	108.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

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HCM Signalized Intersection Capacity Analysis
20: Fremont St. & Folsom St. & I-80 WB Off-Ramp

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBT	NBR	SEL	SER
Lane Configurations										
Volume (vph)	177	260	154	12	105	108	171	78	200	52
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	3.0			2.0		2.0		6.0	
Lane Util. Factor	1.00	0.95			1.00		1.00		0.97	
Frpb, ped/bikes	1.00	0.94			1.00		0.98		1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00		1.00	
Frt	1.00	0.94			0.94		0.96		0.97	
Flt Protected	0.95	1.00			1.00		1.00		0.96	
Satd. Flow (prot)	1459	2397			1427		1439		2776	
Flt Permitted	0.95	1.00			0.97		1.00		0.96	
Satd. Flow (perm)	1459	2397			1390		1439		2776	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	184	271	160	12	109	112	178	81	208	54
RTOR Reduction (vph)	0	100	0	0	0	0	18	0	0	0
Lane Group Flow (vph)	184	331	0	0	233	0	241	0	262	0
Confl. Peds. (#/hr)	174		172	172				45		
Confl. Bikes (#/hr)			30							
Parking (#/hr)		10	10							
Turn Type	Prot	NA		Perm	NA		NA		Prot	
Protected Phases	5	2			6		8		4	
Permitted Phases				6						
Actuated Green, G (s)	6.0	28.5			18.5		20.0		19.0	
Effective Green, g (s)	8.0	31.5			20.5		23.0		19.0	
Actuated g/C Ratio	0.09	0.37			0.24		0.27		0.22	
Clearance Time (s)	6.0	6.0			4.0		5.0		6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0	
Lane Grp Cap (vph)	138	893			337		391		624	
v/s Ratio Prot	c0.13	0.14					c0.17		c0.09	
v/s Ratio Perm					c0.17					
v/c Ratio	1.33	0.37			0.69		0.62		0.42	
Uniform Delay, d1	38.2	19.3			29.1		26.9		28.0	
Progression Factor	1.00	1.00			1.00		1.00		1.00	
Incremental Delay, d2	191.0	0.3			6.0		2.9		0.5	
Delay (s)	229.2	19.5			35.1		29.8		28.5	
Level of Service	F	B			D		C		C	
Approach Delay (s)		82.3			35.1		29.8		28.5	
Approach LOS		F			D		C		C	

Intersection Summary			
HCM 2000 Control Delay	54.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	84.5	Sum of lost time (s)	14.0
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
21: Freeway & First St. & Harrison St.

5/28/2015

Movement	EBT	EBR2	WBL	WBT	NBR	SBL	SBT	SBR	SBR2
Lane Configurations									
Volume (vph)	84	65	696	477	23	42	42	1171	253
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1600	1600	1600	1600
Total Lost time (s)	3.0		5.0	3.0	3.0		3.0	5.0	3.0
Lane Util. Factor	1.00		0.91	0.91	1.00		1.00	0.88	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	0.96	0.96
Flpb, ped/bikes	1.00		1.00	1.00	1.00		0.95	1.00	1.00
Frt	0.94		1.00	1.00	0.86		1.00	0.85	0.85
Flt Protected	1.00		0.95	0.98	1.00		0.98	1.00	1.00
Satd. Flow (prot)	1445		1327	2534	1328		1262	1955	1115
Flt Permitted	1.00		0.58	0.74	1.00		0.98	1.00	1.00
Satd. Flow (perm)	1445		811	1918	1328		1262	1955	1115
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	85	66	703	482	23	42	42	1183	256
RTOR Reduction (vph)	106	0	0	0	18	0	0	0	145
Lane Group Flow (vph)	45	0	380	805	5	0	84	1183	111
Confl. Peds. (#/hr)					90	90		20	37
Parking (#/hr)				10		10			
Turn Type	NA		pm+pt	NA	Over	Perm	NA	Perm	custom
Protected Phases	2		1	6	1		4		
Permitted Phases			6			4		4	6
Actuated Green, G (s)	8.0		24.0	24.0	11.0		26.0	26.0	24.0
Effective Green, g (s)	10.0		24.0	26.0	13.0		28.0	26.0	26.0
Actuated g/C Ratio	0.17		0.40	0.43	0.22		0.47	0.43	0.43
Clearance Time (s)	5.0		5.0	5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	240		419	964	287		588	847	483
v/s Ratio Prot	0.03		0.17	c0.18	0.00				
v/s Ratio Perm			c0.20	0.18			0.07	c0.61	0.10
v/c Ratio	0.19		0.91	0.84	0.02		0.14	1.40	0.23
Uniform Delay, d1	21.5		16.9	15.1	18.5		9.1	17.0	10.7
Progression Factor	1.00		1.36	1.30	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.7		13.1	3.7	0.1		0.5	185.7	1.1
Delay (s)	23.2		36.1	23.4	18.6		9.7	202.7	11.8
Level of Service	C		D	C	B		A	F	B
Approach Delay (s)	23.2			27.5			160.0		
Approach LOS	C			C			F		

Intersection Summary			
HCM 2000 Control Delay	97.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	103.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

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HCM Signalized Intersection Capacity Analysis
22: Fourth St. & Howard St.

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	697	1444	0	0	0	0	0	1133	460
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1900	1900	1900
Total Lost time (s)				2.5	2.5						2.0	2.0
Lane Util. Factor				0.81	0.81						0.81	0.81
Frpb, ped/bikes				1.00	1.00						0.95	0.65
Flpb, ped/bikes				1.00	1.00						1.00	1.00
Frt				1.00	1.00						0.98	0.85
Flt Protected				0.95	0.99						1.00	1.00
Satd. Flow (prot)				1181	4934						4882	728
Flt Permitted				0.95	0.99						1.00	1.00
Satd. Flow (perm)				1181	4934						4882	728
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	711	1473	0	0	0	0	0	1156	469
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	419	1765	0	0	0	0	0	1334	291
Confl. Peds. (#/hr)	20		20	215		419	515		677	677		515
Confl. Bikes (#/hr)			30			30			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	5	0
Turn Type				Split	NA						NA	Perm
Protected Phases				6	6						4	
Permitted Phases												4
Actuated Green, G (s)				32.0	32.0						26.0	26.0
Effective Green, g (s)				33.5	33.5						28.0	28.0
Actuated g/C Ratio				0.37	0.37						0.31	0.31
Clearance Time (s)				4.0	4.0						4.0	4.0
Lane Grp Cap (vph)				439	1836						1518	226
v/s Ratio Prot				0.35	c0.36						0.27	
v/s Ratio Perm												c0.40
v/c Ratio				0.95	0.96						0.88	1.29
Uniform Delay, d1				27.5	27.6						29.4	31.0
Progression Factor				1.00	1.00						1.00	1.00
Incremental Delay, d2				32.9	13.7						7.6	158.5
Delay (s)				60.5	41.3						36.9	189.5
Level of Service				E	D						D	F
Approach Delay (s)		0.0			45.0			0.0			64.3	
Approach LOS		A			D			A			E	

Intersection Summary			
HCM 2000 Control Delay	53.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	6.5
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
23: I-80 WB On-Ramp & Fourth St. & Harrison St.

5/28/2015

Movement	WBL2	WBL	WBT	SBT	SBR	SBR2
Lane Configurations						
Volume (vph)	172	747	1141	544	951	288
Ideal Flow (vphpl)	1600	1600	1800	1600	1600	1600
Total Lost time (s)	2.4		2.4	5.7	2.7	2.7
Lane Util. Factor	0.81		0.81	0.91	0.91	1.00
Frpb, ped/bikes	1.00		1.00	0.99	0.98	0.96
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	0.93	0.85	0.85
Flt Protected	0.95		0.98	1.00	1.00	1.00
Satd. Flow (prot)	1050		4852	2120	1038	1112
Flt Permitted	0.95		0.98	1.00	1.00	1.00
Satd. Flow (perm)	1050		4852	2120	1038	1112
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	176	762	1164	555	970	294
RTOR Reduction (vph)	0	0	0	0	0	14
Lane Group Flow (vph)	158	0	1944	1040	485	280
Confl. Peds. (#/hr)						41
Confl. Bikes (#/hr)					10	10
Bus Blockages (#/hr)	0	0	5	0	0	0
Parking (#/hr)				10		
Turn Type	Perm	Perm	NA	NA	Perm	Perm
Protected Phases			6	4		
Permitted Phases	6	6			4	4
Actuated Green, G (s)	35.6		35.6	43.3	43.3	43.3
Effective Green, g (s)	38.6		38.6	43.3	46.3	46.3
Actuated g/C Ratio	0.43		0.43	0.48	0.51	0.51
Clearance Time (s)	5.4		5.4	5.7	5.7	5.7
Lane Grp Cap (vph)	450		2080	1019	533	572
v/s Ratio Prot				c0.49		
v/s Ratio Perm	0.15		0.40		0.47	0.25
v/c Ratio	0.35		1.34dl	1.09dr	0.91	0.49
Uniform Delay, d1	17.3		24.5	23.4	19.9	14.2
Progression Factor	1.00		1.00	1.65	1.86	2.04
Incremental Delay, d2	2.1		9.4	23.3	10.8	1.2
Delay (s)	19.4		33.9	61.9	47.9	30.2
Level of Service	B		C	E	D	C
Approach Delay (s)			32.8	53.0		
Approach LOS			C	D		

Intersection Summary			
HCM 2000 Control Delay	42.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.1
Intersection Capacity Utilization	113.1%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

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HCM Signalized Intersection Capacity Analysis
24: Fourth St. & Bryant St. & I-80 EB Off-Ramp

5/28/2015

Movement	EBT	EBR	SBL	SBT	SEL	SER
Lane Configurations						
Volume (vph)	729	113	132	584	143	14
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.5		4.2	4.2	4.5	4.5
Lane Util. Factor	0.81		1.00	1.00	0.94	0.86
Frpb, ped/bikes	0.97		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	5751		1459	1305	4118	1122
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	5751		1459	1305	4118	1122
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	776	120	140	621	152	15
RTOR Reduction (vph)	31	0	95	0	0	0
Lane Group Flow (vph)	865	0	45	621	154	13
Confl. Peds. (#/hr)		163	796			
Confl. Bikes (#/hr)		10				
Parking (#/hr)	10	10		10		
Turn Type	NA		Split	NA	Prot	Perm
Protected Phases	2		7	7	4	
Permitted Phases						4
Actuated Green, G (s)	23.5		26.8	26.8	19.5	19.5
Effective Green, g (s)	25.5		28.8	28.8	23.5	23.5
Actuated g/C Ratio	0.28		0.32	0.32	0.26	0.26
Clearance Time (s)	5.5		6.2	6.2	8.5	8.5
Lane Grp Cap (vph)	1629		466	417	1075	292
v/s Ratio Prot	c0.15		0.03	c0.48	c0.04	
v/s Ratio Perm						0.01
v/c Ratio	0.53		0.10	1.49	0.14	0.04
Uniform Delay, d1	27.2		21.5	30.6	25.5	24.9
Progression Factor	1.00		0.94	0.78	1.00	1.00
Incremental Delay, d2	1.2		0.2	226.7	0.3	0.3
Delay (s)	28.5		20.4	250.7	25.8	25.1
Level of Service	C		C	F	C	C
Approach Delay (s)	28.5			208.3	25.8	
Approach LOS	C			F	C	

Intersection Summary			
HCM 2000 Control Delay	103.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	77.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
25: Fifth St. & I-80 WB Off-Ramp & Harrison St.

5/28/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	272	1171	161	52	302	537	219	192	722	265
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		2.0			2.0	2.0			2.0	2.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.96			0.99	0.85
Flpb, ped/bikes		0.99			1.00	1.00			0.79	1.00
Frt		0.98			1.00	0.96			1.00	0.85
Flt Protected		0.99			0.99	1.00			0.95	1.00
Satd. Flow (prot)		5718			2855	2448			3234	954
Flt Permitted		0.99			0.66	1.00			0.95	1.00
Satd. Flow (perm)		5718			1898	2448			3234	954
Peak-hour factor, PHF	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93
Adj. Flow (vph)	296	1259	173	56	325	577	235	209	776	285
RTOR Reduction (vph)	0	22	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	0	1706	0	0	381	809	0	0	1014	256
Confl. Peds. (#/hr)	70		120	120			120	70	120	120
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Perm	Prot	Perm
Protected Phases		6			4	4			7	
Permitted Phases	6			4				7		7
Actuated Green, G (s)		27.0			25.0	25.0			24.0	24.0
Effective Green, g (s)		29.0			28.0	28.0			27.0	27.0
Actuated g/C Ratio		0.32			0.31	0.31			0.30	0.30
Clearance Time (s)		4.0			5.0	5.0			5.0	5.0
Lane Grp Cap (vph)		1842			590	761			970	286
v/s Ratio Prot						c0.33				
v/s Ratio Perm		0.30			0.20				0.31	0.27
v/c Ratio		0.93			0.65	1.06			1.05	0.90
Uniform Delay, d1		29.5			26.7	31.0			31.5	30.1
Progression Factor		1.48			1.00	1.00			1.00	1.00
Incremental Delay, d2		6.9			5.4	50.5			41.5	32.0
Delay (s)		50.5			32.1	81.5			73.0	62.2
Level of Service		D			C	F			E	E
Approach Delay (s)		50.5			32.1	81.5			70.8	
Approach LOS		D			C	F			E	

Intersection Summary			
HCM 2000 Control Delay	61.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	109.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

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HCM Unsignalized Intersection Capacity Analysis
26: Delancey St & Brannan St

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	121	90	29	15	322	19	23	3	3	4	4	210
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	139	103	33	17	370	22	26	3	3	5	5	241

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	276	409	33	251
Volume Left (vph)	139	17	26	5
Volume Right (vph)	33	22	3	241
Hadj (s)	0.06	0.01	0.13	-0.54
Departure Headway (s)	5.4	5.1	6.3	5.2
Degree Utilization, x	0.41	0.58	0.06	0.36
Capacity (veh/h)	631	674	465	626
Control Delay (s)	12.0	15.0	9.7	11.1
Approach Delay (s)	12.0	15.0	9.7	11.1
Approach LOS	B	C	A	B

Intersection Summary			
Delay	13.0		
Level of Service	B		
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
27: Second St. & Brannan St.

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	538	93	168	235	81	44	338	73	38	308	215
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)		2.0			2.0			2.0			3.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		0.93			0.95			0.95			0.88	
Flpb, ped/bikes		0.99			0.94			0.99			0.99	
Frt		0.98			0.97			0.98			0.94	
Flt Protected		1.00			0.98			1.00			1.00	
Satd. Flow (prot)		2153			2058			2342			1945	
Flt Permitted		0.89			0.61			0.87			0.90	
Satd. Flow (perm)		1924			1274			2050			1761	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	53	566	98	177	247	85	46	356	77	40	324	226
RTOR Reduction (vph)	0	14	0	0	13	0	0	7	0	0	19	0
Lane Group Flow (vph)	0	703	0	0	496	0	0	472	0	0	571	0
Confl. Peds. (#/hr)	420		420	420		420	420		420	420		420
Confl. Bikes (#/hr)			20			6			3			23
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	0	0	5	0
Parking (#/hr)		10	10		10	10					10	10
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		25.0			25.0			25.0			25.0	
Effective Green, g (s)		28.0			28.0			28.0			27.0	
Actuated g/C Ratio		0.47			0.47			0.47			0.45	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Lane Grp Cap (vph)		897			594			956			792	
v/s Ratio Prot												
v/s Ratio Perm		0.37			c0.39			0.23			c0.32	
v/c Ratio		0.78			1.15dl			0.49			0.72	
Uniform Delay, d1		13.4			14.0			11.1			13.4	
Progression Factor		1.00			1.00			1.00			1.52	
Incremental Delay, d2		6.8			13.0			1.8			4.5	
Delay (s)		20.2			27.0			12.9			24.9	
Level of Service		C			C			B			C	
Approach Delay (s)		20.2			27.0			12.9			24.9	
Approach LOS		C			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	21.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	107.1%	ICU Level of Service	G
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

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HCM Signalized Intersection Capacity Analysis
28: Second St. & Bryant St. 5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	354	576	48	0	0	0	0	512	177	12	521	0
Ideal Flow (vphpl)	1050	1050	1050	1800	1800	1800	1050	1050	1050	1600	1600	1600
Total Lost time (s)	2.0	2.0						2.0	2.0		2.0	
Lane Util. Factor	*0.50	*0.50						*0.50	0.91		0.95	
Frpb, ped/bikes	1.00	0.98						0.99	0.70		1.00	
Flpb, ped/bikes	1.00	1.00						1.00	1.00		1.00	
Frt	1.00	0.99						0.99	0.85		1.00	
Flt Protected	0.95	1.00						1.00	1.00		1.00	
Satd. Flow (prot)	787	1233						882	484		2390	
Flt Permitted	0.95	1.00						1.00	1.00		0.93	
Satd. Flow (perm)	787	1233						882	484		2225	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	381	619	52	0	0	0	0	551	190	13	560	0
RTOR Reduction (vph)	0	8	0	0	0	0	0	2	8	0	0	0
Lane Group Flow (vph)	381	663	0	0	0	0	0	568	163	0	573	0
Confl. Peds. (#/hr)	20		420	20		20	20		420	420		20
Confl. Bikes (#/hr)			1						17			
Parking (#/hr)	10	10	10								10	
Turn Type	Split	NA						NA	Perm	Perm	NA	
Protected Phases	2	2						4			4	
Permitted Phases									4	4		
Actuated Green, G (s)	27.0	27.0						26.0	26.0		26.0	
Effective Green, g (s)	28.5	28.5						27.5	27.5		27.5	
Actuated g/C Ratio	0.48	0.48						0.46	0.46		0.46	
Clearance Time (s)	3.5	3.5						3.5	3.5		3.5	
Lane Grp Cap (vph)	373	585						404	221		1019	
v/s Ratio Prot	0.48	c0.54						c0.64				
v/s Ratio Perm									0.34		0.26	
v/c Ratio	1.02	1.13						1.41	0.74		0.56	
Uniform Delay, d1	15.8	15.8						16.2	13.3		11.9	
Progression Factor	1.00	1.00						0.73	0.70		1.00	
Incremental Delay, d2	52.2	79.8						196.0	18.7		2.2	
Delay (s)	67.9	95.5						207.7	28.1		14.1	
Level of Service	E	F						F	C		B	
Approach Delay (s)		85.5			0.0			166.3			14.1	
Approach LOS		F			A			F			B	

Intersection Summary			
HCM 2000 Control Delay	93.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.24		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	81.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

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Off-site Alternative at Piers 30/32 & SWL 330
Intersection Level of Service
Existing plus No Event – Saturday Evening

HCM Signalized Intersection Capacity Analysis
1: The Embarcadero & Broadway

5/28/2015

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	52	214	172	527	0	661	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	0.97	0.95		0.95	
Frpb, ped/bikes	1.00	0.79	1.00	1.00		0.99	
Flpb, ped/bikes	0.97	1.00	1.00	1.00		1.00	
Frt	1.00	0.85	1.00	1.00		0.99	
Flt Protected	0.95	1.00	0.95	1.00		1.00	
Satd. Flow (prot)	1498	1091	2987	3079		3044	
Flt Permitted	0.95	1.00	0.95	1.00		1.00	
Satd. Flow (perm)	1498	1091	2987	3079		3044	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	57	235	189	579	0	726	31
RTOR Reduction (vph)	0	152	0	0	0	3	0
Lane Group Flow (vph)	57	83	189	579	0	754	0
Confl. Peds. (#/hr)	30	221	30				140
Parking (#/hr)							10
Turn Type	Perm	Perm	Prot	NA	Prot	NA	
Protected Phases			5		1	6	
Permitted Phases	4	4		2			
Actuated Green, G (s)	36.5	36.5	17.1	48.4		37.6	
Effective Green, g (s)	39.0	39.0	20.0	51.3		39.0	
Actuated g/C Ratio	0.35	0.35	0.18	0.47		0.35	
Clearance Time (s)	6.5	6.5	6.9	6.9		5.4	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	531	386	543	1435		1079	
v/s Ratio Prot			0.06			c0.25	
v/s Ratio Perm	0.04	c0.08		c0.19			
v/c Ratio	0.11	0.22	0.35	0.40		0.70	
Uniform Delay, d1	23.8	24.8	39.3	19.3		30.5	
Progression Factor	1.00	1.00	0.88	0.69		1.00	
Incremental Delay, d2	0.1	0.3	0.4	0.8		3.8	
Delay (s)	23.9	25.1	35.0	14.1		34.2	
Level of Service	C	C	D	B		C	
Approach Delay (s)	24.9			19.3		34.2	
Approach LOS	C			B		C	

Intersection Summary			
HCM 2000 Control Delay	26.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	77.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: The Embarcadero & Washington

5/28/2015

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	138	99	141	549	12	799	63
Ideal Flow (vphpl)	1900	1900	1400	1400	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.1	4.0	
Lane Util. Factor	1.00	1.00	0.97	0.91	1.00	0.91	
Frpb, ped/bikes	1.00	0.82	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	0.98	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1503	1126	2201	3260	1540	4316	
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	1503	1126	2201	3260	1540	4316	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	142	102	145	566	12	824	65
RTOR Reduction (vph)	0	60	0	0	0	8	0
Lane Group Flow (vph)	142	42	145	566	12	881	0
Confl. Peds. (#/hr)	30	218	161				161
Turn Type	Perm	Perm	Prot	NA	Prot	NA	
Protected Phases			5	2	1	6	
Permitted Phases	4	4					
Actuated Green, G (s)	41.3	41.3	17.6	39.0	6.5	30.0	
Effective Green, g (s)	45.0	45.0	21.0	42.4	10.5	32.0	
Actuated g/C Ratio	0.41	0.41	0.19	0.39	0.10	0.29	
Clearance Time (s)	7.7	7.7	7.4	7.4	8.1	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	614	460	420	1256	147	1255	
v/s Ratio Prot			0.07	c0.17	0.01	c0.20	
v/s Ratio Perm	c0.09	0.04					
v/c Ratio	0.23	0.09	0.35	0.45	0.08	0.70	
Uniform Delay, d1	21.2	19.9	38.5	25.1	45.4	34.8	
Progression Factor	1.00	1.00	1.19	1.23	0.54	0.87	
Incremental Delay, d2	0.2	0.1	0.5	1.1	0.8	2.6	
Delay (s)	21.4	20.0	46.5	31.9	25.3	32.7	
Level of Service	C	C	D	C	C	C	
Approach Delay (s)	20.8			34.9		32.6	
Approach LOS	C			C		C	

Intersection Summary			
HCM 2000 Control Delay	31.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.8
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

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HCM Signalized Intersection Capacity Analysis
3: The Embarcadero & Mission
5/28/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	130	101	0	601	818	64
Ideal Flow (vphpl)	1900	1900	1600	1600	1600	1600
Total Lost time (s)	4.0	6.4		4.0	4.0	
Lane Util. Factor	1.00	1.00		0.91	*0.80	
Frpb, ped/bikes	1.00	0.80		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1540	1098		3726	3163	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	1540	1098		3726	3163	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	149	116	0	691	940	74
RTOR Reduction (vph)	0	23	0	0	7	0
Lane Group Flow (vph)	149	93	0	691	1007	0
Confl. Peds. (#/hr)	347	210	190			270
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	35.6	35.6		62.8	62.8	
Effective Green, g (s)	38.0	35.6		64.0	64.0	
Actuated g/C Ratio	0.35	0.32		0.58	0.58	
Clearance Time (s)	6.4	6.4		5.2	5.2	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	532	355		2167	1840	
v/s Ratio Prot	c0.10			0.19	c0.32	
v/s Ratio Perm		0.08				
v/c Ratio	0.28	0.26		0.32	0.55	
Uniform Delay, d1	26.1	27.5		11.8	14.1	
Progression Factor	1.00	1.00		1.46	0.38	
Incremental Delay, d2	0.3	0.4		0.4	1.0	
Delay (s)	26.4	27.9		17.6	6.3	
Level of Service	C	C		B	A	
Approach Delay (s)	27.0			17.6	6.3	
Approach LOS	C			B	A	

Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: The Embarcadero & Howard
5/28/2015

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	67	49	199	530	4	745	171
Ideal Flow (vphpl)	1900	1900	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	7.1	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.91	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.90	1.00	1.00	1.00	1.00	0.86
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	1245	1459	4191	1459	2917	1116
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1540	1245	1459	4191	1459	2917	1116
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	76	56	226	602	5	847	194
RTOR Reduction (vph)	0	34	0	0	0	0	125
Lane Group Flow (vph)	76	22	226	602	5	847	69
Confl. Peds. (#/hr)	160	112	146				146
Turn Type	Prot	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	4		5	2	1	6	
Permitted Phases		4					6
Actuated Green, G (s)	42.9	42.9	10.1	39.8	7.0	37.6	37.6
Effective Green, g (s)	46.0	42.9	13.0	42.7	9.3	39.0	39.0
Actuated g/C Ratio	0.42	0.39	0.12	0.39	0.08	0.35	0.35
Clearance Time (s)	7.1	7.1	6.9	6.9	6.3	5.4	5.4
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	644	485	172	1626	123	1034	395
v/s Ratio Prot	c0.05		c0.15	0.14	0.00	c0.29	
v/s Ratio Perm		0.02					0.06
v/c Ratio	0.12	0.05	1.31	0.37	0.04	0.82	0.17
Uniform Delay, d1	19.6	20.8	48.5	24.0	46.3	32.3	24.4
Progression Factor	1.00	1.00	0.72	0.76	1.59	0.69	1.24
Incremental Delay, d2	0.1	0.0	175.5	0.6	0.5	6.3	0.8
Delay (s)	19.7	20.9	210.6	18.9	74.2	28.7	31.2
Level of Service	B	C	F	B	E	C	C
Approach Delay (s)	20.2			71.2		29.4	
Approach LOS	C			E		C	

Intersection Summary			
HCM 2000 Control Delay	46.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	87.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

Movement	EBL	EBR	NBU	NBL	NBT	SBT	SBR
Lane Configurations							
Volume (vph)	172	97	23	176	556	778	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1600	1600
Lane Width	12	12	11	12	12	12	12
Total Lost time (s)	3.7	3.7		3.4	2.3	2.3	
Lane Util. Factor	0.97	1.00		1.00	0.95	0.95	
Frpb, ped/bikes	1.00	0.75		1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	
Frt	1.00	0.85		1.00	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00	1.00	
Satd. Flow (prot)	3090	904		1593	2946	2644	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	
Satd. Flow (perm)	3090	904		1593	2946	2644	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	181	102	24	185	585	819	17
RTOR Reduction (vph)	0	14	0	0	0	1	0
Lane Group Flow (vph)	181	88	0	209	585	835	0
Confl. Peds. (#/hr)	134	316		100			323
Confl. Bikes (#/hr)							48
Parking (#/hr)		10			10		
Turn Type	Prot	Perm	Prot	Prot	NA	NA	
Protected Phases	4		5	5	2	6	
Permitted Phases		4					
Actuated Green, G (s)	42.3	42.3		12.6	55.7	36.7	
Effective Green, g (s)	45.3	45.3		15.6	58.7	39.7	
Actuated g/C Ratio	0.41	0.41		0.14	0.53	0.36	
Clearance Time (s)	6.7	6.7		6.4	5.3	5.3	
Lane Grp Cap (vph)	1272	372		225	1572	954	
v/s Ratio Prot	0.06			c0.13	0.20	c0.32	
v/s Ratio Perm		c0.10					
v/c Ratio	0.14	0.24		0.93	0.37	0.87	
Uniform Delay, d1	20.2	21.1		46.7	14.9	32.8	
Progression Factor	1.00	1.00		1.60	0.20	0.09	
Incremental Delay, d2	0.2	1.5		42.3	0.6	7.1	
Delay (s)	20.4	22.6		116.8	3.6	9.9	
Level of Service	C	C		F	A	A	
Approach Delay (s)	21.2				33.4	9.9	
Approach LOS	C				C	A	

Intersection Summary			
HCM 2000 Control Delay	21.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	10.4
Intersection Capacity Utilization	86.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	99	126	0	656	674	224
Ideal Flow (vphpl)	1900	1900	1900	1900	1600	1600
Total Lost time (s)	6.8	6.8		5.4	5.4	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.88		1.00	0.96	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.96	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1540	1210		3079	2385	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	1540	1210		3079	2385	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	102	130	0	676	695	231
RTOR Reduction (vph)	0	36	0	0	30	0
Lane Group Flow (vph)	102	94	0	676	896	0
Confl. Peds. (#/hr)	173	140	80			220
Confl. Bikes (#/hr)						117
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	41.2	41.2		56.6	56.6	
Effective Green, g (s)	41.2	41.2		56.6	56.6	
Actuated g/C Ratio	0.37	0.37		0.51	0.51	
Clearance Time (s)	6.8	6.8		5.4	5.4	
Lane Grp Cap (vph)	576	453		1584	1227	
v/s Ratio Prot	0.07			0.22	c0.38	
v/s Ratio Perm		c0.08				
v/c Ratio	0.18	0.21		0.43	0.73	
Uniform Delay, d1	23.0	23.3		16.6	20.8	
Progression Factor	1.00	1.00		1.75	0.84	
Incremental Delay, d2	0.7	1.0		0.7	2.2	
Delay (s)	23.7	24.4		29.8	19.6	
Level of Service	C	C		C	B	
Approach Delay (s)	24.1			29.8	19.6	
Approach LOS	C			C	B	

Intersection Summary			
HCM 2000 Control Delay	23.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↰	↱			✣			↰	↑↱		↰	↑↑
Volume (vph)	59	0	129	0	0	0	73	187	598	0	0	725
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1600	1600
Total Lost time (s)	6.9	6.9						6.5	6.5			5.2
Lane Util. Factor	1.00	1.00						1.00	0.95			0.95
Frpb, ped/bikes	1.00	0.90						1.00	1.00			1.00
Flpb, ped/bikes	0.78	1.00						0.97	1.00			1.00
Frt	1.00	0.85						1.00	1.00			1.00
Flt Protected	0.95	1.00						0.95	1.00			1.00
Satd. Flow (prot)	1200	1238						1497	3079			2593
Flt Permitted	0.76	1.00						0.36	1.00			1.00
Satd. Flow (perm)	956	1238						567	3079			2593
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	63	0	137	0	0	0	78	199	636	0	0	771
RTOR Reduction (vph)	0	90	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	63	47	0	0	0	0	0	277	636	0	0	771
Confl. Peds. (#/hr)	255		104	104		255		80		1863	1690	
Confl. Bikes (#/hr)			2							52		
Turn Type	Perm	NA					custom	Prot	NA		Prot	NA
Protected Phases		4			8			5	2		1	6
Permitted Phases	4			8			5					
Actuated Green, G (s)	38.1	38.1						16.5	41.5			36.8
Effective Green, g (s)	38.1	38.1						16.5	41.5			36.8
Actuated g/C Ratio	0.35	0.35						0.15	0.38			0.33
Clearance Time (s)	6.9	6.9						6.5	6.5			5.2
Lane Grp Cap (vph)	331	428						85	1161			867
v/s Ratio Prot		0.04							0.21			c0.30
v/s Ratio Perm	c0.07							c0.49				
v/c Ratio	0.19	0.11						3.26	0.55			0.89
Uniform Delay, d1	25.2	24.4						46.8	26.9			34.7
Progression Factor	1.00	1.00						0.57	0.59			0.81
Incremental Delay, d2	1.3	0.5						1042.3	1.6			10.5
Delay (s)	26.4	25.0						1068.7	17.5			38.7
Level of Service	C	C						F	B			D
Approach Delay (s)		25.4			0.0				336.4			37.0
Approach LOS		C			A				F			D

Intersection Summary			
HCM 2000 Control Delay	175.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.3
Intersection Capacity Utilization	93.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBR
Lane Configurations	↱
Volume (vph)	75
Ideal Flow (vphpl)	1600
Total Lost time (s)	5.2
Lane Util. Factor	1.00
Frpb, ped/bikes	0.79
Flpb, ped/bikes	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	921
Flt Permitted	1.00
Satd. Flow (perm)	921
Peak-hour factor, PHF	0.94
Adj. Flow (vph)	80
RTOR Reduction (vph)	53
Lane Group Flow (vph)	27
Confl. Peds. (#/hr)	157
Confl. Bikes (#/hr)	80
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Actuated Green, G (s)	36.8
Effective Green, g (s)	36.8
Actuated g/C Ratio	0.33
Clearance Time (s)	5.2
Lane Grp Cap (vph)	308
v/s Ratio Prot	
v/s Ratio Perm	0.03
v/c Ratio	0.09
Uniform Delay, d1	25.1
Progression Factor	0.80
Incremental Delay, d2	0.4
Delay (s)	20.6
Level of Service	C
Approach Delay (s)	
Approach LOS	

Intersection Summary

DRAFT - SUBJECT TO REVIEW

HCM Unsignalized Intersection Capacity Analysis
8: SWL 330 Lot & Bryant St

5/28/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	344	0	0	220	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	447	0	0	286	0	0
Pedestrians	30			30	30	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	2			2	2	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	183			131		
pX, platoon unblocked					0.98	
vC, conflicting volume			477		792	283
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			477		779	283
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1057		312	681

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	298	149	286	0
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	1057	1700
Volume to Capacity	0.18	0.09	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS				A
Approach Delay (s)	0.0		0.0	0.0
Approach LOS				A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	29.2%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
9: The Embarcadero & Brannan St.

5/28/2015

Movement	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Lane Configurations								
Volume (vph)	48	30	5	147	625	98	713	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.9	6.9		6.6	5.2	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	0.95	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.76		1.00	1.00	1.00	1.00	0.67
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85		1.00	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	1045		1540	3079	1540	3079	927
Flt Permitted	0.95	1.00		0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1540	1045		1540	3079	1540	3079	927
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	53	33	5	162	687	108	784	126
RTOR Reduction (vph)	0	22	0	0	0	0	0	58
Lane Group Flow (vph)	53	11	0	167	687	108	784	68
Confl. Peds. (#/hr)	76	270		30				163
Confl. Bikes (#/hr)								92
Turn Type	Prot	Perm	Prot	Prot	NA	Prot	NA	Perm
Protected Phases	4		5	5	2	1	6	
Permitted Phases		4						6
Actuated Green, G (s)	38.1	38.1		11.4	43.8	10.0	41.0	41.0
Effective Green, g (s)	38.1	38.1		11.4	43.8	10.0	41.0	41.0
Actuated g/C Ratio	0.35	0.35		0.10	0.40	0.09	0.37	0.37
Clearance Time (s)	6.9	6.9		6.6	5.2	6.0	6.0	6.0
Lane Grp Cap (vph)	533	361		159	1226	140	1147	345
v/s Ratio Prot	c0.03			c0.11	0.22	0.07	c0.25	
v/s Ratio Perm		0.01						0.07
v/c Ratio	0.10	0.03		1.05	0.56	0.77	0.68	0.20
Uniform Delay, d1	24.3	23.8		49.3	25.6	48.9	29.0	23.4
Progression Factor	1.00	1.00		0.44	0.70	0.71	0.50	0.38
Incremental Delay, d2	0.4	0.2		75.2	1.4	11.9	1.0	0.4
Delay (s)	24.7	23.9		97.0	19.3	46.7	15.6	9.3
Level of Service	C	C		F	B	D	B	A
Approach Delay (s)	24.4				34.5		18.1	
Approach LOS	C				C		B	

Intersection Summary			
HCM 2000 Control Delay	25.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	26	2	45	1	6	2	16	54	749	10	3	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1600
Total Lost time (s)		7.0			7.0			7.0	7.0			5.8
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frpb, ped/bikes		0.79			0.93			1.00	0.99			1.00
Flpb, ped/bikes		0.89			0.97			1.00	1.00			0.90
Frt		0.92			0.97			1.00	1.00			1.00
Flt Protected		0.98			1.00			0.95	1.00			0.95
Satd. Flow (prot)		1023			1421			1540	3049			1162
Flt Permitted		0.91			0.99			0.95	1.00			0.43
Satd. Flow (perm)		949			1409			1540	3049			532
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	2	49	1	7	2	17	59	814	11	3	1
RTOR Reduction (vph)	0	32	0	0	1	0	0	0	1	0	0	0
Lane Group Flow (vph)	0	47	0	0	9	0	0	76	824	0	0	4
Confl. Peds. (#/hr)	480		480	480		480		60		610		210
Confl. Bikes (#/hr)			30			30				30		
Turn Type	Perm	NA		Perm	NA		Prot	Prot	NA		custom	Prot
Protected Phases		4			8		5	5	2			1
Permitted Phases	4			8							1	
Actuated Green, G (s)		38.0			38.0			15.0	43.0			9.2
Effective Green, g (s)		38.0			38.0			15.0	43.0			9.2
Actuated g/C Ratio		0.35			0.35			0.14	0.39			0.08
Clearance Time (s)		7.0			7.0			7.0	7.0			5.8
Lane Grp Cap (vph)		327			486			210	1191			44
v/s Ratio Prot								0.05	c0.27			
v/s Ratio Perm		c0.05			0.01							0.01
v/c Ratio		0.14			0.02			0.36	0.69			0.09
Uniform Delay, d1		24.8			23.7			43.2	28.0			46.5
Progression Factor		1.00			1.00			0.79	0.74			1.56
Incremental Delay, d2		0.9			0.1			3.6	2.5			3.0
Delay (s)		25.7			23.8			37.7	23.1			75.4
Level of Service		C			C			D	C			E
Approach Delay (s)		25.7			23.8				24.4			
Approach LOS		C			C				C			

Intersection Summary			
HCM 2000 Control Delay	23.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.8
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBT	SBR
Lane Configurations		
Volume (vph)	685	59
Ideal Flow (vphpl)	1600	1600
Total Lost time (s)	5.4	
Lane Util. Factor	0.95	
Frpb, ped/bikes	0.97	
Flpb, ped/bikes	1.00	
Frt	0.99	
Flt Protected	1.00	
Satd. Flow (prot)	2494	
Flt Permitted	1.00	
Satd. Flow (perm)	2494	
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	745	64
RTOR Reduction (vph)	6	0
Lane Group Flow (vph)	803	0
Confl. Peds. (#/hr)		460
Confl. Bikes (#/hr)		30
Turn Type	NA	
Protected Phases	6	
Permitted Phases		
Actuated Green, G (s)	37.6	
Effective Green, g (s)	37.6	
Actuated g/C Ratio	0.34	
Clearance Time (s)	5.4	
Lane Grp Cap (vph)	852	
v/s Ratio Prot	c0.32	
v/s Ratio Perm		
v/c Ratio	0.94	
Uniform Delay, d1	35.2	
Progression Factor	0.16	
Incremental Delay, d2	16.1	
Delay (s)	21.5	
Level of Service	C	
Approach Delay (s)	21.8	
Approach LOS	C	

Intersection Summary

DRAFT - SUBJECT TO REVIEW

HCM Signalized Intersection Capacity Analysis
11: King St. & Second St.
5/28/2015

Movement	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations							
Volume (vph)	123	804	4	687	56	15	209
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1900	1900
Total Lost time (s)	6.6	5.2	6.6	6.6		6.8	6.8
Lane Util. Factor	1.00	0.95	1.00	0.95		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.98		1.00	0.66
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	1540	3079	1540	2500		1540	908
Flt Permitted	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	1540	3079	1540	2500		1540	908
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	132	865	4	739	60	16	225
RTOR Reduction (vph)	0	0	0	5	0	0	78
Lane Group Flow (vph)	132	865	4	794	0	16	147
Confl. Peds. (#/hr)	60				460	460	500
Confl. Bikes (#/hr)					10		30
Parking (#/hr)					10		
Turn Type	Prot	NA	Prot	NA		Prot	Perm
Protected Phases	5	2	1	6		4	
Permitted Phases							4
Actuated Green, G (s)	15.4	44.8	8.4	36.4		38.2	38.2
Effective Green, g (s)	15.4	44.8	8.4	36.4		38.2	38.2
Actuated g/C Ratio	0.14	0.41	0.08	0.33		0.35	0.35
Clearance Time (s)	6.6	5.2	6.6	6.6		6.8	6.8
Lane Grp Cap (vph)	215	1253	117	827		534	315
v/s Ratio Prot	0.09	c0.28	0.00	c0.32		0.01	
v/s Ratio Perm							c0.16
v/c Ratio	0.61	0.69	0.03	0.96		0.03	0.47
Uniform Delay, d1	44.5	26.9	47.0	36.1		23.7	28.0
Progression Factor	0.71	1.35	0.75	0.61		1.00	1.00
Incremental Delay, d2	10.4	2.6	0.2	13.2		0.1	4.9
Delay (s)	41.8	38.9	35.4	35.3		23.8	32.9
Level of Service	D	D	D	D		C	C
Approach Delay (s)		39.3		35.3		32.3	
Approach LOS		D		D		C	

Intersection Summary			
HCM 2000 Control Delay	36.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
12: Third St. & King St.
5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	634	781	58	149	668	80	43	454	155	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Lane Util. Factor	0.94	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.98		1.00	0.96			1.00	0.67			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.97	1.00			
Frt	1.00	0.99		1.00	0.98			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4342	2979		2515	2459			5397	924			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4342	2979		2515	2459			5397	924			
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	704	868	64	166	742	89	48	504	172	0	0	0
RTOR Reduction (vph)	0	3	0	0	2	0	0	0	142	0	0	0
Lane Group Flow (vph)	704	929	0	166	829	0	0	552	30	0	0	0
Confl. Peds. (#/hr)	60		460	60		460	460		460	60		60
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.2	56.2		14.1	53.6			19.3	19.3			
Effective Green, g (s)	18.2	56.2		14.1	53.6			19.3	19.3			
Actuated g/C Ratio	0.17	0.51		0.13	0.49			0.18	0.18			
Clearance Time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	718	1521		322	1198			946	162			
v/s Ratio Prot	c0.16	0.31		0.07	c0.34							
v/s Ratio Perm								0.10	0.03			
v/c Ratio	0.98	0.61		0.52	0.69			0.58	0.19			
Uniform Delay, d1	45.7	19.1		44.8	21.8			41.7	38.7			
Progression Factor	0.75	0.92		1.38	0.77			1.00	1.00			
Incremental Delay, d2	18.0	0.8		0.7	0.9			0.9	0.6			
Delay (s)	52.2	18.5		62.7	17.6			42.6	39.2			
Level of Service	D	B		E	B			D	D			
Approach Delay (s)		33.0			25.1			41.8			0.0	
Approach LOS		C			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	32.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	92.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

DRAFT - SUBJECT TO REVIEW

HCM Signalized Intersection Capacity Analysis
13: Fourth St. & King St.

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	152	1388	79	56	606	49	7	47	25	60	208	97
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.98		1.00	0.95			1.00	0.63	1.00	0.98	0.46
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.95	1.00	0.66	1.00	1.00
Frt	1.00	0.99		1.00	0.99			1.00	0.85	1.00	0.99	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	4296		1296	2442			1534	846	1019	2862	571
Flt Permitted	0.95	1.00		0.95	1.00			0.96	1.00	0.72	1.00	1.00
Satd. Flow (perm)	1540	4296		1296	2442			1481	846	772	2862	571
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	162	1477	84	60	645	52	7	50	27	64	221	103
RTOR Reduction (vph)	0	5	0	0	5	0	0	0	18	0	3	60
Lane Group Flow (vph)	162	1556	0	60	692	0	0	57	9	64	228	33
Confl. Peds. (#/hr)	50		811	50		745	1698		728	728		1698
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.4	40.0		11.9	35.9			38.2	38.2	39.2	39.2	39.2
Effective Green, g (s)	14.4	40.0		11.9	35.9			38.2	38.2	39.2	39.2	39.2
Actuated g/C Ratio	0.13	0.36		0.11	0.33			0.35	0.35	0.36	0.36	0.36
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	201	1562		140	796			514	293	275	1019	203
v/s Ratio Prot	0.11	c0.36		0.05	c0.28						0.08	
v/s Ratio Perm								0.04	0.01	c0.08		0.06
v/c Ratio	0.81	1.00		0.43	0.87			0.11	0.03	0.23	0.22	0.16
Uniform Delay, d1	46.4	34.9		45.9	34.8			24.4	23.7	24.8	24.8	24.2
Progression Factor	0.65	0.76		0.75	0.65			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.2	6.0		1.6	7.6			0.1	0.0	0.4	0.1	0.4
Delay (s)	32.5	32.7		36.1	30.1			24.5	23.7	25.3	24.9	24.6
Level of Service	C	C		D	C			C	C	C	C	C
Approach Delay (s)		32.7			30.5			24.2			24.9	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	30.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	112.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
14: Fifth St. & I-280 Ramps/King St.

5/28/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1564	80	0	710	30	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.96
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3049			3079	1540	1321
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3049			3079	1540	1321
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	1719	88	0	780	33	60
RTOR Reduction (vph)	3	0	0	0	0	8
Lane Group Flow (vph)	1804	0	0	780	33	52
Confl. Peds. (#/hr)		67	67		31	33
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	1721			1738	512	439
v/s Ratio Prot	c0.59			0.25	0.02	
v/s Ratio Perm						c0.04
v/c Ratio	1.05			0.45	0.06	0.12
Uniform Delay, d1	23.9			14.0	25.0	25.5
Progression Factor	1.00			0.55	1.00	1.00
Incremental Delay, d2	35.5			0.5	0.2	0.6
Delay (s)	59.4			8.3	25.3	26.0
Level of Service	E			A	C	C
Approach Delay (s)	59.4			8.3	25.8	
Approach LOS	E			A	C	

Intersection Summary			
HCM 2000 Control Delay	43.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	91.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

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HCM Signalized Intersection Capacity Analysis
15: Main St & Harrison St

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	175	65	10	315	69	83	362	20	3	27	71
Ideal Flow (vphpl)	1900	1900	1900	1100	1100	1100	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0			4.0	4.0
Lane Util. Factor		1.00			*0.40		1.00	1.00			1.00	1.00
Frpb, ped/bikes		0.94			0.95		1.00	0.99			1.00	0.73
Flpb, ped/bikes		1.00			1.00		0.75	1.00			0.99	1.00
Frt		0.97			0.97		1.00	0.99			1.00	0.85
Flt Protected		0.99			1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)		1620			1157		1288	1769			1780	955
Flt Permitted		0.86			0.93		0.74	1.00			0.97	1.00
Satd. Flow (perm)		1395			1080		997	1769			1742	955
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	31	194	72	11	350	77	92	402	22	3	30	79
RTOR Reduction (vph)	0	19	0	0	16	0	0	3	0	0	0	45
Lane Group Flow (vph)	0	278	0	0	422	0	92	421	0	0	33	34
Confl. Peds. (#/hr)	30		130	130		130	230		160	160		230
Parking (#/hr)			10			10			10			10
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		26.0			26.0		26.0	26.0			26.0	26.0
Effective Green, g (s)		26.0			26.0		26.0	26.0			26.0	26.0
Actuated g/C Ratio		0.43			0.43		0.43	0.43			0.43	0.43
Clearance Time (s)		4.0			4.0		4.0	4.0			4.0	4.0
Lane Grp Cap (vph)		604			468		432	766			754	413
v/s Ratio Prot								c0.24				
v/s Ratio Perm		0.20			c0.39		0.09				0.02	0.04
v/c Ratio		0.46			0.90		0.21	0.55			0.04	0.08
Uniform Delay, d1		12.0			15.8		10.6	12.6			9.8	10.0
Progression Factor		1.17			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		2.3			23.2		1.1	2.8			0.1	0.4
Delay (s)		16.4			39.0		11.7	15.5			9.9	10.4
Level of Service		B			D		B	B			A	B
Approach Delay (s)		16.4			39.0			14.8			10.3	
Approach LOS		B			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
16: Bryant St & Main St

5/28/2015

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	198	144	138	121	40	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.91	1.00	0.82
Flpb, ped/bikes	0.98	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1502	1378	1621	1247	1540	959
Flt Permitted	0.66	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1037	1378	1621	1247	1540	959
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	228	166	159	139	46	89
RTOR Reduction (vph)	0	0	0	40	0	76
Lane Group Flow (vph)	228	166	159	99	46	13
Confl. Peds. (#/hr)	30			82	130	91
Parking (#/hr)		10				10
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		6	2		8	
Permitted Phases	6			2		8
Actuated Green, G (s)	46.4	46.4	46.4	46.4	9.6	9.6
Effective Green, g (s)	46.4	46.4	46.4	46.4	9.6	9.6
Actuated g/C Ratio	0.71	0.71	0.71	0.71	0.15	0.15
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	740	983	1157	890	227	141
v/s Ratio Prot		0.12	0.10		c0.03	
v/s Ratio Perm	c0.22			0.08		0.01
v/c Ratio	0.31	0.17	0.14	0.11	0.20	0.09
Uniform Delay, d1	3.4	3.0	3.0	2.9	24.3	23.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	0.4	0.2	0.3	0.4	0.3
Delay (s)	4.5	3.4	3.2	3.1	24.8	24.2
Level of Service	A	A	A	A	C	C
Approach Delay (s)		4.0	3.2		24.4	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	7.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

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HCM Signalized Intersection Capacity Analysis
17: Beale St & Mission St

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	352	95	19	159	0	0	0	0	10	162	34
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1200	1200	1200
Total Lost time (s)		5.0		5.0	5.0					5.0	5.0	
Lane Util. Factor		0.95		1.00	1.00					1.00	0.91	
Frpb, ped/bikes		0.99		1.00	1.00					1.00	0.99	
Flpb, ped/bikes		1.00		0.98	1.00					0.95	1.00	
Frt		0.97		1.00	1.00					1.00	0.97	
Flt Protected		1.00		0.95	1.00					0.95	1.00	
Satd. Flow (prot)		2954		1276	1365					926	2691	
Flt Permitted		1.00		0.46	1.00					0.95	1.00	
Satd. Flow (perm)		2954		618	1365					926	2691	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	387	104	21	175	0	0	0	0	11	178	37
RTOR Reduction (vph)	0	41	0	0	0	0	0	0	0	0	22	0
Lane Group Flow (vph)	0	450	0	21	175	0	0	0	0	11	193	0
Confl. Peds. (#/hr)	30		30	30		30	30		30	30		30
Parking (#/hr)			10									10
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		2			6						4	
Permitted Phases				6						4		
Actuated Green, G (s)		26.0		26.0	26.0					24.0	24.0	
Effective Green, g (s)		26.0		26.0	26.0					24.0	24.0	
Actuated g/C Ratio		0.43		0.43	0.43					0.40	0.40	
Clearance Time (s)		5.0		5.0	5.0					5.0	5.0	
Lane Grp Cap (vph)		1280		267	591					370	1076	
v/s Ratio Prot		c0.15			0.13						c0.07	
v/s Ratio Perm				0.03						0.01		
v/c Ratio		0.35		0.08	0.30					0.03	0.18	
Uniform Delay, d1		11.4		10.0	11.1					10.9	11.6	
Progression Factor		1.00		1.00	1.00					1.00	1.00	
Incremental Delay, d2		0.8		0.6	1.3					0.1	0.4	
Delay (s)		12.1		10.5	12.3					11.1	12.0	
Level of Service		B		B	B					B	B	
Approach Delay (s)		12.1			12.1			0.0			12.0	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	45.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
18: Delancey St. & Beale St. & Bryant St.

5/28/2015

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	51	189	10	14	50	14	76	80	19	27	16	54
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		5.0					5.0				5.0	
Lane Util. Factor		1.00					1.00				1.00	
Frpb, ped/bikes		0.95					0.94				0.96	
Flpb, ped/bikes		0.98					0.92				0.84	
Frt		0.99					0.95				0.94	
Flt Protected		0.99					0.99				0.98	
Satd. Flow (prot)		1406					1063				962	
Flt Permitted		0.88					0.75				0.84	
Satd. Flow (perm)		1249					813				825	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	60	222	12	16	59	16	89	94	22	32	19	64
RTOR Reduction (vph)	0	0	0	0	0	0	27	0	0	0	39	0
Lane Group Flow (vph)	0	310	0	0	0	0	231	0	0	0	98	0
Confl. Peds. (#/hr)	81		116	230	116	230		81	230	230		96
Confl. Bikes (#/hr)			3	3								11
Parking (#/hr)					10	10	10	10	10	10	10	10
Turn Type	Perm	NA			Perm	Perm	NA		Perm	Perm	NA	
Protected Phases		2					6				8	
Permitted Phases	2				6	6			8	8		
Actuated Green, G (s)		21.0					21.0				29.0	
Effective Green, g (s)		21.0					21.0				29.0	
Actuated g/C Ratio		0.28					0.28				0.39	
Clearance Time (s)		5.0					5.0				5.0	
Vehicle Extension (s)		3.0					3.0				3.0	
Lane Grp Cap (vph)		349					227				319	
v/s Ratio Prot												
v/s Ratio Perm		0.25					c0.28				0.12	
v/c Ratio		0.89					1.02				0.31	
Uniform Delay, d1		25.9					27.0				16.0	
Progression Factor		1.00					1.00				1.00	
Incremental Delay, d2		26.8					63.9				0.5	
Delay (s)		52.6					90.9				16.6	
Level of Service		D					F				B	
Approach Delay (s)		52.6					90.9				16.6	
Approach LOS		D					F				B	

Intersection Summary			
HCM 2000 Control Delay	50.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

HCM Signalized Intersection Capacity Analysis
18: Delancey St. & Beale St. & Bryant St.

5/28/2015

Movement	SBL	SBT	SBR	SBR2	NEL2	NEL	NER	NER2
Lane Configurations								
Volume (vph)	88	31	11	103	35	91	13	7
Ideal Flow (vphpl)	1800	1800	1800	1800	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0		3.5	3.5	
Lane Util. Factor		0.95		0.95		1.00	1.00	
Frpb, ped/bikes		0.92		0.68		1.00	0.55	
Flpb, ped/bikes		0.99		1.00		0.70	1.00	
Frt		0.98		0.85		1.00	0.85	
Flt Protected		0.97		1.00		0.95	1.00	
Satd. Flow (prot)		1254		844		1072	763	
Flt Permitted		0.75		1.00		0.95	1.00	
Satd. Flow (perm)		969		844		1072	763	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	104	36	13	121	41	107	15	8
RTOR Reduction (vph)	0	4	0	67	0	0	19	0
Lane Group Flow (vph)	0	161	0	42	0	148	4	0
Confl. Peds. (#/hr)	30		230	230		81		116
Confl. Bikes (#/hr)			12	12				
Parking (#/hr)								
Turn Type	Perm	NA		Perm	Perm	Prot	Perm	
Protected Phases		4				5		
Permitted Phases	4			4	5		5	
Actuated Green, G (s)		29.0		29.0		11.5	11.5	
Effective Green, g (s)		29.0		29.0		11.5	11.5	
Actuated g/C Ratio		0.39		0.39		0.15	0.15	
Clearance Time (s)		5.0		5.0		3.5	3.5	
Vehicle Extension (s)		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		374		326		164	116	
v/s Ratio Prot								
v/s Ratio Perm		c0.17		0.05		0.14	0.00	
v/c Ratio		0.43		0.13		0.90	0.03	
Uniform Delay, d1		16.9		14.8		31.2	27.0	
Progression Factor		1.00		1.00		1.00	1.00	
Incremental Delay, d2		0.8		0.2		43.1	0.1	
Delay (s)		17.7		15.0		74.3	27.1	
Level of Service		B		B		E	C	
Approach Delay (s)		16.7				67.9		
Approach LOS		B				E		

Intersection Summary

HCM Signalized Intersection Capacity Analysis
19: Fremont St. & Harrison St./I-80 WB Off-Ramp

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	133	91	0	0	434	35	128	138	173	4	0	63
Ideal Flow (vphpl)	1800	1800	1800	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0			5.0	
Lane Util. Factor		1.00			*0.80	1.00	1.00	0.95			1.00	
Frpb, ped/bikes		1.00			1.00	0.94	1.00	0.96			0.97	
Flpb, ped/bikes		0.99			1.00	1.00	0.98	1.00			1.00	
Frt		1.00			1.00	0.85	1.00	0.92			0.87	
Flt Protected		0.97			1.00	1.00	0.95	1.00			1.00	
Satd. Flow (prot)		1250			2047	682	1426	2569			1288	
Flt Permitted		0.55			1.00	1.00	0.71	1.00			0.98	
Satd. Flow (perm)		708			2047	682	1067	2569			1268	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	141	97	0	0	462	37	136	147	184	4	0	67
RTOR Reduction (vph)	0	0	0	0	0	0	0	110	0	0	0	0
Lane Group Flow (vph)	0	238	0	0	462	37	136	221	0	0	71	0
Confl. Peds. (#/hr)	62		30	30		62	30		38	38		30
Confl. Bikes (#/hr)						10						
Parking (#/hr)	10	10										
Turn Type	Perm	NA			NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2					6	8			4		
Actuated Green, G (s)		26.0			26.0	26.0	24.0	24.0			24.0	
Effective Green, g (s)		26.0			26.0	26.0	24.0	24.0			24.0	
Actuated g/C Ratio		0.43			0.43	0.43	0.40	0.40			0.40	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0			5.0	
Lane Grp Cap (vph)		306			887	295	426	1027			507	
v/s Ratio Prot					0.23			0.09				
v/s Ratio Perm		c0.34				0.05	c0.13				0.06	
v/c Ratio		0.78			0.52	0.13	0.32	0.21			0.14	
Uniform Delay, d1		14.5			12.4	10.2	12.4	11.8			11.4	
Progression Factor		0.97			1.00	0.86	1.00	1.00			1.00	
Incremental Delay, d2		17.3			1.6	0.6	2.0	0.5			0.6	
Delay (s)		31.4			14.0	9.4	14.3	12.3			12.0	
Level of Service		C			B	A	B	B			B	
Approach Delay (s)		31.4			13.7			12.9			12.0	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

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HCM Signalized Intersection Capacity Analysis
20: Fremont St. & Folsom St. & I-80 WB Off-Ramp

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR2	NBL	NBT	NBR	SEL	SER	SER2
Lane Configurations												
Volume (vph)	100	288	13	2	13	112	3	210	93	198	52	3
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	3.0			2.0			2.0		6.0		
Lane Util. Factor	1.00	0.95			1.00			1.00		0.97		
Frpb, ped/bikes	1.00	0.99			0.82			0.98		0.98		
Flpb, ped/bikes	1.00	1.00			1.00			1.00		1.00		
Frt	1.00	0.99			0.88			0.96		0.97		
Flt Protected	0.95	1.00			1.00			1.00		0.96		
Satd. Flow (prot)	1459	2661			1102			1438		2706		
Flt Permitted	0.95	1.00			1.00			1.00		0.96		
Satd. Flow (perm)	1459	2661			1097			1438		2706		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	112	324	15	2	15	126	3	236	104	222	58	3
RTOR Reduction (vph)	0	4	0	0	114	0	0	17	0	114	0	0
Lane Group Flow (vph)	112	335	0	0	29	0	0	326	0	169	0	0
Confl. Peds. (#/hr)	184		182	182		184			55			45
Confl. Bikes (#/hr)			30									
Parking (#/hr)		10	10									
Turn Type	Prot	NA		Perm	NA		Perm	NA		Prot		
Protected Phases	5	2			6			8		4		
Permitted Phases				6			8					
Actuated Green, G (s)	6.0	24.0			14.0			20.0		19.0		
Effective Green, g (s)	8.0	27.0			16.0			23.0		19.0		
Actuated g/C Ratio	0.10	0.34			0.20			0.29		0.24		
Clearance Time (s)	6.0	6.0			4.0			5.0		6.0		
Vehicle Extension (s)	3.0	3.0			3.0			3.0		3.0		
Lane Grp Cap (vph)	145	898			219			413		642		
v/s Ratio Prot	c0.08	c0.13								c0.06		
v/s Ratio Perm					0.03			0.23				
v/c Ratio	0.77	0.37			0.13			0.79		0.26		
Uniform Delay, d1	35.1	20.1			26.3			26.3		24.8		
Progression Factor	1.00	1.00			1.00			1.00		1.00		
Incremental Delay, d2	22.1	0.3			0.3			9.7		0.2		
Delay (s)	57.2	20.3			26.6			35.9		25.0		
Level of Service	E	C			C			D		C		
Approach Delay (s)		29.5			26.6			35.9		25.0		
Approach LOS		C			C			D		C		

Intersection Summary			
HCM 2000 Control Delay	29.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	96.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
21: Freeway & First St. & Harrison St.

5/28/2015

Movement	EBT	EBR2	WBL	WBT	NBR	SBL	SBT	SBR	SBR2
Lane Configurations									
Volume (vph)	106	14	275	350	45	73	0	941	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0		5.0	3.0	3.0		3.0	5.0	3.0
Lane Util. Factor	1.00		0.91	0.91	1.00		1.00	0.88	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	0.95	0.95
Flpb, ped/bikes	1.00		1.00	1.00	1.00		0.88	1.00	1.00
Frt	0.98		1.00	1.00	0.86		1.00	0.85	0.85
Flt Protected	1.00		0.95	0.99	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1595		1401	2703	1402		1362	2294	1313
Flt Permitted	1.00		0.62	0.90	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1595		909	2448	1402		1362	2294	1313
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	119	16	309	393	51	82	0	1057	257
RTOR Reduction (vph)	106	0	0	0	40	0	0	0	146
Lane Group Flow (vph)	29	0	219	483	11	0	82	1057	111
Confl. Peds. (#/hr)					100	100		30	47
Parking (#/hr)				10		10			
Turn Type	NA		pm+pt	NA	Over	Perm	NA	Perm	custom
Protected Phases	2		1	6	1		4		
Permitted Phases			6			4		4	6
Actuated Green, G (s)	8.0		24.0	24.0	11.0		26.0	26.0	24.0
Effective Green, g (s)	10.0		24.0	26.0	13.0		28.0	26.0	26.0
Actuated g/C Ratio	0.17		0.40	0.43	0.22		0.47	0.43	0.43
Clearance Time (s)	5.0		5.0	5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	265		453	1116	303		635	994	568
v/s Ratio Prot	0.02		0.09	c0.09	0.01				
v/s Ratio Perm			c0.10	0.09			0.06	c0.46	0.08
v/c Ratio	0.11		0.48	0.43	0.04		0.13	1.06	0.20
Uniform Delay, d1	21.2		14.7	11.9	18.6		9.1	17.0	10.5
Progression Factor	1.00		0.61	0.62	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.8		3.4	1.1	0.2		0.4	47.0	0.8
Delay (s)	22.1		12.3	8.4	18.8		9.5	64.0	11.3
Level of Service	C		B	A	B		A	E	B
Approach Delay (s)	22.1			9.6			51.1		
Approach LOS	C			A			D		

Intersection Summary			
HCM 2000 Control Delay	35.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

HCM Signalized Intersection Capacity Analysis
22: Fourth St. & Howard St.
5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	400	694	0	0	0	0	0	504	392
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)				2.5	2.5						2.0	2.0
Lane Util. Factor				0.81	0.81						0.81	0.81
Frpb, ped/bikes				1.00	1.00						0.90	0.66
Flpb, ped/bikes				1.00	1.00						1.00	1.00
Frt				1.00	1.00						0.96	0.85
Flt Protected				0.95	0.99						1.00	1.00
Satd. Flow (prot)				1181	4922						4287	695
Flt Permitted				0.95	0.99						1.00	1.00
Satd. Flow (perm)				1181	4922						4287	695
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	0	412	715	0	0	0	0	0	520	404
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	218	909	0	0	0	0	0	722	202
Confl. Peds. (#/hr)	30		30	225		429	525		687	687		525
Confl. Bikes (#/hr)			30			30			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	5	0
Turn Type				Split	NA						NA	Perm
Protected Phases				6	6						4	
Permitted Phases												4
Actuated Green, G (s)				30.0	30.0						28.0	28.0
Effective Green, g (s)				31.5	31.5						30.0	30.0
Actuated g/C Ratio				0.35	0.35						0.33	0.33
Clearance Time (s)				4.0	4.0						4.0	4.0
Lane Grp Cap (vph)				413	1722						1429	231
v/s Ratio Prot				0.18	c0.18						0.17	
v/s Ratio Perm												c0.29
v/c Ratio				0.53	0.53						0.51	0.87
Uniform Delay, d1				23.3	23.3						24.1	28.2
Progression Factor				1.00	1.00						1.00	1.00
Incremental Delay, d2				4.8	1.2						1.3	33.9
Delay (s)				28.1	24.5						25.3	62.1
Level of Service				C	C						C	E
Approach Delay (s)		0.0			25.2			0.0			33.4	
Approach LOS		A			C			A			C	

Intersection Summary			
HCM 2000 Control Delay	28.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	6.5
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
23: I-80 WB On-Ramp & Fourth St. & Harrison St.
5/28/2015

Movement	WBL2	WBL	WBT	SBT	SBR	SBR2
Lane Configurations						
Volume (vph)	71	508	361	217	551	104
Ideal Flow (vphpl)	1600	1600	1800	1600	1600	1600
Total Lost time (s)		5.4	2.4	5.7	2.7	2.7
Lane Util. Factor		0.81	0.81	0.91	0.91	1.00
Frpb, ped/bikes		1.00	1.00	0.99	0.98	0.95
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00
Frt		1.00	1.00	0.92	0.85	0.85
Flt Protected		0.95	0.98	1.00	1.00	1.00
Satd. Flow (prot)		1050	4842	2085	1039	1105
Flt Permitted		0.95	0.98	1.00	1.00	1.00
Satd. Flow (perm)		1050	4842	2085	1039	1105
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	74	529	376	226	574	108
RTOR Reduction (vph)	0	0	0	0	0	49
Lane Group Flow (vph)	0	301	678	513	287	59
Confl. Peds. (#/hr)						51
Confl. Bikes (#/hr)					10	10
Bus Blockages (#/hr)	0	0	5	0	0	0
Parking (#/hr)				10		
Turn Type	Perm	Perm	NA	NA	Perm	Perm
Protected Phases			6	4		
Permitted Phases	6	6			4	4
Actuated Green, G (s)		32.6	32.6	46.3	46.3	46.3
Effective Green, g (s)		32.6	35.6	46.3	49.3	49.3
Actuated g/C Ratio		0.36	0.40	0.51	0.55	0.55
Clearance Time (s)		5.4	5.4	5.7	5.7	5.7
Lane Grp Cap (vph)		380	1915	1072	569	605
v/s Ratio Prot				0.25		
v/s Ratio Perm		c0.29	0.14		c0.28	0.05
v/c Ratio		0.79	0.35	0.48	0.50	0.10
Uniform Delay, d1		25.7	19.1	14.1	12.7	9.7
Progression Factor		1.00	1.00	1.07	1.11	2.33
Incremental Delay, d2		15.5	0.5	1.3	2.8	0.3
Delay (s)		41.2	19.6	16.4	16.8	22.9
Level of Service		D	B	B	B	C
Approach Delay (s)			26.2	17.3		
Approach LOS			C	B		

Intersection Summary			
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.1
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

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HCM Signalized Intersection Capacity Analysis
24: Fourth St. & Bryant St. & I-80 EB Off-Ramp

5/28/2015

Movement	EBT	EBR	SBL	SBT	SEL	SER
Lane Configurations						
Volume (vph)	358	92	68	220	349	52
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.5		4.2	4.2	4.5	4.5
Lane Util. Factor	0.81		1.00	1.00	0.94	0.86
Frpb, ped/bikes	0.96		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	5592		1459	1305	4117	1122
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	5592		1459	1305	4117	1122
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	407	105	77	250	397	59
RTOR Reduction (vph)	52	0	52	0	0	0
Lane Group Flow (vph)	460	0	25	250	403	53
Confl. Peds. (#/hr)		173	806			
Confl. Bikes (#/hr)		10				
Parking (#/hr)	10	10		10		
Turn Type	NA		Split	NA	Prot	Perm
Protected Phases	2		7	7	4	
Permitted Phases						4
Actuated Green, G (s)	23.5		26.8	26.8	19.5	19.5
Effective Green, g (s)	25.5		28.8	28.8	23.5	23.5
Actuated g/C Ratio	0.28		0.32	0.32	0.26	0.26
Clearance Time (s)	5.5		6.2	6.2	8.5	8.5
Lane Grp Cap (vph)	1584		466	417	1074	292
v/s Ratio Prot	c0.08		0.02	c0.19	c0.10	
v/s Ratio Perm						0.05
v/c Ratio	0.29		0.05	0.60	0.38	0.18
Uniform Delay, d1	25.2		21.2	25.7	27.2	25.8
Progression Factor	1.00		1.59	0.96	1.00	1.00
Incremental Delay, d2	0.5		0.2	5.5	1.0	1.4
Delay (s)	25.7		33.9	30.1	28.2	27.2
Level of Service	C		C	C	C	C
Approach Delay (s)	25.7			31.0	28.1	
Approach LOS	C			C	C	

Intersection Summary			
HCM 2000 Control Delay	27.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
25: Fifth St. & I-80 WB Off-Ramp & Harrison St.

5/28/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	79	381	44	34	166	356	188	134	443	262
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.5			2.0	2.0			2.5	2.5
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.99			1.00	0.95			0.97	0.83
Flpb, ped/bikes		0.99			0.99	1.00			0.77	1.00
Frt		0.99			1.00	0.95			0.98	0.85
Flt Protected		0.99			0.99	1.00			0.96	1.00
Satd. Flow (prot)		6041			2997	2537			3220	979
Flt Permitted		0.99			0.83	1.00			0.96	1.00
Satd. Flow (perm)		6041			2516	2537			3220	979
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	81	393	45	35	171	367	194	138	457	270
RTOR Reduction (vph)	0	23	0	0	0	25	0	0	0	0
Lane Group Flow (vph)	0	496	0	0	206	536	0	0	665	200
Confl. Peds. (#/hr)	80		130	130			130	80	130	130
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Perm	Prot	Perm
Protected Phases		6			4	4			7	
Permitted Phases	6			4				7		7
Actuated Green, G (s)		20.5			22.0	22.0			14.5	14.5
Effective Green, g (s)		23.5			26.0	26.0			18.5	18.5
Actuated g/C Ratio		0.31			0.35	0.35			0.25	0.25
Clearance Time (s)		5.5			6.0	6.0			6.5	6.5
Lane Grp Cap (vph)		1892			872	879			794	241
v/s Ratio Prot						c0.21				
v/s Ratio Perm		0.08			0.08				0.21	0.20
v/c Ratio		0.26			0.24	0.61			0.84	0.83
Uniform Delay, d1		19.3			17.4	20.3			26.8	26.8
Progression Factor		1.00			1.00	1.00			1.00	1.00
Incremental Delay, d2		0.3			0.6	3.1			10.2	26.9
Delay (s)		19.6			18.1	23.4			37.1	53.7
Level of Service		B			B	C			D	D
Approach Delay (s)		19.6			18.1	23.4			40.9	
Approach LOS		B			B	C			D	

Intersection Summary			
HCM 2000 Control Delay	29.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

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HCM Unsignalized Intersection Capacity Analysis
26: Delancey St & Brannan St

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	129	101	50	9	192	80	19	4	6	12	8	101
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	142	111	55	10	211	88	21	4	7	13	9	111

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	308	309	32	133
Volume Left (vph)	142	10	21	13
Volume Right (vph)	55	88	7	111
Hadj (s)	0.02	-0.13	0.04	-0.45
Departure Headway (s)	4.7	4.6	5.6	4.9
Degree Utilization, x	0.40	0.39	0.05	0.18
Capacity (veh/h)	725	751	546	647
Control Delay (s)	10.9	10.5	8.9	9.0
Approach Delay (s)	10.9	10.5	8.9	9.0
Approach LOS	B	B	A	A

Intersection Summary			
Delay	10.3		
Level of Service	B		
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
27: Second St. & Brannan St.

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	198	141	57	24	188	141	22	275	36	68	284	94
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		2.0			2.0			2.0			3.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		0.92			0.87			0.97			0.93	
Flpb, ped/bikes		0.91			0.98			0.99			0.97	
Frt		0.98			0.94			0.98			0.97	
Flt Protected		0.98			1.00			1.00			0.99	
Satd. Flow (prot)		2169			2168			2707			2330	
Flt Permitted		0.66			0.92			0.92			0.86	
Satd. Flow (perm)		1476			1995			2492			2009	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	206	147	59	25	196	147	23	286	38	71	296	98
RTOR Reduction (vph)	0	19	0	0	20	0	0	16	0	0	13	0
Lane Group Flow (vph)	0	393	0	0	348	0	0	332	0	0	452	0
Confl. Peds. (#/hr)	440		440	440		440	440		440	440		440
Confl. Bikes (#/hr)			20			6			3			23
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	0	0	5	0
Parking (#/hr)		10	10		10	10					10	10
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		23.0			23.0			27.0			27.0	
Effective Green, g (s)		26.0			26.0			30.0			29.0	
Actuated g/C Ratio		0.43			0.43			0.50			0.48	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Lane Grp Cap (vph)		639			864			1246			971	
v/s Ratio Prot												
v/s Ratio Perm		c0.27			0.17			0.13			c0.22	
v/c Ratio		0.61			0.40			0.27			0.47	
Uniform Delay, d1		13.1			11.7			8.7			10.3	
Progression Factor		1.00			1.00			1.00			0.42	
Incremental Delay, d2		4.4			1.4			0.5			1.4	
Delay (s)		17.5			13.1			9.2			5.8	
Level of Service		B			B			A			A	
Approach Delay (s)		17.5			13.1			9.2			5.8	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	93.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	157	485	56	0	0	0	0	224	234	22	379	0
Ideal Flow (vphpl)	1000	1000	1000	1800	1800	1800	1000	1000	1000	1800	1800	1800
Total Lost time (s)	2.0	2.0						2.0	2.0		2.0	
Lane Util. Factor	*0.60	*0.60						*0.60	0.91		0.95	
Frpb, ped/bikes	1.00	0.97						0.91	0.69		1.00	
Flpb, ped/bikes	1.00	1.00						1.00	1.00		0.99	
Frt	1.00	0.98						0.96	0.85		1.00	
Flt Protected	0.95	1.00						1.00	1.00		1.00	
Satd. Flow (prot)	899	1392						892	457		2667	
Flt Permitted	0.95	1.00						1.00	1.00		0.92	
Satd. Flow (perm)	899	1392						892	457		2450	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	185	571	66	0	0	0	0	264	275	26	446	0
RTOR Reduction (vph)	0	14	0	0	0	0	0	8	8	0	0	0
Lane Group Flow (vph)	185	623	0	0	0	0	0	363	160	0	472	0
Confl. Peds. (#/hr)	30		430	30		30	30		430	430		30
Confl. Bikes (#/hr)			1						17			
Parking (#/hr)	10	10	10								10	
Turn Type	Split	NA						NA	Perm	Perm	NA	
Protected Phases	2	2						4			4	
Permitted Phases									4	4		
Actuated Green, G (s)	27.0	27.0						26.0	26.0		26.0	
Effective Green, g (s)	28.5	28.5						27.5	27.5		27.5	
Actuated g/C Ratio	0.48	0.48						0.46	0.46		0.46	
Clearance Time (s)	3.5	3.5						3.5	3.5		3.5	
Lane Grp Cap (vph)	427	661						408	209		1122	
v/s Ratio Prot	0.21	c0.45						c0.41				
v/s Ratio Perm									0.35		0.19	
v/c Ratio	0.43	0.94						0.89	0.76		0.42	
Uniform Delay, d1	10.4	15.0						14.9	13.6		10.9	
Progression Factor	1.00	1.00						0.90	0.90		1.00	
Incremental Delay, d2	3.2	23.5						22.6	21.5		1.2	
Delay (s)	13.6	38.5						36.0	33.7		12.1	
Level of Service	B	D						D	C		B	
Approach Delay (s)		32.9			0.0			35.3			12.1	
Approach LOS		C			A			D			B	

Intersection Summary			
HCM 2000 Control Delay	28.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	84.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

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Off-site Alternative at Piers 30/32 & SWL 330
Intersection Level of Service
Existing plus Basketball – Weekday PM Peak

HCM Signalized Intersection Capacity Analysis
1: The Embarcadero & Broadway

5/28/2015

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	50	316	201	625	4	758	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	3.3	4.0	
Lane Util. Factor	1.00	1.00	0.97	0.95	1.00	0.95	
Frpb, ped/bikes	1.00	0.75	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	0.93	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	1.00	
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1428	1030	2987	3079	1540	3073	
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	1428	1030	2987	3079	1540	3073	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	53	336	214	665	4	806	5
RTOR Reduction (vph)	0	217	0	0	0	1	0
Lane Group Flow (vph)	53	119	214	665	4	810	0
Confl. Peds. (#/hr)	80	271	80				190
Parking (#/hr)							10
Turn Type	Perm	Perm	Prot	NA	Prot	NA	
Protected Phases			5		1	6	
Permitted Phases	4	4		2			
Actuated Green, G (s)	36.5	36.5	17.1	48.0	5.9	37.6	
Effective Green, g (s)	39.0	39.0	20.0	50.9	8.8	39.0	
Actuated g/C Ratio	0.35	0.35	0.18	0.46	0.08	0.35	
Clearance Time (s)	6.5	6.5	6.9	6.9	6.2	5.4	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	506	365	543	1424	123	1089	
v/s Ratio Prot			0.07		0.00	c0.26	
v/s Ratio Perm	0.04	c0.12		c0.22			
v/c Ratio	0.10	0.33	0.39	0.47	0.03	0.74	
Uniform Delay, d1	23.8	25.9	39.7	20.3	46.7	31.1	
Progression Factor	1.00	1.00	1.51	1.86	1.00	1.00	
Incremental Delay, d2	0.1	0.5	0.4	0.9	0.5	4.6	
Delay (s)	23.9	26.4	60.4	38.7	47.2	35.7	
Level of Service	C	C	E	D	D	D	
Approach Delay (s)	26.1			44.0		35.8	
Approach LOS	C			D		D	

Intersection Summary			
HCM 2000 Control Delay	37.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: The Embarcadero & Washington

5/28/2015

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	115	156	119	725	11	1025	38
Ideal Flow (vphpl)	1900	1900	1400	1400	1700	1700	1700
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00	0.97	0.91	1.00	0.91	
Frpb, ped/bikes	1.00	0.78	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	0.94	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1441	1072	2201	3260	1377	3904	
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	1441	1072	2201	3260	1377	3904	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	125	170	129	788	12	1114	41
RTOR Reduction (vph)	0	100	0	0	0	4	0
Lane Group Flow (vph)	125	70	129	788	12	1151	0
Confl. Peds. (#/hr)	80	268	211				211
Turn Type	Perm	Perm	Prot	NA	Prot	NA	
Protected Phases			5	2	1	6	
Permitted Phases	4	4					
Actuated Green, G (s)	41.3	41.3	17.6	39.0	6.5	30.0	
Effective Green, g (s)	45.0	45.0	21.0	42.4	10.6	32.0	
Actuated g/C Ratio	0.41	0.41	0.19	0.39	0.10	0.29	
Clearance Time (s)	7.7	7.7	7.4	7.4	8.1	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	589	438	420	1256	132	1135	
v/s Ratio Prot			0.06	c0.24	0.01	c0.29	
v/s Ratio Perm	c0.09	0.06					
v/c Ratio	0.21	0.16	0.31	0.63	0.09	1.01	
Uniform Delay, d1	21.0	20.5	38.2	27.4	45.3	39.0	
Progression Factor	1.00	1.00	1.14	1.18	1.24	0.47	
Incremental Delay, d2	0.2	0.2	0.2	1.4	1.0	26.4	
Delay (s)	21.2	20.7	43.7	33.7	57.3	44.8	
Level of Service	C	C	D	C	E	D	
Approach Delay (s)	20.9			35.1		44.9	
Approach LOS	C			D		D	

Intersection Summary			
HCM 2000 Control Delay	38.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.7
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
3: The Embarcadero & Mission

5/28/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	167	71	0	1145	1203	140
Ideal Flow (vphpl)	1900	1900	1600	1600	1600	1600
Total Lost time (s)	4.0	6.4		4.0	4.0	
Lane Util. Factor	1.00	1.00		*0.50	*0.40	
Frpb, ped/bikes	1.00	0.65		1.00	0.95	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.98	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1540	896		2047	1535	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	1540	896		2047	1535	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	178	76	0	1218	1280	149
RTOR Reduction (vph)	0	2	0	0	3	0
Lane Group Flow (vph)	178	74	0	1218	1426	0
Confl. Peds. (#/hr)	417	380	540			620
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	24.2	24.2		74.2	74.2	
Effective Green, g (s)	26.6	24.2		75.4	75.4	
Actuated g/C Ratio	0.24	0.22		0.69	0.69	
Clearance Time (s)	6.4	6.4		5.2	5.2	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	372	197		1403	1052	
v/s Ratio Prot	c0.12			0.59	c0.93	
v/s Ratio Perm		0.08				
v/c Ratio	0.48	0.38		0.87	1.36	
Uniform Delay, d1	35.8	36.5		13.4	17.3	
Progression Factor	1.00	1.00		2.49	1.03	
Incremental Delay, d2	1.0	1.2		5.3	163.2	
Delay (s)	36.7	37.7		38.8	181.0	
Level of Service	D	D		D	F	
Approach Delay (s)	37.0			38.8	181.0	
Approach LOS	D			D	F	

Intersection Summary			
HCM 2000 Control Delay	108.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
4: The Embarcadero & Howard

5/28/2015

Movement	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Lane Configurations								
Volume (vph)	164	120	6	191	979	2	963	309
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1600	1600
Total Lost time (s)	4.0	7.1		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	*0.80	1.00	*0.76	1.00
Frpb, ped/bikes	1.00	0.85		1.00	1.00	1.00	1.00	0.70
Flpb, ped/bikes	0.82	1.00		0.93	1.00	1.00	1.00	1.00
Frt	1.00	0.85		1.00	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1267	1172		1202	3275	1296	2074	813
Flt Permitted	0.95	1.00		0.27	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1267	1172		337	3275	1296	2074	813
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	171	125	6	199	1020	2	1003	322
RTOR Reduction (vph)	0	1	0	0	0	0	0	176
Lane Group Flow (vph)	171	124	0	205	1020	2	1003	146
Confl. Peds. (#/hr)	230	182		316				316
Turn Type	Perm	Perm	custom	Prot	NA	Prot	NA	custom
Protected Phases				5		1		
Permitted Phases	4	4	5		2		6	6
Actuated Green, G (s)	42.9	42.9		12.1	39.8	7.0	35.6	35.6
Effective Green, g (s)	46.0	42.9		15.0	42.7	9.3	37.0	37.0
Actuated g/C Ratio	0.42	0.39		0.14	0.39	0.08	0.34	0.34
Clearance Time (s)	7.1	7.1		6.9	6.9	6.3	5.4	5.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	529	457		45	1271	109	697	273
v/s Ratio Prot						0.00		
v/s Ratio Perm	c0.13	0.11		c0.61	0.31		c0.48	0.18
v/c Ratio	0.32	0.27		4.56	0.80	0.02	1.44	0.54
Uniform Delay, d1	21.5	22.9		47.5	29.9	46.2	36.5	29.5
Progression Factor	1.00	1.00		0.71	0.51	1.23	0.91	0.83
Incremental Delay, d2	0.4	0.3		1641.9	4.6	0.0	198.3	0.7
Delay (s)	21.9	23.2		1675.7	19.7	56.8	231.5	25.1
Level of Service	C	C		F	B	E	F	C
Approach Delay (s)	22.4				296.8		181.2	
Approach LOS	C				F		F	

Intersection Summary			
HCM 2000 Control Delay	214.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.47		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	97.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

HCM Signalized Intersection Capacity Analysis
5: The Embarcadero & Folsom St.
5/28/2015

Movement	EBL	EBR	NBU	NBL	NBT	SBT	SBR
Lane Configurations							
Volume (vph)	218	173	70	135	959	1029	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1700	1700
Lane Width	12	12	11	12	12	12	12
Total Lost time (s)	3.7	3.7		3.4	2.3	2.3	
Lane Util. Factor	0.97	1.00		1.00	0.95	0.95	
Frpb, ped/bikes	1.00	0.69		1.00	1.00	0.97	
Flpb, ped/bikes	1.00	1.00		0.93	1.00	1.00	
Frt	1.00	0.85		1.00	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	
Satd. Flow (prot)	3090	837		1485	2946	2733	
Flt Permitted	0.95	1.00		0.22	1.00	1.00	
Satd. Flow (perm)	3090	837		336	2946	2733	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	229	182	74	142	1009	1083	63
RTOR Reduction (vph)	0	1	0	0	0	4	0
Lane Group Flow (vph)	229	181	0	216	1009	1142	0
Confl. Peds. (#/hr)	224	406		270			493
Confl. Bikes (#/hr)							48
Parking (#/hr)		10			10		
Turn Type	Prot	Perm	custom	Prot	NA	NA	
Protected Phases	4			5	2	6	
Permitted Phases		4	5				
Actuated Green, G (s)	42.3	42.3		15.6	55.7	33.7	
Effective Green, g (s)	45.3	45.3		18.6	58.7	36.7	
Actuated g/C Ratio	0.41	0.41		0.17	0.53	0.33	
Clearance Time (s)	6.7	6.7		6.4	5.3	5.3	
Lane Grp Cap (vph)	1272	344		56	1572	911	
v/s Ratio Prot	0.07				0.34	c0.42	
v/s Ratio Perm		c0.22		c0.64			
v/c Ratio	0.18	0.53		3.86	0.64	1.25	
Uniform Delay, d1	20.6	24.3		45.7	18.2	36.6	
Progression Factor	1.00	1.00		0.81	1.98	0.22	
Incremental Delay, d2	0.3	5.7		1317.3	1.5	115.0	
Delay (s)	20.9	30.0		1354.4	37.6	123.0	
Level of Service	C	C		F	D	F	
Approach Delay (s)	24.9				269.8	123.0	
Approach LOS	C				F	F	

Intersection Summary			
HCM 2000 Control Delay	173.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.39		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.4
Intersection Capacity Utilization	98.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
6: The Embarcadero & Harrison St.
5/28/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	174	214	0	991	1058	215
Ideal Flow (vphpl)	1900	1900	1900	1900	1600	1600
Total Lost time (s)	6.8	6.8		5.4	5.4	
Lane Util. Factor	1.00	1.00		*0.90	*0.80	
Frpb, ped/bikes	1.00	0.74		1.00	0.96	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.97	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1540	1026		2917	2038	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	1540	1026		2917	2038	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	189	233	0	1077	1150	234
RTOR Reduction (vph)	0	4	0	0	12	0
Lane Group Flow (vph)	189	229	0	1077	1372	0
Confl. Peds. (#/hr)	343	310	220			360
Confl. Bikes (#/hr)						117
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	41.2	41.2		56.6	56.6	
Effective Green, g (s)	41.2	41.2		56.6	56.6	
Actuated g/C Ratio	0.37	0.37		0.51	0.51	
Clearance Time (s)	6.8	6.8		5.4	5.4	
Lane Grp Cap (vph)	576	384		1500	1048	
v/s Ratio Prot	0.12			0.37	c0.67	
v/s Ratio Perm		c0.22				
v/c Ratio	0.33	0.60		0.72	1.31	
Uniform Delay, d1	24.5	27.7		20.6	26.7	
Progression Factor	1.00	1.00		1.86	0.56	
Incremental Delay, d2	1.5	6.7		0.8	139.7	
Delay (s)	26.0	34.3		39.1	154.8	
Level of Service	C	C		D	F	
Approach Delay (s)	30.6			39.1	154.8	
Approach LOS	C			D	F	

Intersection Summary			
HCM 2000 Control Delay	93.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	93.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	41	4	246	0	0	0	0	930	0	0	1155	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1600	1600	1600	1600	1600	1600
Total Lost time (s)	6.9	6.9						6.5			5.2	5.2
Lane Util. Factor	1.00	1.00						0.95			*0.90	*0.90
Frpb, ped/bikes	1.00	0.78						1.00			1.00	0.67
Flpb, ped/bikes	0.65	1.00						1.00			1.00	1.00
Frt	1.00	0.85						1.00			1.00	0.85
Flt Protected	0.95	1.00						1.00			1.00	1.00
Satd. Flow (prot)	998	1082						2593			2456	701
Flt Permitted	0.76	1.00						1.00			1.00	1.00
Satd. Flow (perm)	796	1082						2593			2456	701
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	45	4	267	0	0	0	0	1011	0	0	1255	127
RTOR Reduction (vph)	0	14	0	0	0	0	0	0	0	0	0	65
Lane Group Flow (vph)	45	257	0	0	0	0	0	1011	0	0	1255	62
Confl. Peds. (#/hr)	645		244	244		645	220		5003	4830		297
Confl. Bikes (#/hr)			2						52			80
Turn Type	Perm	NA					Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								6
Actuated Green, G (s)	30.3	30.3						41.5			40.6	40.6
Effective Green, g (s)	30.3	30.3						41.5			40.6	40.6
Actuated g/C Ratio	0.28	0.28						0.38			0.37	0.37
Clearance Time (s)	6.9	6.9						6.5			5.2	5.2
Vehicle Extension (s)	3.0	3.0						3.0			3.0	3.0
Lane Grp Cap (vph)	219	298						978			906	258
v/s Ratio Prot		c0.24						c0.39			c0.51	
v/s Ratio Perm	0.06											0.09
v/c Ratio	0.21	0.86						1.03			1.39	0.24
Uniform Delay, d1	30.6	37.8						34.2			34.7	24.0
Progression Factor	1.00	1.00						0.89			1.20	1.76
Incremental Delay, d2	0.5	21.6						32.6			174.0	0.2
Delay (s)	31.1	59.4						63.1			215.8	42.4
Level of Service	C	E						E			F	D
Approach Delay (s)		55.4			0.0			63.1			199.8	
Approach LOS		E			A			E			F	

Intersection Summary			
HCM 2000 Control Delay	132.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.3
Intersection Capacity Utilization	84.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	366	0	0	172	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	411	0	0	193	0	0
Pedestrians	80			80	80	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	6			6	6	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	183			131		
pX, platoon unblocked						
vC, conflicting volume			491		764	366
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			491		764	366
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1003		300	556

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	274	137	193	0
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	1003	1700
Volume to Capacity	0.16	0.08	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS				A
Approach Delay (s)	0.0		0.0	0.0
Approach LOS				A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	32.5%	ICU Level of Service	A
Analysis Period (min)	15		

DRAFT - SUBJECT TO REVIEW

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	145	39	112	923	14	968	419
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.9	6.9	6.6	5.2	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.64	1.00	1.00	1.00	1.00	0.60
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	876	1540	3079	1540	3079	827
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1540	876	1540	3079	1540	3079	827
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	156	42	120	992	15	1041	451
RTOR Reduction (vph)	0	18	0	0	0	0	156
Lane Group Flow (vph)	156	24	120	992	15	1041	295
Confl. Peds. (#/hr)	146	690	80				213
Confl. Bikes (#/hr)							92
Turn Type	Prot	Perm	Prot	NA	Prot	NA	Perm
Protected Phases	4		5	2	1	6	
Permitted Phases		4					6
Actuated Green, G (s)	38.1	38.1	15.4	43.8	10.0	37.0	37.0
Effective Green, g (s)	38.1	38.1	15.4	43.8	10.0	37.0	37.0
Actuated g/C Ratio	0.35	0.35	0.14	0.40	0.09	0.34	0.34
Clearance Time (s)	6.9	6.9	6.6	5.2	6.0	6.0	6.0
Lane Grp Cap (vph)	533	303	215	1226	140	1035	278
v/s Ratio Prot	c0.10		0.08	c0.32	0.01	0.34	
v/s Ratio Perm		0.03					c0.36
v/c Ratio	0.29	0.08	0.56	0.81	0.11	1.01	1.06
Uniform Delay, d1	26.1	24.2	44.1	29.4	45.9	36.5	36.5
Progression Factor	1.00	1.00	0.61	0.87	0.89	0.91	1.29
Incremental Delay, d2	1.4	0.5	4.4	2.6	0.1	9.8	35.4
Delay (s)	27.5	24.7	31.2	28.2	40.9	43.1	82.4
Level of Service	C	C	C	C	D	D	F
Approach Delay (s)	26.9			28.5		54.9	
Approach LOS	C			C		D	

Intersection Summary			
HCM 2000 Control Delay	42.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	152	6	20	4	5	6	10	35	876	5	2	838
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1600	1600	1600	1600	1600	1600
Total Lost time (s)		7.0			7.0			7.0	7.0		5.8	5.4
Lane Util. Factor		1.00			1.00			1.00	0.95		1.00	0.95
Frpb, ped/bikes		0.96			0.86			1.00	1.00		1.00	0.94
Flpb, ped/bikes		0.71			0.93			1.00	1.00		1.00	1.00
Frt		0.98			0.95			1.00	1.00		1.00	0.98
Flt Protected		0.96			0.99			0.95	1.00		0.95	1.00
Satd. Flow (prot)		1040			1209			1296	2582		1296	2380
Flt Permitted		0.75			0.94			0.95	1.00		0.95	1.00
Satd. Flow (perm)		810			1147			1296	2582		1296	2380
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	163	6	22	4	5	6	11	38	942	5	2	901
RTOR Reduction (vph)	0	5	0	0	4	0	0	0	1	0	0	14
Lane Group Flow (vph)	0	186	0	0	11	0	0	49	946	0	2	1067
Confl. Peds. (#/hr)	620		620	620		620		160		1000	600	
Confl. Bikes (#/hr)			30			30				30		
Turn Type	Perm	NA		Perm	NA		Prot	Prot	NA		Prot	NA
Protected Phases		4			8		5	5	2		1	6
Permitted Phases	4			8								
Actuated Green, G (s)		33.8			33.8			15.0	43.0		13.4	41.8
Effective Green, g (s)		33.8			33.8			15.0	43.0		13.4	41.8
Actuated g/C Ratio		0.31			0.31			0.14	0.39		0.12	0.38
Clearance Time (s)		7.0			7.0			7.0	7.0		5.8	5.4
Vehicle Extension (s)		3.0			3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		248			352			176	1009		157	904
v/s Ratio Prot								0.04	c0.37		0.00	c0.45
v/s Ratio Perm		c0.23			0.01							
v/c Ratio		0.75			0.03			0.28	0.94		0.01	1.18
Uniform Delay, d1		34.3			26.6			42.6	32.2		42.5	34.1
Progression Factor		1.00			1.00			0.90	0.77		1.88	0.65
Incremental Delay, d2		12.0			0.0			2.3	11.4		0.0	84.5
Delay (s)		46.3			26.7			40.7	36.2		79.8	106.7
Level of Service		D			C			D	D		E	F
Approach Delay (s)		46.3			26.7				36.4			106.7
Approach LOS		D			C				D			F

Intersection Summary			
HCM 2000 Control Delay	70.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.8
Intersection Capacity Utilization	92.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

Movement	SBR
Lane Configurations	
Volume (vph)	167
Ideal Flow (vphpl)	1600
Total Lost time (s)	
Lane Util. Factor	
Frpb, ped/bikes	
Flpb, ped/bikes	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.93
Adj. Flow (vph)	180
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Confl. Peds. (#/hr)	560
Confl. Bikes (#/hr)	30
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

Movement	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations							
Volume (vph)	196	882	5	842	25	11	285
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)	6.6	5.2	6.6	6.6		6.8	6.8
Lane Util. Factor	1.00	0.95	1.00	*0.90		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.99		1.00	0.63
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	1.00	1.00		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	1296	2593	1296	2421		1296	733
Flt Permitted	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	1296	2593	1296	2421		1296	733
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	202	909	5	868	26	11	294
RTOR Reduction (vph)	0	0	0	2	0	0	192
Lane Group Flow (vph)	202	909	5	892	0	11	102
Confl. Peds. (#/hr)	160				560	560	670
Confl. Bikes (#/hr)					10		30
Parking (#/hr)					10		
Turn Type	Prot	NA	Prot	NA		Prot	Perm
Protected Phases	5	2	1	6		4	
Permitted Phases							4
Actuated Green, G (s)	15.4	44.8	8.4	36.4		38.2	38.2
Effective Green, g (s)	15.4	44.8	8.4	36.4		38.2	38.2
Actuated g/C Ratio	0.14	0.41	0.08	0.33		0.35	0.35
Clearance Time (s)	6.6	5.2	6.6	6.6		6.8	6.8
Lane Grp Cap (vph)	181	1056	98	801		450	254
v/s Ratio Prot	c0.16	0.35	0.00	c0.37		0.01	
v/s Ratio Perm							c0.14
v/c Ratio	1.12	0.86	0.05	1.11		0.02	0.40
Uniform Delay, d1	47.3	29.8	47.1	36.8		23.6	27.2
Progression Factor	0.81	1.44	0.63	0.54		1.00	1.00
Incremental Delay, d2	91.1	6.8	0.1	53.0		0.1	4.7
Delay (s)	129.3	49.5	29.8	73.0		23.7	31.9
Level of Service	F	D	C	E		C	C
Approach Delay (s)		64.0		72.7		31.6	
Approach LOS		E		E		C	

Intersection Summary			
HCM 2000 Control Delay	63.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	94.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

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HCM Signalized Intersection Capacity Analysis
12: Third St. & King St.

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	911	826	12	137	954	36	53	999	255	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Lane Util. Factor	0.94	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	0.66			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00			
Frt	1.00	1.00		1.00	0.99			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4342	3058		2515	2545			5467	905			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4342	3058		2515	2545			5467	905			
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	939	852	12	141	984	37	55	1030	263	0	0	0
RTOR Reduction (vph)	0	1	0	0	0	0	0	0	181	0	0	0
Lane Group Flow (vph)	939	863	0	141	1021	0	0	1085	82	0	0	0
Confl. Peds. (#/hr)	160		560	160		560	560		560	160		160
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.2	41.9		13.2	38.4			34.5	34.5			
Effective Green, g (s)	18.2	41.9		13.2	38.4			34.5	34.5			
Actuated g/C Ratio	0.17	0.38		0.12	0.35			0.31	0.31			
Clearance Time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	718	1164		301	888			1714	283			
v/s Ratio Prot	c0.22	0.28		0.06	c0.40							
v/s Ratio Perm								0.20	0.09			
v/c Ratio	1.31	0.74		0.47	1.15			0.63	0.29			
Uniform Delay, d1	45.9	29.4		45.1	35.8			32.3	28.5			
Progression Factor	1.39	1.61		1.52	1.02			1.00	1.00			
Incremental Delay, d2	144.2	2.4		0.3	70.8			0.8	0.6			
Delay (s)	207.9	49.7		68.7	107.1			33.1	29.1			
Level of Service	F	D		E	F			C	C			
Approach Delay (s)		132.1			102.4			32.3			0.0	
Approach LOS		F			F			C			A	

Intersection Summary			
HCM 2000 Control Delay	92.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	104.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
13: Fourth St. & King St.

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	151	1654	25	24	964	19	5	60	61	34	258	308
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	0.61	1.00	0.82	0.46
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.98	1.00	0.65	1.00	1.00
Frt	1.00	1.00		1.00	1.00			1.00	0.85	1.00	0.95	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	4387		1296	2553			1578	826	1004	2285	563
Flt Permitted	0.95	1.00		0.95	1.00			0.97	1.00	0.71	1.00	1.00
Satd. Flow (perm)	1540	4387		1296	2553			1532	826	755	2285	563
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	154	1688	26	24	984	19	5	61	62	35	263	314
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	40	0	53	115
Lane Group Flow (vph)	154	1713	0	24	1002	0	0	66	22	35	345	64
Confl. Peds. (#/hr)	140		901	140		835	1788		818	818		1788
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.4	45.9		6.0	35.9			38.2	38.2	39.2	39.2	39.2
Effective Green, g (s)	14.4	45.9		6.0	35.9			38.2	38.2	39.2	39.2	39.2
Actuated g/C Ratio	0.13	0.42		0.05	0.33			0.35	0.35	0.36	0.36	0.36
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	201	1830		70	833			532	286	269	814	200
v/s Ratio Prot	0.10	c0.39		0.02	c0.39						c0.15	
v/s Ratio Perm								0.04	0.03	0.05		0.11
v/c Ratio	0.77	0.94		0.34	1.20			0.12	0.08	0.13	0.42	0.32
Uniform Delay, d1	46.2	30.6		50.1	37.0			24.5	24.1	23.9	26.8	25.7
Progression Factor	0.58	1.20		0.88	0.91			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.6	1.2		0.3	92.2			0.1	0.1	0.2	0.4	0.9
Delay (s)	28.5	37.9		44.3	126.1			24.6	24.2	24.1	27.2	26.6
Level of Service	C	D		D	F			C	C	C	C	C
Approach Delay (s)		37.1			124.2			24.4			26.9	
Approach LOS		D			F			C			C	

Intersection Summary			
HCM 2000 Control Delay	59.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	117.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

DRAFT - SUBJECT TO REVIEW

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1822	138	0	1277	86	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	0.99			1.00	1.00	0.91
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3031			3079	1540	1260
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3031			3079	1540	1260
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1898	144	0	1330	90	8
RTOR Reduction (vph)	5	0	0	0	0	4
Lane Group Flow (vph)	2037	0	0	1330	90	4
Confl. Peds. (#/hr)		117	117		81	83
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	62.1			62.1	36.6	36.6
Effective Green, g (s)	62.1			62.1	36.6	36.6
Actuated g/C Ratio	0.56			0.56	0.33	0.33
Clearance Time (s)	4.9			4.9	6.4	6.4
Lane Grp Cap (vph)	1711			1738	512	419
v/s Ratio Prot	c0.67			0.43	c0.06	
v/s Ratio Perm						0.00
v/c Ratio	1.19			0.77	0.18	0.01
Uniform Delay, d1	23.9			18.4	26.0	24.6
Progression Factor	1.00			0.54	1.00	1.00
Incremental Delay, d2	91.8			0.3	0.7	0.0
Delay (s)	115.8			10.3	26.8	24.6
Level of Service	F			B	C	C
Approach Delay (s)	115.8			10.3	26.6	
Approach LOS	F			B	C	

Intersection Summary			
HCM 2000 Control Delay	72.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	11.3
Intersection Capacity Utilization	101.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	189	164	5	588	57	126	99	14	2	124	255
Ideal Flow (vphpl)	1900	1900	1900	1100	1100	1100	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.0		4.5	4.5			4.5	4.5
Lane Util. Factor		1.00			*0.40		1.00	1.00			1.00	1.00
Frpb, ped/bikes		0.90			0.97		1.00	0.98			1.00	0.69
Flpb, ped/bikes		1.00			1.00		0.75	1.00			1.00	1.00
Frt		0.94			0.99		1.00	0.98			1.00	0.85
Flt Protected		1.00			1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)		1516			1195		1282	1728			1795	898
Flt Permitted		0.76			0.94		0.67	1.00			1.00	1.00
Satd. Flow (perm)		1150			1121		902	1728			1793	898
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	26	208	180	5	646	63	138	109	15	2	136	280
RTOR Reduction (vph)	0	24	0	0	7	0	0	9	0	0	0	26
Lane Group Flow (vph)	0	390	0	0	707	0	138	116	0	0	138	255
Confl. Peds. (#/hr)	80		180	180		180	460		260	260		460
Parking (#/hr)			10			10			10			10
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		25.0			25.5		26.0	26.0			26.0	26.0
Effective Green, g (s)		25.0			25.5		26.0	26.0			26.0	26.0
Actuated g/C Ratio		0.42			0.42		0.43	0.43			0.43	0.43
Clearance Time (s)		4.5			4.0		4.5	4.5			4.5	4.5
Lane Grp Cap (vph)		479			476		390	748			776	389
v/s Ratio Prot								0.07				
v/s Ratio Perm		0.34			c0.63		0.15				0.08	c0.28
v/c Ratio		0.81			1.49		0.35	0.15			0.18	0.65
Uniform Delay, d1		15.5			17.2		11.4	10.3			10.4	13.4
Progression Factor		0.74			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		12.9			229.5		2.5	0.4			0.5	8.3
Delay (s)		24.4			246.7		13.9	10.8			10.9	21.8
Level of Service		C			F		B	B			B	C
Approach Delay (s)		24.4			246.7			12.4			18.2	
Approach LOS		C			F			B			B	

Intersection Summary			
HCM 2000 Control Delay	109.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	98.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

HCM Signalized Intersection Capacity Analysis
16: Bryant St & Main St

5/28/2015

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	172	191	72	43	96	93
Ideal Flow (vphpl)	1500	1500	1500	1500	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	4.0
Lane Util. Factor	*0.40	*0.40	*0.40	*0.40	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.92	1.00	0.48
Flpb, ped/bikes	0.96	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	468	435	512	400	1540	560
Flt Permitted	0.63	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	311	435	512	400	1540	560
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	191	212	80	48	107	103
RTOR Reduction (vph)	0	0	0	11	0	88
Lane Group Flow (vph)	191	212	80	37	107	15
Confl. Peds. (#/hr)	80			132	380	191
Parking (#/hr)		10				10
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		6	2		8	
Permitted Phases	6			2		8
Actuated Green, G (s)	76.4	76.4	76.4	76.4	14.6	14.6
Effective Green, g (s)	76.4	76.4	76.4	76.4	14.6	14.6
Actuated g/C Ratio	0.76	0.76	0.76	0.76	0.15	0.15
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	237	332	391	305	224	81
v/s Ratio Prot		0.49	0.16		c0.07	
v/s Ratio Perm	c0.61			0.09		0.03
v/c Ratio	0.81	0.64	0.20	0.12	0.48	0.19
Uniform Delay, d1	7.2	5.4	3.3	3.1	39.2	37.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	24.6	9.1	1.2	0.8	1.6	1.1
Delay (s)	31.9	14.5	4.5	3.9	40.8	38.6
Level of Service	C	B	A	A	D	D
Approach Delay (s)		22.7	4.3		39.7	
Approach LOS		C	A		D	

Intersection Summary			
HCM 2000 Control Delay	24.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
17: Beale St & Mission St

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	460	177	77	299	0	0	0	0	102	839	92
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1200	1200	1200
Total Lost time (s)		5.0		5.0	5.0					5.0	5.0	
Lane Util. Factor		0.95		1.00	1.00					1.00	0.91	
Frpb, ped/bikes		0.98		1.00	1.00					1.00	0.99	
Flpb, ped/bikes		1.00		0.98	1.00					0.89	1.00	
Frt		0.96		1.00	1.00					1.00	0.99	
Flt Protected		1.00		0.95	1.00					0.95	1.00	
Satd. Flow (prot)		2901		1274	1365					861	2717	
Flt Permitted		1.00		0.33	1.00					0.95	1.00	
Satd. Flow (perm)		2901		447	1365					861	2717	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	0	523	201	88	340	0	0	0	0	116	953	105
RTOR Reduction (vph)	0	7	0	0	0	0	0	0	0	0	22	0
Lane Group Flow (vph)	0	717	0	88	340	0	0	0	0	116	1036	0
Confl. Peds. (#/hr)	80		80	80		80	80		80	80		80
Parking (#/hr)			10									10
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		2			6						4	
Permitted Phases				6						4		
Actuated Green, G (s)		29.0		29.0	29.0					21.0	21.0	
Effective Green, g (s)		29.0		29.0	29.0					21.0	21.0	
Actuated g/C Ratio		0.48		0.48	0.48					0.35	0.35	
Clearance Time (s)		5.0		5.0	5.0					5.0	5.0	
Lane Grp Cap (vph)		1402		216	659					301	950	
v/s Ratio Prot		0.25			c0.25						c0.38	
v/s Ratio Perm				0.20						0.13		
v/c Ratio		0.51		0.41	0.52					0.39	1.09	
Uniform Delay, d1		10.6		10.0	10.7					14.7	19.5	
Progression Factor		1.00		1.00	1.00					1.00	1.00	
Incremental Delay, d2		1.3		5.6	2.9					3.7	57.0	
Delay (s)		12.0		15.6	13.5					18.4	76.5	
Level of Service		B		B	B					B	E	
Approach Delay (s)		12.0			14.0			0.0			70.8	
Approach LOS		B			B			A			E	

Intersection Summary			
HCM 2000 Control Delay	42.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

DRAFT - SUBJECT TO REVIEW

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	30	94	23	8	43	61	19	48	22	13	9	69
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		5.0					5.0				5.0	
Lane Util. Factor		1.00					1.00				1.00	
Frpb, ped/bikes		0.89					0.93				0.91	
Flpb, ped/bikes		0.97					0.76				0.90	
Frt		0.97					0.96				0.92	
Flt Protected		0.99					0.97				0.98	
Satd. Flow (prot)		1274					867				975	
Flt Permitted		0.92					0.70				0.84	
Satd. Flow (perm)		1179					623				829	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	102	25	9	47	66	21	52	24	14	10	75
RTOR Reduction (vph)	0	0	0	0	0	0	15	0	0	0	43	0
Lane Group Flow (vph)	0	169	0	0	0	0	171	0	0	0	80	0
Confl. Peds. (#/hr)	131		166	280	166	280		131	280	280		146
Confl. Bikes (#/hr)			3	3								11
Parking (#/hr)					10	10	10	10	10	10	10	10
Turn Type	Perm	NA			Perm	Perm	NA		Perm	Perm	NA	
Protected Phases		2					6				8	
Permitted Phases	2				6	6			8	8		
Actuated Green, G (s)		27.0					27.0				38.0	
Effective Green, g (s)		27.0					27.0				38.0	
Actuated g/C Ratio		0.30					0.30				0.42	
Clearance Time (s)		5.0					5.0				5.0	
Vehicle Extension (s)		3.0					3.0				3.0	
Lane Grp Cap (vph)		353					186				350	
v/s Ratio Prot												
v/s Ratio Perm		0.14					c0.27				0.10	
v/c Ratio		0.48					0.92				0.23	
Uniform Delay, d1		25.7					30.4				16.6	
Progression Factor		1.00					1.00				1.00	
Incremental Delay, d2		4.6					42.7				0.3	
Delay (s)		30.3					73.2				17.0	
Level of Service		C					E				B	
Approach Delay (s)		30.3					73.2				17.0	
Approach LOS		C					E				B	

Intersection Summary			
HCM 2000 Control Delay	68.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	101.9%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBL	SBT	SBR	SBR2	NEL	NER	NER2
Lane Configurations							
Volume (vph)	81	32	174	209	59	121	16
Ideal Flow (vphpl)	1800	1800	1800	1800	1900	1800	1800
Total Lost time (s)		5.0		5.0	3.5	3.5	
Lane Util. Factor		0.95		0.95	1.00	1.00	
Frpb, ped/bikes		0.63		0.58	1.00	0.44	
Flpb, ped/bikes		0.98		1.00	1.00	1.00	
Frt		0.91		0.85	1.00	0.85	
Flt Protected		0.99		1.00	0.95	1.00	
Satd. Flow (prot)		812		713	1540	576	
Flt Permitted		0.88		1.00	0.95	1.00	
Satd. Flow (perm)		728		713	1540	576	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	88	35	189	227	64	132	17
RTOR Reduction (vph)	0	3	0	79	0	74	0
Lane Group Flow (vph)	0	332	0	125	64	75	0
Confl. Peds. (#/hr)	80		280	280	131		166
Confl. Bikes (#/hr)			12	12			
Parking (#/hr)							
Turn Type	Perm	NA		Perm	Prot	Perm	
Protected Phases		4			5		
Permitted Phases	4			4		5	
Actuated Green, G (s)		38.0		38.0	11.5	11.5	
Effective Green, g (s)		38.0		38.0	11.5	11.5	
Actuated g/C Ratio		0.42		0.42	0.13	0.13	
Clearance Time (s)		5.0		5.0	3.5	3.5	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)		307		301	196	73	
v/s Ratio Prot					0.04		
v/s Ratio Perm		c0.46		0.18		c0.13	
v/c Ratio		1.08		0.42	0.33	1.03	
Uniform Delay, d1		26.0		18.2	35.7	39.2	
Progression Factor		1.00		1.00	1.00	1.00	
Incremental Delay, d2		74.9		0.9	4.4	112.6	
Delay (s)		100.9		19.2	40.1	151.8	
Level of Service		F		B	D	F	
Approach Delay (s)		70.0			118.3		
Approach LOS		E			F		

Intersection Summary

DRAFT - SUBJECT TO REVIEW

HCM Signalized Intersection Capacity Analysis
19: Fremont St. & Harrison St./I-80 WB Off-Ramp

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	51	185	0	0	921	48	79	153	187	4	0	214
Ideal Flow (vphpl)	1800	1800	1800	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0			5.0	
Lane Util. Factor		1.00			*0.80	1.00	1.00	0.95			1.00	
Frpb, ped/bikes		1.00			1.00	0.91	1.00	0.92			0.93	
Flpb, ped/bikes		1.00			1.00	1.00	0.96	1.00			1.00	
Frt		1.00			1.00	0.85	1.00	0.92			0.87	
Flt Protected		0.99			1.00	1.00	0.95	1.00			1.00	
Satd. Flow (prot)		1286			2047	662	1394	2474			1229	
Flt Permitted		0.68			1.00	1.00	0.62	1.00			0.99	
Satd. Flow (perm)		878			2047	662	914	2474			1223	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	54	195	0	0	969	51	83	161	197	4	0	225
RTOR Reduction (vph)	0	0	0	0	0	0	0	118	0	0	0	0
Lane Group Flow (vph)	0	249	0	0	969	51	83	240	0	0	229	0
Confl. Peds. (#/hr)	112		80	80		112	80		88	88		80
Confl. Bikes (#/hr)						10						
Parking (#/hr)	10	10										
Turn Type	Perm	NA			NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2					6	8			4		
Actuated Green, G (s)		26.0			26.0	26.0	24.0	24.0			24.0	
Effective Green, g (s)		26.0			26.0	26.0	24.0	24.0			24.0	
Actuated g/C Ratio		0.43			0.43	0.43	0.40	0.40			0.40	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0			5.0	
Lane Grp Cap (vph)		380			887	286	365	989			489	
v/s Ratio Prot					c0.47			0.10				
v/s Ratio Perm		0.28				0.08	0.09				c0.19	
v/c Ratio		0.66			1.09	0.18	0.23	0.24			0.47	
Uniform Delay, d1		13.5			17.0	10.4	11.9	12.0			13.3	
Progression Factor		0.47			1.22	1.14	1.00	1.00			1.00	
Incremental Delay, d2		5.4			43.7	0.1	1.4	0.6			3.2	
Delay (s)		11.7			64.4	12.0	13.3	12.5			16.5	
Level of Service		B			E	B	B	B			B	
Approach Delay (s)		11.7			61.8			12.7			16.5	
Approach LOS		B			E			B			B	

Intersection Summary			
HCM 2000 Control Delay	38.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	115.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Warriors Arena (Pier 30-32) 5:00 pm 5/20/2013 EPP Weekday Peak, With Basketball (No Giants)

Synchro 8 Report

HCM Signalized Intersection Capacity Analysis
20: Fremont St. & Folsom St. & I-80 WB Off-Ramp

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR2	NBT	NBR	SEL	SER
Lane Configurations										
Volume (vph)	253	444	154	12	107	108	174	78	252	52
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	3.0			2.0		2.0		6.0	
Lane Util. Factor	1.00	0.95			1.00		1.00		0.97	
Frpb, ped/bikes	1.00	0.95			0.87		0.96		1.00	
Flpb, ped/bikes	1.00	1.00			1.00		1.00		1.00	
Frt	1.00	0.96			0.94		0.96		0.97	
Flt Protected	0.95	1.00			1.00		1.00		0.96	
Satd. Flow (prot)	1459	2460			1245		1408		2787	
Flt Permitted	0.95	1.00			0.95		1.00		0.96	
Satd. Flow (perm)	1459	2460			1180		1408		2787	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	264	462	160	12	111	112	181	81	262	54
RTOR Reduction (vph)	0	42	0	0	137	0	18	0	0	0
Lane Group Flow (vph)	264	580	0	0	98	0	244	0	316	0
Confl. Peds. (#/hr)	234		232	232		234		105		
Confl. Bikes (#/hr)			30							
Parking (#/hr)		10	10							
Turn Type	Prot	NA		Perm	NA		NA		Prot	
Protected Phases	5	2			6		8		4	
Permitted Phases				6						
Actuated Green, G (s)	7.0	26.4			15.4		20.0		19.0	
Effective Green, g (s)	9.0	29.4			17.4		23.0		19.0	
Actuated g/C Ratio	0.11	0.36			0.21		0.28		0.23	
Clearance Time (s)	6.0	6.0			4.0		5.0		6.0	
Vehicle Extension (s)	3.0	3.0			3.0		3.0		3.0	
Lane Grp Cap (vph)	159	877			249		393		642	
v/s Ratio Prot	c0.18	c0.24					c0.17		c0.11	
v/s Ratio Perm					0.08					
v/c Ratio	1.66	0.66			0.39		0.62		0.49	
Uniform Delay, d1	36.7	22.3			28.0		25.9		27.5	
Progression Factor	1.00	1.00			1.00		1.00		1.00	
Incremental Delay, d2	323.3	1.9			1.0		3.0		0.6	
Delay (s)	360.0	24.2			29.0		28.9		28.1	
Level of Service	F	C			C		C		C	
Approach Delay (s)		124.3			29.0		28.9		28.1	
Approach LOS		F			C		C		C	

Intersection Summary			
HCM 2000 Control Delay	78.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	82.4	Sum of lost time (s)	14.0
Intersection Capacity Utilization	94.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Warriors Arena (Pier 30-32) 5:00 pm 5/20/2013 EPP Weekday Peak, With Basketball (No Giants)

Synchro 8 Report

DRAFT - SUBJECT TO REVIEW

HCM Signalized Intersection Capacity Analysis
21: Freeway & First St. & Harrison St.

5/28/2015

Movement	EBT	EBR	WBL	WBT	NBR	SBL	SBT	SBR	SBR2
Lane Configurations									
Volume (vph)	171	65	703	512	23	42	42	1180	262
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1600	1600	1600	1600
Total Lost time (s)	3.0		5.0	3.0	3.0		3.0	5.0	3.0
Lane Util. Factor	1.00		0.91	0.91	1.00		1.00	0.88	1.00
Frpb, ped/bikes	0.91		1.00	1.00	1.00		1.00	0.89	0.92
Flpb, ped/bikes	1.00		1.00	1.00	1.00		0.91	1.00	1.00
Frt	0.96		1.00	1.00	0.86		1.00	0.85	0.85
Flt Protected	1.00		0.95	0.98	1.00		0.98	1.00	1.00
Satd. Flow (prot)	1350		1327	2536	1328		1216	1816	1063
Flt Permitted	1.00		0.39	0.64	1.00		0.98	1.00	1.00
Satd. Flow (perm)	1350		547	1656	1328		1216	1816	1063
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	173	66	710	517	23	42	42	1192	265
RTOR Reduction (vph)	0	0	0	0	18	0	0	0	150
Lane Group Flow (vph)	239	0	383	844	5	0	84	1192	115
Confl. Peds. (#/hr)		80			150	150		80	97
Parking (#/hr)				10		10			
Turn Type	NA		pm+pt	NA	Over	Perm	NA	Perm	custom
Protected Phases	2		1	6	1		4		
Permitted Phases			6			4		4	6
Actuated Green, G (s)	8.0		24.0	24.0	11.0		26.0	26.0	24.0
Effective Green, g (s)	10.0		24.0	26.0	13.0		28.0	26.0	26.0
Actuated g/C Ratio	0.17		0.40	0.43	0.22		0.47	0.43	0.43
Clearance Time (s)	5.0		5.0	5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	225		361	908	287		567	786	460
v/s Ratio Prot	0.18		0.19	c0.20	0.00				
v/s Ratio Perm			c0.23	0.20			0.07	c0.66	0.11
v/c Ratio	1.06		1.06	0.93	0.02		0.15	1.52	0.25
Uniform Delay, d1	25.0		19.3	16.1	18.5		9.2	17.0	10.8
Progression Factor	1.00		1.33	1.28	1.00		1.00	1.00	1.00
Incremental Delay, d2	77.4		46.3	7.7	0.1		0.6	239.0	1.3
Delay (s)	102.4		72.0	28.4	18.6		9.7	256.0	12.1
Level of Service	F		E	C	B		A	F	B
Approach Delay (s)	102.4			42.0			200.6		
Approach LOS	F			D			F		

Intersection Summary			
HCM 2000 Control Delay	127.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.31		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	114.3%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
22: Fourth St. & Howard St.

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	712	1435	0	0	0	0	0	1148	460
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1900	1900	1900
Total Lost time (s)				2.5	2.5						2.0	2.0
Lane Util. Factor				0.81	0.81						0.81	0.81
Frpb, ped/bikes				1.00	1.00						0.95	0.64
Flpb, ped/bikes				1.00	1.00						1.00	1.00
Frt				1.00	1.00						0.98	0.85
Flt Protected				0.95	0.99						1.00	1.00
Satd. Flow (prot)				1181	4932						4879	715
Flt Permitted				0.95	0.99						1.00	1.00
Satd. Flow (perm)				1181	4932						4879	715
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	0	0	0	727	1464	0	0	0	0	0	1171	469
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	422	1769	0	0	0	0	0	1349	291
Confl. Peds. (#/hr)	80		80	275		479	575		737	737		575
Confl. Bikes (#/hr)			30			30			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	5	0
Turn Type				Split	NA						NA	Perm
Protected Phases				6	6						4	
Permitted Phases												4
Actuated Green, G (s)				32.0	32.0						26.0	26.0
Effective Green, g (s)				33.5	33.5						28.0	28.0
Actuated g/C Ratio				0.37	0.37						0.31	0.31
Clearance Time (s)				4.0	4.0						4.0	4.0
Lane Grp Cap (vph)				439	1835						1517	222
v/s Ratio Prot				0.36	c0.36						0.28	
v/s Ratio Perm												c0.41
v/c Ratio				0.96	0.96						0.89	1.31
Uniform Delay, d1				27.6	27.7						29.5	31.0
Progression Factor				1.00	1.00						1.00	1.00
Incremental Delay, d2				34.3	14.1						8.2	168.3
Delay (s)				61.9	41.7						37.7	199.3
Level of Service				E	D						D	F
Approach Delay (s)		0.0			45.6			0.0			66.4	
Approach LOS		A			D			A			E	

Intersection Summary			
HCM 2000 Control Delay	54.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	6.5
Intersection Capacity Utilization	67.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

HCM Signalized Intersection Capacity Analysis
23: I-80 WB On-Ramp & Fourth St. & Harrison St.

5/28/2015

Movement	WBL2	WBL	WBT	SBT	SBR	SBR2
Lane Configurations						
Volume (vph)	183	759	1145	559	966	288
Ideal Flow (vphpl)	1600	1600	1800	1600	1600	1600
Total Lost time (s)	2.4		2.4	5.7	2.7	2.7
Lane Util. Factor	0.81		0.81	0.91	0.91	1.00
Frpb, ped/bikes	1.00		1.00	0.99	0.98	0.92
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	1.00		1.00	0.93	0.85	0.85
Flt Protected	0.95		0.98	1.00	1.00	1.00
Satd. Flow (prot)	1050		4851	2121	1038	1070
Flt Permitted	0.95		0.98	1.00	1.00	1.00
Satd. Flow (perm)	1050		4851	2121	1038	1070
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	187	774	1168	570	986	294
RTOR Reduction (vph)	0	0	0	0	0	14
Lane Group Flow (vph)	168	0	1961	1063	493	280
Confl. Peds. (#/hr)						101
Confl. Bikes (#/hr)					10	10
Bus Blockages (#/hr)	0	0	5	0	0	0
Parking (#/hr)				10		
Turn Type	Perm	Perm	NA	NA	Perm	Perm
Protected Phases			6	4		
Permitted Phases	6	6			4	4
Actuated Green, G (s)	35.6		35.6	43.3	43.3	43.3
Effective Green, g (s)	38.6		38.6	43.3	46.3	46.3
Actuated g/C Ratio	0.43		0.43	0.48	0.51	0.51
Clearance Time (s)	5.4		5.4	5.7	5.7	5.7
Lane Grp Cap (vph)	450		2080	1020	533	550
v/s Ratio Prot				c0.50		
v/s Ratio Perm	0.16		0.40		0.47	0.26
v/c Ratio	0.37		1.36dl	1.11dr	0.92	0.51
Uniform Delay, d1	17.5		24.6	23.4	20.2	14.4
Progression Factor	1.00		1.00	1.65	1.85	2.03
Incremental Delay, d2	2.4		10.2	29.7	11.9	1.3
Delay (s)	19.8		34.9	68.2	49.4	30.5
Level of Service	B		C	E	D	C
Approach Delay (s)			33.7	57.2		
Approach LOS			C	E		

Intersection Summary			
HCM 2000 Control Delay	44.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.1
Intersection Capacity Utilization	114.8%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
24: Fourth St. & Bryant St. & I-80 EB Off-Ramp

5/28/2015

Movement	EBT	EBR	SBL	SBT	SEL	SER
Lane Configurations						
Volume (vph)	749	113	132	610	385	14
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.5		4.2	4.2	4.5	4.5
Lane Util. Factor	0.81		1.00	1.00	0.94	0.86
Frpb, ped/bikes	0.96		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.98		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	5706		1459	1305	4121	1122
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	5706		1459	1305	4121	1122
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	797	120	140	649	410	15
RTOR Reduction (vph)	30	0	90	0	0	0
Lane Group Flow (vph)	887	0	50	649	412	13
Confl. Peds. (#/hr)		223	856			
Confl. Bikes (#/hr)		10				
Parking (#/hr)	10	10		10		
Turn Type	NA		Split	NA	Prot	Perm
Protected Phases	2		7	7	4	
Permitted Phases						4
Actuated Green, G (s)	23.5		26.8	26.8	19.5	19.5
Effective Green, g (s)	25.5		28.8	28.8	23.5	23.5
Actuated g/C Ratio	0.28		0.32	0.32	0.26	0.26
Clearance Time (s)	5.5		6.2	6.2	8.5	8.5
Lane Grp Cap (vph)	1616		466	417	1076	292
v/s Ratio Prot	c0.16		0.03	c0.50	c0.10	
v/s Ratio Perm						0.01
v/c Ratio	0.55		0.11	1.56	0.38	0.04
Uniform Delay, d1	27.4		21.5	30.6	27.3	24.9
Progression Factor	1.00		0.85	0.78	1.00	1.00
Incremental Delay, d2	1.3		0.2	256.1	1.0	0.3
Delay (s)	28.7		18.6	280.1	28.3	25.1
Level of Service	C		B	F	C	C
Approach Delay (s)	28.7			233.7	28.2	
Approach LOS	C			F	C	

Intersection Summary			
HCM 2000 Control Delay	104.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

HCM Signalized Intersection Capacity Analysis
25: Fifth St. & I-80 WB Off-Ramp & Harrison St.

5/28/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	272	1175	161	52	302	537	219	241	722	265
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		2.0			2.0	2.0			2.0	2.0
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.98			1.00	0.94			0.99	0.78
Flpb, ped/bikes		0.98			0.99	1.00			0.70	1.00
Frt		0.99			1.00	0.96			1.00	0.85
Flt Protected		0.99			0.99	1.00			0.95	1.00
Satd. Flow (prot)		5626			2849	2402			2845	881
Flt Permitted		0.99			0.66	1.00			0.95	1.00
Satd. Flow (perm)		5626			1894	2402			2845	881
Peak-hour factor, PHF	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.92	0.93	0.93
Adj. Flow (vph)	296	1263	173	56	325	577	235	262	776	285
RTOR Reduction (vph)	0	22	0	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	1710	0	0	381	810	0	0	1067	256
Confl. Peds. (#/hr)	130		180	180			180	130	180	180
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Perm	Prot	Perm
Protected Phases		6			4	4			7	
Permitted Phases	6			4				7		7
Actuated Green, G (s)		27.0			25.0	25.0			24.0	24.0
Effective Green, g (s)		29.0			28.0	28.0			27.0	27.0
Actuated g/C Ratio		0.32			0.31	0.31			0.30	0.30
Clearance Time (s)		4.0			5.0	5.0			5.0	5.0
Lane Grp Cap (vph)		1812			589	747			853	264
v/s Ratio Prot						c0.34				
v/s Ratio Perm		0.30			0.20				0.38	0.29
v/c Ratio		0.94			0.65	1.08			1.25	0.97
Uniform Delay, d1		29.7			26.7	31.0			31.5	31.1
Progression Factor		1.48			1.00	1.00			1.00	1.00
Incremental Delay, d2		8.4			5.4	58.1			122.6	48.2
Delay (s)		52.2			32.1	89.1			154.1	79.2
Level of Service		D			C	F			F	E
Approach Delay (s)		52.2			32.1	89.1			139.6	
Approach LOS		D			C	F			F	

Intersection Summary			
HCM 2000 Control Delay	84.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	110.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
26: Delancey St & Brannan St

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	178	134	29	15	352	43	23	3	3	4	4	216
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	205	154	33	17	405	49	26	3	3	5	5	248

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	392	471	33	257
Volume Left (vph)	205	17	26	5
Volume Right (vph)	33	49	3	248
Hadj (s)	0.09	-0.02	0.13	-0.54
Departure Headway (s)	5.6	5.4	7.1	5.7
Degree Utilization, x	0.61	0.71	0.07	0.41
Capacity (veh/h)	611	644	413	564
Control Delay (s)	17.2	20.6	10.6	12.7
Approach Delay (s)	17.2	20.6	10.6	12.7
Approach LOS	C	C	B	B

Intersection Summary			
Delay	17.4		
Level of Service	C		
Intersection Capacity Utilization	73.0%	ICU Level of Service	D
Analysis Period (min)	15		

DRAFT - SUBJECT TO REVIEW

HCM Signalized Intersection Capacity Analysis
27: Second St. & Brannan St.

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	622	93	168	223	127	44	338	73	54	331	215
Ideal Flow (vphpl)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Total Lost time (s)		2.0			2.0			2.0			3.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		0.93			0.92			0.95			0.88	
Flpb, ped/bikes		0.99			0.95			0.99			0.99	
Frt		0.98			0.96			0.98			0.95	
Flt Protected		1.00			0.98			1.00			1.00	
Satd. Flow (prot)		2174			1997			2338			1950	
Flt Permitted		0.89			0.59			0.87			0.88	
Satd. Flow (perm)		1947			1200			2036			1719	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	53	655	98	177	235	134	46	356	77	57	348	226
RTOR Reduction (vph)	0	7	0	0	7	0	0	3	0	0	11	0
Lane Group Flow (vph)	0	799	0	0	539	0	0	476	0	0	620	0
Confl. Peds. (#/hr)	510		510	510		510	510		510	510		510
Confl. Bikes (#/hr)			20			6			3			23
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	0	0	5	0
Parking (#/hr)		10	10		10	10					10	10
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		25.0			25.0			25.0			25.0	
Effective Green, g (s)		28.0			28.0			28.0			27.0	
Actuated g/C Ratio		0.47			0.47			0.47			0.45	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Lane Grp Cap (vph)		908			560			950			773	
v/s Ratio Prot												
v/s Ratio Perm		0.41			c0.45			0.23			c0.36	
v/c Ratio		0.88			1.42dl			0.50			0.80	
Uniform Delay, d1		14.5			15.5			11.1			14.2	
Progression Factor		1.00			1.00			1.00			1.46	
Incremental Delay, d2		11.9			29.8			1.9			6.7	
Delay (s)		26.4			45.3			13.0			27.4	
Level of Service		C			D			B			C	
Approach Delay (s)		26.4			45.3			13.0			27.4	
Approach LOS		C			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	28.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	113.1%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
28: Second St. & Bryant St.

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	354	571	71	0	0	0	0	512	223	12	537	0
Ideal Flow (vphpl)	1050	1050	1050	1800	1800	1800	1050	1050	1050	1600	1600	1600
Total Lost time (s)	2.0	2.0						2.0	2.0		2.0	
Lane Util. Factor	*0.50	*0.50						*0.50	0.91		0.95	
Frpb, ped/bikes	1.00	0.97						0.99	0.68		1.00	
Flpb, ped/bikes	1.00	1.00						1.00	1.00		1.00	
Frt	1.00	0.98						0.99	0.85		1.00	
Flt Protected	0.95	1.00						1.00	1.00		1.00	
Satd. Flow (prot)	787	1212						878	474		2390	
Flt Permitted	0.95	1.00						1.00	1.00		0.93	
Satd. Flow (perm)	787	1212						878	474		2226	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	381	614	76	0	0	0	0	551	240	13	577	0
RTOR Reduction (vph)	0	12	0	0	0	0	0	3	5	0	0	0
Lane Group Flow (vph)	381	678	0	0	0	0	0	572	211	0	590	0
Confl. Peds. (#/hr)	80		480	80		80	80		480	480		80
Confl. Bikes (#/hr)			1						17			
Parking (#/hr)	10	10	10								10	
Turn Type	Split	NA						NA	Perm	Perm	NA	
Protected Phases	2	2						4			4	
Permitted Phases									4	4		
Actuated Green, G (s)	27.0	27.0						26.0	26.0		26.0	
Effective Green, g (s)	28.5	28.5						27.5	27.5		27.5	
Actuated g/C Ratio	0.48	0.48						0.46	0.46		0.46	
Clearance Time (s)	3.5	3.5						3.5	3.5		3.5	
Lane Grp Cap (vph)	373	575						402	217		1020	
v/s Ratio Prot	0.48	c0.56						c0.65				
v/s Ratio Perm									0.44		0.27	
v/c Ratio	1.02	1.18						1.42	0.97		0.58	
Uniform Delay, d1	15.8	15.8						16.2	15.9		12.0	
Progression Factor	1.00	1.00						0.73	0.71		1.00	
Incremental Delay, d2	52.2	97.6						203.4	51.1		2.4	
Delay (s)	67.9	113.3						215.4	62.4		14.4	
Level of Service	E	F						F	E		B	
Approach Delay (s)		97.2			0.0			173.6			14.4	
Approach LOS		F			A			F			B	

Intersection Summary			
HCM 2000 Control Delay	101.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	86.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

OFF-SITE ALTERNATIVE AT PIERS 30/32 & SWL 330
INTERSECTION LEVEL OF SERVICE
EXISTING PLUS BASKETBALL – SATURDAY EVENING

HCM Signalized Intersection Capacity Analysis
1: The Embarcadero & Broadway

5/28/2015

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	52	256	167	517	0	775	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0		4.0	
Lane Util. Factor	1.00	1.00	0.97	0.95		0.95	
Frpb, ped/bikes	1.00	0.69	1.00	1.00		0.99	
Flpb, ped/bikes	0.86	1.00	1.00	1.00		1.00	
Frt	1.00	0.85	1.00	1.00		0.99	
Flt Protected	0.95	1.00	0.95	1.00		1.00	
Satd. Flow (prot)	1331	954	2987	3079		3038	
Flt Permitted	0.95	1.00	0.95	1.00		1.00	
Satd. Flow (perm)	1331	954	2987	3079		3038	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	57	281	184	568	0	852	31
RTOR Reduction (vph)	0	181	0	0	0	3	0
Lane Group Flow (vph)	57	100	184	568	0	880	0
Confl. Peds. (#/hr)	150	341	150				260
Parking (#/hr)							10
Turn Type	Perm	Perm	Prot	NA	Prot	NA	
Protected Phases			5		1	6	
Permitted Phases	4	4		2			
Actuated Green, G (s)	36.5	36.5	17.1	48.4		37.6	
Effective Green, g (s)	39.0	39.0	20.0	51.3		39.0	
Actuated g/C Ratio	0.35	0.35	0.18	0.47		0.35	
Clearance Time (s)	6.5	6.5	6.9	6.9		5.4	
Vehicle Extension (s)	3.0	3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	471	338	543	1435		1077	
v/s Ratio Prot			0.06			c0.29	
v/s Ratio Perm	0.04	c0.10		c0.18			
v/c Ratio	0.12	0.29	0.34	0.40		0.82	
Uniform Delay, d1	23.9	25.6	39.2	19.2		32.3	
Progression Factor	1.00	1.00	0.88	0.69		1.00	
Incremental Delay, d2	0.1	0.5	0.4	0.8		6.9	
Delay (s)	24.1	26.1	35.0	14.1		39.2	
Level of Service	C	C	C	B		D	
Approach Delay (s)	25.7			19.2		39.2	
Approach LOS	C			B		D	

Intersection Summary			
HCM 2000 Control Delay	29.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.7
Intersection Capacity Utilization	77.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
2: The Embarcadero & Washington

5/28/2015

Movement	EBL	EBR	NBL	NBT	SBU	SBT	SBR
Lane Configurations							
Volume (vph)	138	99	145	534	12	956	63
Ideal Flow (vphpl)	1900	1900	1400	1400	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.1	4.0	
Lane Util. Factor	1.00	1.00	0.97	0.91	1.00	0.91	
Frpb, ped/bikes	1.00	0.72	1.00	1.00	1.00	0.98	
Flpb, ped/bikes	0.88	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1355	996	2201	3260	1540	4300	
Flt Permitted	0.95	1.00	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	1355	996	2201	3260	1540	4300	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	142	102	149	551	12	986	65
RTOR Reduction (vph)	0	60	0	0	0	6	0
Lane Group Flow (vph)	142	42	149	551	12	1045	0
Confl. Peds. (#/hr)	150	338	281				281
Turn Type	Perm	Perm	Prot	NA	Prot	NA	
Protected Phases			5	2	1	6	
Permitted Phases	4	4					
Actuated Green, G (s)	41.3	41.3	17.6	39.0	6.5	30.0	
Effective Green, g (s)	45.0	45.0	21.0	42.4	10.5	32.0	
Actuated g/C Ratio	0.41	0.41	0.19	0.39	0.10	0.29	
Clearance Time (s)	7.7	7.7	7.4	7.4	8.1	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	554	407	420	1256	147	1250	
v/s Ratio Prot			0.07	c0.17	0.01	c0.24	
v/s Ratio Perm	c0.10	0.04					
v/c Ratio	0.26	0.10	0.35	0.44	0.08	0.84	
Uniform Delay, d1	21.5	20.0	38.6	25.0	45.4	36.5	
Progression Factor	1.00	1.00	1.20	1.23	0.51	0.84	
Incremental Delay, d2	0.2	0.1	0.5	1.1	0.7	4.4	
Delay (s)	21.7	20.2	46.7	31.9	23.8	35.2	
Level of Service	C	C	D	C	C	D	
Approach Delay (s)	21.1			35.1		35.0	
Approach LOS	C			D		D	

Intersection Summary			
HCM 2000 Control Delay	33.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.8
Intersection Capacity Utilization	75.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

DRAFT - SUBJECT TO REVIEW

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	130	99	0	590	975	64
Ideal Flow (vphpl)	1900	1900	1600	1600	1600	1600
Total Lost time (s)	4.0	6.4		4.0	4.0	
Lane Util. Factor	1.00	1.00		0.91	*0.80	
Frpb, ped/bikes	1.00	0.63		1.00	0.97	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.99	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1540	874		3726	3136	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	1540	874		3726	3136	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	149	114	0	678	1121	74
RTOR Reduction (vph)	0	0	0	0	6	0
Lane Group Flow (vph)	149	114	0	678	1189	0
Confl. Peds. (#/hr)	517	650	1070			1150
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	35.6	35.6		62.8	62.8	
Effective Green, g (s)	38.0	35.6		64.0	64.0	
Actuated g/C Ratio	0.35	0.32		0.58	0.58	
Clearance Time (s)	6.4	6.4		5.2	5.2	
Vehicle Extension (s)	3.0	3.0		0.2	0.2	
Lane Grp Cap (vph)	532	282		2167	1824	
v/s Ratio Prot	0.10			0.18	c0.38	
v/s Ratio Perm		c0.13				
v/c Ratio	0.28	0.40		0.31	0.65	
Uniform Delay, d1	26.1	28.9		11.8	15.5	
Progression Factor	1.00	1.00		1.37	0.40	
Incremental Delay, d2	0.3	0.9		0.4	1.3	
Delay (s)	26.4	29.9		16.5	7.5	
Level of Service	C	C		B	A	
Approach Delay (s)	27.9			16.5	7.5	
Approach LOS	C			B	A	

Intersection Summary			
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Lane Configurations								
Volume (vph)	67	49	8	206	519	4	850	221
Ideal Flow (vphpl)	1900	1900	1900	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	7.1		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	0.91	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.78		1.00	1.00	1.00	1.00	0.65
Flpb, ped/bikes	1.00	1.00		0.91	1.00	1.00	1.00	1.00
Frt	1.00	0.85		1.00	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	1068		1326	4191	1459	2917	843
Flt Permitted	0.95	1.00		0.31	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1540	1068		429	4191	1459	2917	843
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	76	56	9	234	590	5	966	251
RTOR Reduction (vph)	0	0	0	0	0	0	0	162
Lane Group Flow (vph)	76	56	0	243	590	5	966	89
Confl. Peds. (#/hr)	330	282		586				586
Turn Type	Prot	Perm	custom	Prot	NA	Prot	NA	Perm
Protected Phases	4			5	2	1	6	
Permitted Phases		4	5					6
Actuated Green, G (s)	42.9	42.9		10.1	39.8	7.0	37.6	37.6
Effective Green, g (s)	46.0	42.9		13.0	42.7	9.3	39.0	39.0
Actuated g/C Ratio	0.42	0.39		0.12	0.39	0.08	0.35	0.35
Clearance Time (s)	7.1	7.1		6.9	6.9	6.3	5.4	5.4
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	644	416		50	1626	123	1034	298
v/s Ratio Prot	0.05				0.14	0.00	c0.33	
v/s Ratio Perm		c0.05		c0.57				0.11
v/c Ratio	0.12	0.13		4.86	0.36	0.04	0.93	0.30
Uniform Delay, d1	19.6	21.6		48.5	24.0	46.3	34.3	25.6
Progression Factor	1.00	1.00		0.79	0.88	1.57	0.87	1.82
Incremental Delay, d2	0.1	0.1		1779.9	0.6	0.5	13.2	2.0
Delay (s)	19.7	21.7		1818.1	21.6	73.3	43.0	48.6
Level of Service	B	C		F	C	E	D	D
Approach Delay (s)	20.5				545.7		44.3	
Approach LOS	C				F		D	

Intersection Summary			
HCM 2000 Control Delay	233.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	91.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

5: The Embarcadero & Folsom St.

Movement	EBL	EBR	NBU	NBL	NBT	SBT	SBR
Lane Configurations							
Volume (vph)	172	56	60	212	561	813	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1600	1600
Lane Width	12	12	11	12	12	12	12
Total Lost time (s)	3.7	3.7		3.4	2.3	2.3	
Lane Util. Factor	0.97	1.00		1.00	0.95	0.95	
Frpb, ped/bikes	1.00	0.67		1.00	1.00	0.93	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	
Frt	1.00	0.85		1.00	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	
Satd. Flow (prot)	3090	813		1593	2946	2454	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	
Satd. Flow (perm)	3090	813		1593	2946	2454	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	181	59	63	223	591	856	98
RTOR Reduction (vph)	0	0	0	0	0	8	0
Lane Group Flow (vph)	181	59	0	286	591	946	0
Confl. Peds. (#/hr)	354	536		540			763
Confl. Bikes (#/hr)							48
Parking (#/hr)		10			10		
Turn Type	Prot	Perm	Prot	Prot	NA	NA	
Protected Phases	4		5	5	2	6	
Permitted Phases		4					
Actuated Green, G (s)	42.3	42.3		12.6	55.7	36.7	
Effective Green, g (s)	45.3	45.3		15.6	58.7	39.7	
Actuated g/C Ratio	0.41	0.41		0.14	0.53	0.36	
Clearance Time (s)	6.7	6.7		6.4	5.3	5.3	
Lane Grp Cap (vph)	1272	334		225	1572	885	
v/s Ratio Prot	0.06			c0.18	0.20	c0.39	
v/s Ratio Perm		c0.07					
v/c Ratio	0.14	0.18		1.27	0.38	1.07	
Uniform Delay, d1	20.2	20.5		47.2	15.0	35.1	
Progression Factor	1.00	1.00		1.58	0.19	0.12	
Incremental Delay, d2	0.2	1.2		150.0	0.6	41.6	
Delay (s)	20.4	21.7		224.5	3.4	45.8	
Level of Service	C	C		F	A	D	
Approach Delay (s)	20.7				75.5	45.8	
Approach LOS	C				E	D	

Intersection Summary			
HCM 2000 Control Delay	55.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	10.4
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

6: The Embarcadero & Harrison St.

5/28/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	105	107	0	728	677	253
Ideal Flow (vphpl)	1900	1900	1900	1900	1600	1600
Total Lost time (s)	6.8	6.8		5.4	5.4	
Lane Util. Factor	1.00	1.00		0.95	0.95	
Frpb, ped/bikes	1.00	0.66		1.00	0.91	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	
Frt	1.00	0.85		1.00	0.96	
Flt Protected	0.95	1.00		1.00	1.00	
Satd. Flow (prot)	1540	912		3079	2259	
Flt Permitted	0.95	1.00		1.00	1.00	
Satd. Flow (perm)	1540	912		3079	2259	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	108	110	0	751	698	261
RTOR Reduction (vph)	0	5	0	0	35	0
Lane Group Flow (vph)	108	105	0	751	924	0
Confl. Peds. (#/hr)	613	580	430			570
Confl. Bikes (#/hr)						117
Turn Type	Prot	Perm		NA	NA	
Protected Phases	4			2	6	
Permitted Phases		4				
Actuated Green, G (s)	41.2	41.2		56.6	56.6	
Effective Green, g (s)	41.2	41.2		56.6	56.6	
Actuated g/C Ratio	0.37	0.37		0.51	0.51	
Clearance Time (s)	6.8	6.8		5.4	5.4	
Lane Grp Cap (vph)	576	341		1584	1162	
v/s Ratio Prot	0.07			0.24	c0.41	
v/s Ratio Perm		c0.12				
v/c Ratio	0.19	0.31		0.47	0.80	
Uniform Delay, d1	23.1	24.3		17.1	21.9	
Progression Factor	1.00	1.00		1.87	0.84	
Incremental Delay, d2	0.7	2.3		0.8	0.5	
Delay (s)	23.9	26.7		32.9	19.0	
Level of Service	C	C		C	B	
Approach Delay (s)	25.3			32.9	19.0	
Approach LOS	C			C	B	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

DRAFT - SUBJECT TO REVIEW

HCM Signalized Intersection Capacity Analysis
7: The Embarcadero & Bryant St./Pier 30

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	55	3	118	0	0	0	0	673	0	0	682	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1600	1600	1600
Total Lost time (s)	6.9	6.9						6.5			5.2	5.2
Lane Util. Factor	1.00	1.00						0.95			0.95	1.00
Frpb, ped/bikes	1.00	0.68						1.00			1.00	0.63
Flpb, ped/bikes	0.55	1.00						1.00			1.00	1.00
Frt	1.00	0.85						1.00			1.00	0.85
Flt Protected	0.95	1.00						1.00			1.00	1.00
Satd. Flow (prot)	843	944						3079			2593	731
Flt Permitted	0.76	1.00						1.00			1.00	1.00
Satd. Flow (perm)	672	944						3079			2593	731
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	59	3	126	0	0	0	0	716	0	0	726	109
RTOR Reduction (vph)	0	82	0	0	0	0	0	0	0	0	0	69
Lane Group Flow (vph)	59	47	0	0	0	0	0	716	0	0	726	40
Confl. Peds. (#/hr)	1225		454	454		1225	430		9703	9530		507
Confl. Bikes (#/hr)			2						52			80
Turn Type	Perm	NA					Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								6
Actuated Green, G (s)	38.1	38.1						41.5			36.8	36.8
Effective Green, g (s)	38.1	38.1						41.5			36.8	36.8
Actuated g/C Ratio	0.35	0.35						0.38			0.33	0.33
Clearance Time (s)	6.9	6.9						6.5			5.2	5.2
Lane Grp Cap (vph)	232	326						1161			867	244
v/s Ratio Prot		0.05						c0.23			c0.28	
v/s Ratio Perm	c0.09											0.06
v/c Ratio	0.25	0.14						0.62			0.84	0.17
Uniform Delay, d1	25.8	24.7						27.8			33.8	25.8
Progression Factor	1.00	1.00						0.80			0.82	0.58
Incremental Delay, d2	2.6	0.9						1.9			6.7	1.0
Delay (s)	28.4	25.6						24.2			34.6	16.0
Level of Service	C	C						C			C	B
Approach Delay (s)		26.5			0.0			24.2			32.2	
Approach LOS		C			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	28.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.3
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
8: SWL 330 Lot & Bryant St

5/28/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	331	0	0	150	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.77	0.77	0.77	0.77	0.77	0.77
Hourly flow rate (vph)	430	0	0	195	0	0
Pedestrians	150			150	150	
Lane Width (ft)	11.0			11.0	11.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	11			11	11	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	183			131		
pX, platoon unblocked						
vC, conflicting volume			580		925	515
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			580		925	515
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			877		210	396

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total	287	143	195	0
Volume Left	0	0	0	0
Volume Right	0	0	0	0
cSH	1700	1700	877	1700
Volume to Capacity	0.17	0.08	0.00	0.00
Queue Length 95th (ft)	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0
Lane LOS				A
Approach Delay (s)	0.0		0.0	0.0
Approach LOS				A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	33.2%	ICU Level of Service	A
Analysis Period (min)	15		

DRAFT - SUBJECT TO REVIEW

Movement	EBL	EBR	NBU	NBL	NBT	SBU	SBT	SBR
Lane Configurations								
Volume (vph)	149	30	5	173	815	21	689	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.9	6.9		6.6	5.2	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	0.95	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.53		1.00	1.00	1.00	1.00	0.51
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85		1.00	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	728		1540	3079	1540	3079	709
Flt Permitted	0.95	1.00		0.95	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1540	728		1540	3079	1540	3079	709
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	164	33	5	190	896	23	757	98
RTOR Reduction (vph)	0	7	0	0	0	0	0	47
Lane Group Flow (vph)	164	26	0	195	896	23	757	51
Confl. Peds. (#/hr)	246	1320		150				283
Confl. Bikes (#/hr)								92
Turn Type	Prot	Perm	Prot	Prot	NA	Prot	NA	Perm
Protected Phases	4		5	5	2	1	6	
Permitted Phases		4						6
Actuated Green, G (s)	38.1	38.1		11.4	43.8	10.0	41.0	41.0
Effective Green, g (s)	38.1	38.1		11.4	43.8	10.0	41.0	41.0
Actuated g/C Ratio	0.35	0.35		0.10	0.40	0.09	0.37	0.37
Clearance Time (s)	6.9	6.9		6.6	5.2	6.0	6.0	6.0
Lane Grp Cap (vph)	533	252		159	1226	140	1147	264
v/s Ratio Prot	c0.11			c0.13	c0.29	0.01	c0.25	
v/s Ratio Perm		0.04						0.07
v/c Ratio	0.31	0.10		1.23	0.73	0.16	0.66	0.19
Uniform Delay, d1	26.3	24.4		49.3	28.1	46.1	28.7	23.3
Progression Factor	1.00	1.00		0.58	0.75	0.74	0.55	0.50
Incremental Delay, d2	1.5	0.8		131.0	2.4	1.7	2.0	1.1
Delay (s)	27.8	25.2		159.5	23.4	35.9	17.8	12.7
Level of Service	C	C		F	C	D	B	B
Approach Delay (s)	27.4				47.8		17.7	
Approach LOS	C				D		B	

Intersection Summary			
HCM 2000 Control Delay	33.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.5
Intersection Capacity Utilization	93.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Volume (vph)	133	2	45	1	6	2	16	54	858	10	3	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1600
Total Lost time (s)		7.0			7.0			7.0	7.0			5.8
Lane Util. Factor		1.00			1.00			1.00	0.95			1.00
Frpb, ped/bikes		0.90			0.92			1.00	0.99			1.00
Flpb, ped/bikes		0.72			0.97			1.00	1.00			0.88
Frt		0.97			0.97			1.00	1.00			1.00
Flt Protected		0.96			1.00			0.95	1.00			0.95
Satd. Flow (prot)		979			1406			1540	3045			1139
Flt Permitted		0.78			0.98			0.95	1.00			0.43
Satd. Flow (perm)		788			1387			1540	3045			521
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	145	2	49	1	7	2	17	59	933	11	3	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	1	0	0	0
Lane Group Flow (vph)	0	196	0	0	10	0	0	76	943	0	0	4
Confl. Peds. (#/hr)	830		830	830		830		320		1580		1180
Confl. Bikes (#/hr)			30			30				30		
Turn Type	Perm	NA		Perm	NA		Prot	Prot	NA		custom	Prot
Protected Phases		4			8		5	5	2			1
Permitted Phases	4			8							1	
Actuated Green, G (s)		38.0			38.0			15.0	43.0			9.2
Effective Green, g (s)		38.0			38.0			15.0	43.0			9.2
Actuated g/C Ratio		0.35			0.35			0.14	0.39			0.08
Clearance Time (s)		7.0			7.0			7.0	7.0			5.8
Lane Grp Cap (vph)		272			479			210	1190			43
v/s Ratio Prot								0.05	c0.31			
v/s Ratio Perm		c0.25			0.01							0.01
v/c Ratio		0.72			0.02			0.36	0.79			0.09
Uniform Delay, d1		31.4			23.7			43.2	29.6			46.5
Progression Factor		1.00			1.00			0.91	0.88			1.52
Incremental Delay, d2		15.2			0.1			3.1	3.5			3.3
Delay (s)		46.6			23.8			42.5	29.5			74.2
Level of Service		D			C			D	C			E
Approach Delay (s)		46.6			23.8				30.4			
Approach LOS		D			C				C			

Intersection Summary			
HCM 2000 Control Delay	27.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.8
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

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HCM Signalized Intersection Capacity Analysis
10: The Embarcadero & Townsend St./Pier 40

5/28/2015

Movement	SBT	SBR
Lane Configurations		
Volume (vph)	661	59
Ideal Flow (vphpl)	1600	1600
Total Lost time (s)	5.4	
Lane Util. Factor	0.95	
Frpb, ped/bikes	0.97	
Flpb, ped/bikes	1.00	
Frt	0.99	
Flt Protected	1.00	
Satd. Flow (prot)	2482	
Flt Permitted	1.00	
Satd. Flow (perm)	2482	
Peak-hour factor, PHF	0.92	0.92
Adj. Flow (vph)	718	64
RTOR Reduction (vph)	6	0
Lane Group Flow (vph)	776	0
Confl. Peds. (#/hr)		720
Confl. Bikes (#/hr)		30
Turn Type	NA	
Protected Phases	6	
Permitted Phases		
Actuated Green, G (s)	37.6	
Effective Green, g (s)	37.6	
Actuated g/C Ratio	0.34	
Clearance Time (s)	5.4	
Lane Grp Cap (vph)	848	
v/s Ratio Prot	c0.31	
v/s Ratio Perm		
v/c Ratio	0.92	
Uniform Delay, d1	34.7	
Progression Factor	0.14	
Incremental Delay, d2	13.1	
Delay (s)	17.9	
Level of Service	B	
Approach Delay (s)	18.2	
Approach LOS	B	

Intersection Summary

HCM Signalized Intersection Capacity Analysis
11: King St. & Second St.

5/28/2015

Movement	EBL	EBT	WBU	WBT	WBR	SBL	SBR
Lane Configurations							
Volume (vph)	123	913	4	663	56	15	209
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1900	1900
Total Lost time (s)	6.6	5.2	6.6	6.6		6.8	6.8
Lane Util. Factor	1.00	0.95	1.00	0.95		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.97		1.00	0.59
Flpb, ped/bikes	1.00	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (prot)	1540	3079	1540	2488		1540	809
Flt Permitted	0.95	1.00	0.95	1.00		0.95	1.00
Satd. Flow (perm)	1540	3079	1540	2488		1540	809
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	132	982	4	713	60	16	225
RTOR Reduction (vph)	0	0	0	5	0	0	1
Lane Group Flow (vph)	132	982	4	768	0	16	224
Confl. Peds. (#/hr)	320				720	720	940
Confl. Bikes (#/hr)					10		30
Parking (#/hr)					10		
Turn Type	Prot	NA	Prot	NA		Prot	Perm
Protected Phases	5	2	1	6		4	
Permitted Phases							4
Actuated Green, G (s)	15.4	44.8	8.4	36.4		38.2	38.2
Effective Green, g (s)	15.4	44.8	8.4	36.4		38.2	38.2
Actuated g/C Ratio	0.14	0.41	0.08	0.33		0.35	0.35
Clearance Time (s)	6.6	5.2	6.6	6.6		6.8	6.8
Lane Grp Cap (vph)	215	1253	117	823		534	280
v/s Ratio Prot	0.09	c0.32	0.00	c0.31		0.01	
v/s Ratio Perm							c0.28
v/c Ratio	0.61	0.78	0.03	0.93		0.03	0.80
Uniform Delay, d1	44.5	28.4	47.0	35.6		23.7	32.5
Progression Factor	0.69	1.37	0.72	0.65		1.00	1.00
Incremental Delay, d2	9.2	3.7	0.2	9.9		0.1	21.0
Delay (s)	40.1	42.6	34.0	32.9		23.8	53.5
Level of Service	D	D	C	C		C	D
Approach Delay (s)		42.3		32.9		51.5	
Approach LOS		D		C		D	

Intersection Summary			
HCM 2000 Control Delay	39.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

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HCM Signalized Intersection Capacity Analysis
12: Third St. & King St.

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	701	894	58	143	650	80	43	534	151	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Lane Util. Factor	0.94	0.95		0.97	0.95			0.86	1.00			
Frpb, ped/bikes	1.00	0.98		1.00	0.96			1.00	0.63			
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.97	1.00			
Frt	1.00	0.99		1.00	0.98			1.00	0.85			
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (prot)	4342	2982		2515	2442			5404	867			
Flt Permitted	0.95	1.00		0.95	1.00			1.00	1.00			
Satd. Flow (perm)	4342	2982		2515	2442			5404	867			
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	779	993	64	159	722	89	48	593	168	0	0	0
RTOR Reduction (vph)	0	3	0	0	1	0	0	0	135	0	0	0
Lane Group Flow (vph)	779	1054	0	159	810	0	0	641	33	0	0	0
Confl. Peds. (#/hr)	320		720	320		720	720		720	320		320
Confl. Bikes (#/hr)			10			10			10			
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm			
Protected Phases	5	2		1	6			8				
Permitted Phases							8		8			
Actuated Green, G (s)	18.2	54.1		13.9	51.3			21.6	21.6			
Effective Green, g (s)	18.2	54.1		13.9	51.3			21.6	21.6			
Actuated g/C Ratio	0.17	0.49		0.13	0.47			0.20	0.20			
Clearance Time (s)	6.8	6.8		6.8	5.3			6.8	6.8			
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	718	1466		317	1138			1061	170			
v/s Ratio Prot	c0.18	c0.35		0.06	c0.33							
v/s Ratio Perm								0.12	0.04			
v/c Ratio	1.08	0.72		0.50	0.71			0.60	0.19			
Uniform Delay, d1	45.9	22.0		44.8	23.5			40.3	36.9			
Progression Factor	0.80	0.97		1.37	0.80			1.00	1.00			
Incremental Delay, d2	45.0	0.8		0.6	1.0			1.0	0.6			
Delay (s)	81.7	22.2		61.9	19.8			41.3	37.5			
Level of Service	F	C		E	B			D	D			
Approach Delay (s)		47.4			26.7			40.5			0.0	
Approach LOS		D			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	40.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.4
Intersection Capacity Utilization	91.9%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
13: Fourth St. & King St.

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	152	1567	79	56	588	49	7	47	25	60	214	108
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Lane Util. Factor	1.00	0.91		1.00	0.95			1.00	1.00	1.00	0.91	0.91
Frpb, ped/bikes	1.00	0.98		1.00	0.95			1.00	0.59	1.00	0.97	0.46
Flpb, ped/bikes	1.00	1.00		1.00	1.00			0.95	1.00	0.63	1.00	1.00
Frt	1.00	0.99		1.00	0.99			1.00	0.85	1.00	0.99	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1540	4302		1296	2424			1534	797	965	2848	563
Flt Permitted	0.95	1.00		0.95	1.00			0.96	1.00	0.72	1.00	1.00
Satd. Flow (perm)	1540	4302		1296	2424			1480	797	731	2848	563
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	162	1667	84	60	626	52	7	50	27	64	228	115
RTOR Reduction (vph)	0	4	0	0	5	0	0	0	18	0	3	66
Lane Group Flow (vph)	162	1747	0	60	673	0	0	57	9	64	237	37
Confl. Peds. (#/hr)	270		1031	270		965	1918		948	948		1918
Confl. Bikes (#/hr)			10			10			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	5	0	0	5
Turn Type	Prot	NA		Prot	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			4			7	
Permitted Phases							4		4	7		7
Actuated Green, G (s)	14.4	40.0		11.9	35.9			38.2	38.2	39.2	39.2	39.2
Effective Green, g (s)	14.4	40.0		11.9	35.9			38.2	38.2	39.2	39.2	39.2
Actuated g/C Ratio	0.13	0.36		0.11	0.33			0.35	0.35	0.36	0.36	0.36
Clearance Time (s)	7.6	6.0		7.1	7.1			6.8	6.8	5.8	5.8	5.8
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	201	1564		140	791			513	276	260	1014	200
v/s Ratio Prot	0.11	c0.41		0.05	c0.28						0.08	
v/s Ratio Perm								0.04	0.01	c0.09		0.07
v/c Ratio	0.81	1.12		0.43	0.85			0.11	0.03	0.25	0.23	0.18
Uniform Delay, d1	46.4	35.0		45.9	34.5			24.4	23.7	25.0	24.9	24.4
Progression Factor	1.00	1.00		0.74	0.63			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	20.5	61.9		1.5	6.4			0.1	0.1	0.5	0.1	0.4
Delay (s)	66.9	96.9		35.2	28.3			24.5	23.8	25.5	25.0	24.8
Level of Service	E	F		D	C			C	C	C	C	C
Approach Delay (s)		94.3			28.9			24.2			25.0	
Approach LOS		F			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	68.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	21.5
Intersection Capacity Utilization	116.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Fifth St. & I-280 Ramps/King St.

5/28/2015

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1743	80	0	702	30	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.9			4.9	6.4	6.4
Lane Util. Factor	0.95			0.95	1.00	1.00
Frpb, ped/bikes	1.00			1.00	1.00	0.89
Flpb, ped/bikes	1.00			1.00	1.00	1.00
Frt	0.99			1.00	1.00	0.85
Flt Protected	1.00			1.00	0.95	1.00
Satd. Flow (prot)	3047			3079	1540	1222
Flt Permitted	1.00			1.00	0.95	1.00
Satd. Flow (perm)	3047			3079	1540	1222
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	1915	88	0	771	33	60
RTOR Reduction (vph)	2	0	0	0	0	4
Lane Group Flow (vph)	2001	0	0	771	33	56
Confl. Peds. (#/hr)		187	187		151	153
Confl. Bikes (#/hr)		1				
Turn Type	NA			NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases						8
Actuated Green, G (s)	62.6			62.6	7.9	7.9
Effective Green, g (s)	62.6			62.6	7.9	7.9
Actuated g/C Ratio	0.77			0.77	0.10	0.10
Clearance Time (s)	4.9			4.9	6.4	6.4
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	2331			2356	148	118
v/s Ratio Prot	c0.66			0.25	0.02	
v/s Ratio Perm						c0.05
v/c Ratio	0.86			0.33	0.22	0.48
Uniform Delay, d1	6.6			3.0	34.1	35.0
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	3.4			0.1	0.8	3.0
Delay (s)	10.0			3.1	34.9	38.0
Level of Service	A			A	C	D
Approach Delay (s)	10.0			3.1	36.9	
Approach LOS	A			A	D	

Intersection Summary			
HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	81.8	Sum of lost time (s)	11.3
Intersection Capacity Utilization	96.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
15: Main St & Harrison St

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	280	210	10	358	74	83	278	20	3	88	74
Ideal Flow (vphpl)	1900	1900	1900	1100	1100	1100	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0			4.0	4.0
Lane Util. Factor		1.00			*0.40		1.00	1.00			1.00	1.00
Frpb, ped/bikes		0.81			0.92		1.00	0.98			1.00	0.57
Flpb, ped/bikes		0.99			1.00		0.63	1.00			0.99	1.00
Frt		0.95			0.97		1.00	0.99			1.00	0.85
Flt Protected		1.00			1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)		1359			1117		1080	1743			1788	744
Flt Permitted		0.90			0.93		0.69	1.00			0.99	1.00
Satd. Flow (perm)		1232			1038		786	1743			1777	744
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	31	311	233	11	398	82	92	309	22	3	98	82
RTOR Reduction (vph)	0	2	0	0	15	0	0	5	0	0	0	39
Lane Group Flow (vph)	0	573	0	0	476	0	92	326	0	0	101	43
Confl. Peds. (#/hr)	150		250	250		250	820		410	410		820
Parking (#/hr)			10			10			10			10
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)		26.0			26.0		26.0	26.0			26.0	26.0
Effective Green, g (s)		26.0			26.0		26.0	26.0			26.0	26.0
Actuated g/C Ratio		0.43			0.43		0.43	0.43			0.43	0.43
Clearance Time (s)		4.0			4.0		4.0	4.0			4.0	4.0
Lane Grp Cap (vph)		533			449		340	755			770	322
v/s Ratio Prot								c0.19				
v/s Ratio Perm		c0.46			0.46		0.12				0.06	0.06
v/c Ratio		1.07			1.06		0.27	0.43			0.13	0.13
Uniform Delay, d1		17.0			17.0		10.9	11.9			10.2	10.2
Progression Factor		1.02			1.00		1.00	1.00			1.00	1.00
Incremental Delay, d2		54.3			59.1		2.0	1.8			0.4	0.9
Delay (s)		71.6			76.1		12.9	13.7			10.6	11.1
Level of Service		E			E		B	B			B	B
Approach Delay (s)		71.6			76.1			13.5			10.8	
Approach LOS		E			E			B			B	

Intersection Summary			
HCM 2000 Control Delay	51.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

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HCM Signalized Intersection Capacity Analysis
16: Bryant St & Main St

5/28/2015

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	196	133	70	31	40	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	0.78	1.00	0.46
Flpb, ped/bikes	0.86	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1327	1378	1621	1081	1540	543
Flt Permitted	0.70	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	985	1378	1621	1081	1540	543
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	225	153	80	36	46	86
RTOR Reduction (vph)	0	0	0	11	0	72
Lane Group Flow (vph)	225	153	80	25	46	14
Confl. Peds. (#/hr)	150			202	750	351
Parking (#/hr)		10				10
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		6	2		8	
Permitted Phases	6			2		8
Actuated Green, G (s)	45.2	45.2	45.2	45.2	10.8	10.8
Effective Green, g (s)	45.2	45.2	45.2	45.2	10.8	10.8
Actuated g/C Ratio	0.70	0.70	0.70	0.70	0.17	0.17
Clearance Time (s)	5.0	5.0	5.0	5.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	684	958	1127	751	255	90
v/s Ratio Prot		0.11	0.05		c0.03	
v/s Ratio Perm	c0.23			0.02		0.03
v/c Ratio	0.33	0.16	0.07	0.03	0.18	0.16
Uniform Delay, d1	3.9	3.4	3.2	3.1	23.3	23.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	0.4	0.1	0.1	0.3	0.8
Delay (s)	5.2	3.7	3.3	3.2	23.6	24.0
Level of Service	A	A	A	A	C	C
Approach Delay (s)		4.6	3.3		23.9	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	65.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	41.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
17: Beale St & Mission St

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	452	121	19	155	0	0	0	0	98	212	34
Ideal Flow (vphpl)	1900	1900	1900	1600	1600	1600	1900	1900	1900	1200	1200	1200
Total Lost time (s)		5.0		5.0	5.0					5.0	5.0	
Lane Util. Factor		0.95		1.00	1.00					1.00	0.91	
Frpb, ped/bikes		0.96		1.00	1.00					1.00	0.97	
Flpb, ped/bikes		1.00		0.94	1.00					0.76	1.00	
Frt		0.97		1.00	1.00					1.00	0.98	
Flt Protected		1.00		0.95	1.00					0.95	1.00	
Satd. Flow (prot)		2876		1217	1365					742	2642	
Flt Permitted		1.00		0.37	1.00					0.95	1.00	
Satd. Flow (perm)		2876		475	1365					742	2642	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	497	133	21	170	0	0	0	0	108	233	37
RTOR Reduction (vph)	0	40	0	0	0	0	0	0	0	0	22	0
Lane Group Flow (vph)	0	590	0	21	170	0	0	0	0	108	248	0
Confl. Peds. (#/hr)	150		150	150		150	150		150	150		150
Parking (#/hr)			10									10
Turn Type		NA		Perm	NA					Perm	NA	
Protected Phases		2			6						4	
Permitted Phases				6						4		
Actuated Green, G (s)		26.0		26.0	26.0					24.0	24.0	
Effective Green, g (s)		26.0		26.0	26.0					24.0	24.0	
Actuated g/C Ratio		0.43		0.43	0.43					0.40	0.40	
Clearance Time (s)		5.0		5.0	5.0					5.0	5.0	
Lane Grp Cap (vph)		1246		205	591					296	1056	
v/s Ratio Prot		c0.21			0.12						0.09	
v/s Ratio Perm				0.04						c0.15		
v/c Ratio		0.47		0.10	0.29					0.36	0.23	
Uniform Delay, d1		12.1		10.1	11.0					12.6	11.9	
Progression Factor		1.00		1.00	1.00					1.00	1.00	
Incremental Delay, d2		1.3		1.0	1.2					3.5	0.5	
Delay (s)		13.4		11.1	12.2					16.1	12.4	
Level of Service		B		B	B					B	B	
Approach Delay (s)		13.4			12.1			0.0			13.5	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	45.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
18: Delancey St. & Beale St. & Bryant St.

5/28/2015

Movement	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	NBL2	NBL	NBT	NBR
Lane Configurations												
Volume (vph)	51	181	9	14	40	14	16	80	17	21	16	45
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		5.0					5.0				5.0	
Lane Util. Factor		1.00					1.00				1.00	
Frpb, ped/bikes		0.94					0.80				0.92	
Flpb, ped/bikes		0.95					0.89				0.82	
Frt		0.99					0.93				0.94	
Flt Protected		0.99					0.98				0.98	
Satd. Flow (prot)		1346					846				903	
Flt Permitted		0.91					0.75				0.86	
Satd. Flow (perm)		1239					647				790	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	60	213	11	16	47	16	19	94	20	25	19	53
RTOR Reduction (vph)	0	0	0	0	0	0	55	0	0	0	18	0
Lane Group Flow (vph)	0	300	0	0	0	0	121	0	0	0	99	0
Confl. Peds. (#/hr)	201		236	350	236	350		201	350	350		216
Confl. Bikes (#/hr)			3	3								11
Parking (#/hr)					10	10	10	10	10	10	10	10
Turn Type	Perm	NA			Perm	Perm	NA		Perm	Perm	NA	
Protected Phases		2					6				8	
Permitted Phases	2				6	6			8	8		
Actuated Green, G (s)		21.0					21.0				29.0	
Effective Green, g (s)		21.0					21.0				29.0	
Actuated g/C Ratio		0.28					0.28				0.39	
Clearance Time (s)		5.0					5.0				5.0	
Vehicle Extension (s)		3.0					3.0				3.0	
Lane Grp Cap (vph)		346					181				305	
v/s Ratio Prot												
v/s Ratio Perm		c0.24					0.19				0.12	
v/c Ratio		0.87					0.67				0.32	
Uniform Delay, d1		25.7					23.9				16.1	
Progression Factor		1.00					1.00				1.00	
Incremental Delay, d2		24.2					9.3				0.6	
Delay (s)		49.8					33.3				16.7	
Level of Service		D					C				B	
Approach Delay (s)		49.8					33.3				16.7	
Approach LOS		D					C				B	

Intersection Summary			
HCM 2000 Control Delay	63.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
18: Delancey St. & Beale St. & Bryant St.

5/28/2015

Movement	SBL	SBT	SBR	SBR2	NEL2	NEL	NER	NER2
Lane Configurations								
Volume (vph)	78	26	11	106	35	91	28	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1900	1900	1900	1900
Total Lost time (s)		5.0		5.0		3.5	3.5	
Lane Util. Factor		0.95		0.95		1.00	1.00	
Frpb, ped/bikes		0.90		0.53		1.00	0.41	
Flpb, ped/bikes		0.94		1.00		0.45	1.00	
Frt		0.97		0.85		1.00	0.85	
Flt Protected		0.97		1.00		0.95	1.00	
Satd. Flow (prot)		1159		657		692	571	
Flt Permitted		0.77		1.00		0.95	1.00	
Satd. Flow (perm)		920		657		692	571	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	92	31	13	125	41	107	33	7
RTOR Reduction (vph)	0	4	0	64	0	0	34	0
Lane Group Flow (vph)	0	145	0	48	0	148	6	0
Confl. Peds. (#/hr)	150		350	350		201		236
Confl. Bikes (#/hr)			12	12				
Parking (#/hr)								
Turn Type	Perm	NA		Perm	Perm	Prot	Perm	
Protected Phases		4				5		
Permitted Phases	4			4	5		5	
Actuated Green, G (s)		29.0		29.0		11.5	11.5	
Effective Green, g (s)		29.0		29.0		11.5	11.5	
Actuated g/C Ratio		0.39		0.39		0.15	0.15	
Clearance Time (s)		5.0		5.0		3.5	3.5	
Vehicle Extension (s)		3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		355		254		106	87	
v/s Ratio Prot								
v/s Ratio Perm		c0.16		0.07		0.21	0.01	
v/c Ratio		0.41		0.19		1.40	0.07	
Uniform Delay, d1		16.7		15.2		31.8	27.2	
Progression Factor		1.00		1.00		1.00	1.00	
Incremental Delay, d2		0.8		0.4		225.6	0.3	
Delay (s)		17.5		15.6		257.3	27.5	
Level of Service		B		B		F	C	
Approach Delay (s)		16.7				208.4		
Approach LOS		B				F		

Intersection Summary

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HCM Signalized Intersection Capacity Analysis
19: Fremont St. & Harrison St./I-80 WB Off-Ramp

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	133	239	0	0	476	40	166	138	275	4	0	63
Ideal Flow (vphpl)	1800	1800	1800	1000	1000	1000	1800	1800	1800	1800	1800	1800
Total Lost time (s)		5.0			5.0	5.0	5.0	5.0			5.0	
Lane Util. Factor		1.00			*0.80	1.00	1.00	0.95			1.00	
Frpb, ped/bikes		1.00			1.00	0.86	1.00	0.85			0.88	
Flpb, ped/bikes		0.98			1.00	1.00	0.89	1.00			0.99	
Frt		1.00			1.00	0.85	1.00	0.90			0.87	
Flt Protected		0.98			1.00	1.00	0.95	1.00			1.00	
Satd. Flow (prot)		1254			2047	624	1296	2222			1162	
Flt Permitted		0.65			1.00	1.00	0.71	1.00			0.98	
Satd. Flow (perm)		826			2047	624	970	2222			1138	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	141	254	0	0	506	43	177	147	293	4	0	67
RTOR Reduction (vph)	0	0	0	0	0	0	0	122	0	0	0	0
Lane Group Flow (vph)	0	395	0	0	506	43	177	318	0	0	71	0
Confl. Peds. (#/hr)	182		150	150		182	150		158	158		150
Confl. Bikes (#/hr)						10						
Parking (#/hr)	10	10										
Turn Type	Perm	NA			NA	Perm	Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2					6	8			4		
Actuated Green, G (s)		26.0			26.0	26.0	24.0	24.0			24.0	
Effective Green, g (s)		26.0			26.0	26.0	24.0	24.0			24.0	
Actuated g/C Ratio		0.43			0.43	0.43	0.40	0.40			0.40	
Clearance Time (s)		5.0			5.0	5.0	5.0	5.0			5.0	
Lane Grp Cap (vph)		357			887	270	388	888			455	
v/s Ratio Prot					0.25			0.14				
v/s Ratio Perm		c0.48				0.07	c0.18				0.06	
v/c Ratio		1.11			0.57	0.16	0.46	0.36			0.16	
Uniform Delay, d1		17.0			12.8	10.3	13.2	12.6			11.5	
Progression Factor		1.35			0.99	0.86	1.00	1.00			1.00	
Incremental Delay, d2		75.1			1.5	0.7	3.8	1.1			0.7	
Delay (s)		98.1			14.1	9.6	17.0	13.7			12.2	
Level of Service		F			B	A	B	B			B	
Approach Delay (s)		98.1			13.8			14.7			12.2	
Approach LOS		F			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	34.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	77.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
20: Fremont St. & Folsom St. & I-80 WB Off-Ramp

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR2	NBL	NBT	NBR	SEL	SER	SER2
Lane Configurations												
Volume (vph)	230	612	13	2	16	112	3	215	93	325	52	3
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	3.0			2.0			2.0		6.0		
Lane Util. Factor	1.00	0.95			1.00			1.00		0.97		
Frpb, ped/bikes	1.00	0.99			0.73			0.93		0.95		
Flpb, ped/bikes	1.00	1.00			1.00			1.00		1.00		
Frt	1.00	1.00			0.88			0.96		0.98		
Flt Protected	0.95	1.00			1.00			1.00		0.96		
Satd. Flow (prot)	1459	2675			986			1373		2644		
Flt Permitted	0.95	1.00			0.97			1.00		0.96		
Satd. Flow (perm)	1459	2675			956			1373		2644		
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	258	688	15	2	18	126	3	242	104	365	58	3
RTOR Reduction (vph)	0	2	0	0	118	0	0	17	0	115	0	0
Lane Group Flow (vph)	258	701	0	0	28	0	0	332	0	311	0	0
Confl. Peds. (#/hr)	304		302	302		304			175			165
Confl. Bikes (#/hr)			30									
Parking (#/hr)		10	10									
Turn Type	Prot	NA		Perm	NA		Perm	NA		Prot		
Protected Phases	5	2			6			8		4		
Permitted Phases				6			8					
Actuated Green, G (s)	9.7	27.7			14.0			20.0		19.0		
Effective Green, g (s)	11.7	30.7			16.0			23.0		19.0		
Actuated g/C Ratio	0.14	0.37			0.19			0.27		0.23		
Clearance Time (s)	6.0	6.0			4.0			5.0		6.0		
Vehicle Extension (s)	3.0	3.0			3.0			3.0		3.0		
Lane Grp Cap (vph)	203	981			182			377		600		
v/s Ratio Prot	c0.18	c0.26								c0.12		
v/s Ratio Perm					0.03			0.24				
v/c Ratio	1.27	0.71			0.15			0.88		0.52		
Uniform Delay, d1	36.0	22.7			28.2			29.0		28.3		
Progression Factor	1.00	1.00			1.00			1.00		1.00		
Incremental Delay, d2	154.7	2.5			0.4			20.1		0.8		
Delay (s)	190.7	25.2			28.6			49.2		29.1		
Level of Service	F	C			C			D		C		
Approach Delay (s)		69.7			28.6			49.2		29.1		
Approach LOS		E			C			D		C		

Intersection Summary			
HCM 2000 Control Delay	53.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	83.7	Sum of lost time (s)	14.0
Intersection Capacity Utilization	98.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

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HCM Signalized Intersection Capacity Analysis
21: Freeway & First St. & Harrison St.
5/28/2015

Movement	EBT	EBR2	WBL	WBT	NBR	SBL	SBT	SBR	SBR2
Lane Configurations									
Volume (vph)	254	14	287	418	45	73	0	957	242
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0		5.0	3.0	3.0		3.0	5.0	3.0
Lane Util. Factor	1.00		0.91	0.91	1.00		1.00	0.88	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00		1.00	0.81	0.87
Flpb, ped/bikes	1.00		1.00	1.00	1.00		0.75	1.00	1.00
Frt	0.99		1.00	1.00	0.86		1.00	0.85	0.85
Flt Protected	1.00		0.95	0.99	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1609		1401	2707	1402		1149	1965	1192
Flt Permitted	1.00		0.31	0.80	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1609		454	2182	1402		1149	1965	1192
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	285	16	322	470	51	82	0	1075	272
RTOR Reduction (vph)	106	0	0	0	40	0	0	0	154
Lane Group Flow (vph)	195	0	232	560	11	0	82	1075	118
Confl. Peds. (#/hr)					220	220		150	167
Parking (#/hr)				10		10			
Turn Type	NA		pm+pt	NA	Over	Perm	NA	Perm	custom
Protected Phases	2		1	6	1		4		
Permitted Phases			6			4		4	6
Actuated Green, G (s)	8.0		24.0	24.0	11.0		26.0	26.0	24.0
Effective Green, g (s)	10.0		24.0	26.0	13.0		28.0	26.0	26.0
Actuated g/C Ratio	0.17		0.40	0.43	0.22		0.47	0.43	0.43
Clearance Time (s)	5.0		5.0	5.0	5.0		5.0	5.0	5.0
Lane Grp Cap (vph)	268		355	1059	303		536	851	516
v/s Ratio Prot	c0.12		0.12	c0.11	0.01				
v/s Ratio Perm			0.14	0.11			0.07	c0.55	0.10
v/c Ratio	0.73		0.65	0.53	0.04		0.15	1.26	0.23
Uniform Delay, d1	23.7		18.5	12.5	18.6		9.2	17.0	10.7
Progression Factor	1.00		0.69	0.64	1.00		1.00	1.00	1.00
Incremental Delay, d2	15.9		8.1	1.7	0.2		0.6	127.9	1.0
Delay (s)	39.6		20.9	9.7	18.8		9.8	144.9	11.7
Level of Service	D		C	A	B		A	F	B
Approach Delay (s)	39.6			13.0			111.8		
Approach LOS	D			B			F		

Intersection Summary			
HCM 2000 Control Delay	71.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	91.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
22: Fourth St. & Howard St.
5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	424	679	0	0	0	0	0	537	392
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)				2.5	2.5						2.0	2.0
Lane Util. Factor				0.81	0.81						0.81	0.81
Frpb, ped/bikes				1.00	1.00						0.90	0.64
Flpb, ped/bikes				1.00	1.00						1.00	1.00
Frt				1.00	1.00						0.96	0.85
Flt Protected				0.95	0.99						1.00	1.00
Satd. Flow (prot)				1181	4917						4289	673
Flt Permitted				0.95	0.99						1.00	1.00
Satd. Flow (perm)				1181	4917						4289	673
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	0	437	700	0	0	0	0	0	554	404
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	223	914	0	0	0	0	0	756	202
Confl. Peds. (#/hr)	150		150	345		549	645		807	807		645
Confl. Bikes (#/hr)			30			30			10			10
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	5	0
Turn Type				Split	NA						NA	Perm
Protected Phases				6	6						4	
Permitted Phases												4
Actuated Green, G (s)				30.0	30.0						28.0	28.0
Effective Green, g (s)				31.5	31.5						30.0	30.0
Actuated g/C Ratio				0.35	0.35						0.33	0.33
Clearance Time (s)				4.0	4.0						4.0	4.0
Lane Grp Cap (vph)				413	1720						1429	224
v/s Ratio Prot				c0.19	0.19						0.18	
v/s Ratio Perm												c0.30
v/c Ratio				0.54	0.53						0.53	0.90
Uniform Delay, d1				23.4	23.4						24.3	28.6
Progression Factor				1.00	1.00						1.00	1.00
Incremental Delay, d2				5.0	1.2						1.4	39.1
Delay (s)				28.4	24.5						25.7	67.7
Level of Service				C	C						C	E
Approach Delay (s)		0.0			25.3			0.0			34.6	
Approach LOS		A			C			A			C	

Intersection Summary			
HCM 2000 Control Delay	29.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	6.5
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

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23: I-80 WB On-Ramp & Fourth St. & Harrison St.

Movement	WBL2	WBL	WBT	SBT	SBR	SBR2
Lane Configurations						
Volume (vph)	89	526	369	250	575	104
Ideal Flow (vphpl)	1600	1600	1800	1600	1600	1600
Total Lost time (s)		5.4	2.4	5.7	2.7	2.7
Lane Util. Factor		0.81	0.81	0.91	0.91	1.00
Frpb, ped/bikes		1.00	1.00	0.99	0.98	0.88
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00
Frt		1.00	1.00	0.92	0.85	0.85
Flt Protected		0.95	0.98	1.00	1.00	1.00
Satd. Flow (prot)		1050	4840	2094	1039	1021
Flt Permitted		0.95	0.98	1.00	1.00	1.00
Satd. Flow (perm)		1050	4840	2094	1039	1021
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	93	548	384	260	599	108
RTOR Reduction (vph)	0	0	0	0	0	49
Lane Group Flow (vph)	0	323	702	560	299	59
Confl. Peds. (#/hr)						171
Confl. Bikes (#/hr)					10	10
Bus Blockages (#/hr)	0	0	5	0	0	0
Parking (#/hr)				10		
Turn Type	Perm	Perm	NA	NA	Perm	Perm
Protected Phases			6	4		
Permitted Phases	6	6			4	4
Actuated Green, G (s)		32.6	32.6	46.3	46.3	46.3
Effective Green, g (s)		32.6	35.6	46.3	49.3	49.3
Actuated g/C Ratio		0.36	0.40	0.51	0.55	0.55
Clearance Time (s)		5.4	5.4	5.7	5.7	5.7
Lane Grp Cap (vph)		380	1914	1077	569	559
v/s Ratio Prot				0.27		
v/s Ratio Perm		c0.31	0.15		c0.29	0.06
v/c Ratio		0.85	0.37	0.52	0.53	0.11
Uniform Delay, d1		26.4	19.2	14.5	12.9	9.8
Progression Factor		1.00	1.00	1.05	1.09	2.29
Incremental Delay, d2		20.6	0.5	1.5	3.0	0.3
Delay (s)		47.0	19.8	16.7	17.0	22.7
Level of Service		D	B	B	B	C
Approach Delay (s)			28.4	17.5		
Approach LOS			C	B		

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.1
Intersection Capacity Utilization	63.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

24: Fourth St. & Bryant St. & I-80 EB Off-Ramp

Movement	EBT	EBR	SBL	SBT	SEL	SER
Lane Configurations						
Volume (vph)	402	92	68	271	760	52
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.5		4.2	4.2	4.5	4.5
Lane Util. Factor	0.81		1.00	1.00	0.94	0.86
Frpb, ped/bikes	0.94		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	5515		1459	1305	4120	1122
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	5515		1459	1305	4120	1122
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	457	105	77	308	864	59
RTOR Reduction (vph)	46	0	52	0	0	0
Lane Group Flow (vph)	516	0	25	308	870	53
Confl. Peds. (#/hr)		293	926			
Confl. Bikes (#/hr)		10				
Parking (#/hr)	10	10		10		
Turn Type	NA		Split	NA	Prot	Perm
Protected Phases	2		7	7	4	
Permitted Phases						4
Actuated Green, G (s)	23.5		26.8	26.8	19.5	19.5
Effective Green, g (s)	25.5		28.8	28.8	23.5	23.5
Actuated g/C Ratio	0.28		0.32	0.32	0.26	0.26
Clearance Time (s)	5.5		6.2	6.2	8.5	8.5
Lane Grp Cap (vph)	1562		466	417	1075	292
v/s Ratio Prot	c0.09		0.02	c0.24	c0.21	
v/s Ratio Perm						0.05
v/c Ratio	0.33		0.05	0.74	0.81	0.18
Uniform Delay, d1	25.5		21.2	27.2	31.2	25.8
Progression Factor	1.00		1.53	0.97	1.00	1.00
Incremental Delay, d2	0.6		0.2	9.5	6.6	1.4
Delay (s)	26.1		32.5	35.8	37.7	27.2
Level of Service	C		C	D	D	C
Approach Delay (s)	26.1			35.1	37.1	
Approach LOS	C			D	D	

Intersection Summary			
HCM 2000 Control Delay	33.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	64.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

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HCM Signalized Intersection Capacity Analysis
25: Fifth St. & I-80 WB Off-Ramp & Harrison St.

5/28/2015

Movement	WBL	WBT	WBR	NBL	NBT	SBT	SBR	NWL2	NWL	NWR
Lane Configurations										
Volume (vph)	79	389	44	34	166	356	188	249	443	262
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.5			2.0	2.0			2.5	2.5
Lane Util. Factor		0.81			0.95	0.95			0.94	0.86
Frpb, ped/bikes		0.98			1.00	0.91			0.97	0.69
Flpb, ped/bikes		0.97			0.98	1.00			0.67	1.00
Frt		0.99			1.00	0.95			0.99	0.85
Flt Protected		0.99			0.99	1.00			0.95	1.00
Satd. Flow (prot)		5857			2973	2427			2815	816
Flt Permitted		0.99			0.83	1.00			0.95	1.00
Satd. Flow (perm)		5857			2496	2427			2815	816
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	81	401	45	35	171	367	194	257	457	270
RTOR Reduction (vph)	0	23	0	0	0	7	0	0	0	0
Lane Group Flow (vph)	0	504	0	0	206	554	0	0	757	227
Confl. Peds. (#/hr)	200		250	250			250	200	250	250
Confl. Bikes (#/hr)			10				10			10
Bus Blockages (#/hr)	0	5	0	0	5	5	0	0	0	0
Parking (#/hr)		10				10				
Turn Type	Perm	NA		Perm	NA	NA		Perm	Prot	Perm
Protected Phases		6			4	4			7	
Permitted Phases	6			4				7		7
Actuated Green, G (s)		20.5			22.0	22.0			14.5	14.5
Effective Green, g (s)		23.5			26.0	26.0			18.5	18.5
Actuated g/C Ratio		0.31			0.35	0.35			0.25	0.25
Clearance Time (s)		5.5			6.0	6.0			6.5	6.5
Lane Grp Cap (vph)		1835			865	841			694	201
v/s Ratio Prot						c0.23				
v/s Ratio Perm		0.09			0.08				0.27	c0.28
v/c Ratio		0.27			0.24	0.66			1.09	1.13
Uniform Delay, d1		19.3			17.4	20.7			28.2	28.2
Progression Factor		1.00			1.00	1.00			1.00	1.00
Incremental Delay, d2		0.4			0.6	4.0			61.5	102.6
Delay (s)		19.7			18.1	24.8			89.8	130.8
Level of Service		B			B	C			F	F
Approach Delay (s)		19.7			18.1	24.8			99.3	
Approach LOS		B			B	C			F	

Intersection Summary			
HCM 2000 Control Delay	55.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	7.0
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
26: Delancey St & Brannan St

5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	243	202	50	9	181	95	19	4	6	12	8	110
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	267	222	55	10	199	104	21	4	7	13	9	121

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	544	313	32	143
Volume Left (vph)	267	10	21	13
Volume Right (vph)	55	104	7	121
Hadj (s)	0.07	-0.16	0.04	-0.46
Departure Headway (s)	4.9	5.0	6.4	5.6
Degree Utilization, x	0.74	0.43	0.06	0.22
Capacity (veh/h)	714	689	482	572
Control Delay (s)	20.7	11.7	9.7	10.2
Approach Delay (s)	20.7	11.7	9.7	10.2
Approach LOS	C	B	A	B

Intersection Summary			
Delay	16.2		
Level of Service	C		
Intersection Capacity Utilization	71.3%	ICU Level of Service	C
Analysis Period (min)	15		

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HCM Signalized Intersection Capacity Analysis
27: Second St. & Brannan St.
5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	198	318	57	24	170	158	22	275	36	106	334	94
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		2.0			2.0			2.0			3.0	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frpb, ped/bikes		0.94			0.85			0.96			0.94	
Flpb, ped/bikes		0.93			0.99			0.99			0.96	
Frt		0.99			0.93			0.98			0.97	
Flt Protected		0.98			1.00			1.00			0.99	
Satd. Flow (prot)		2300			2091			2702			2327	
Flt Permitted		0.71			0.90			0.91			0.81	
Satd. Flow (perm)		1653			1897			2471			1915	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	206	331	59	25	177	165	23	286	38	110	348	98
RTOR Reduction (vph)	0	6	0	0	7	0	0	3	0	0	4	0
Lane Group Flow (vph)	0	590	0	0	360	0	0	345	0	0	552	0
Confl. Peds. (#/hr)	610		610	610		610	610		610	610		610
Confl. Bikes (#/hr)			20			6			3			23
Bus Blockages (#/hr)	0	0	0	0	0	0	0	5	0	0	5	0
Parking (#/hr)		10	10		10	10					10	10
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)		23.0			23.0			27.0			27.0	
Effective Green, g (s)		26.0			26.0			30.0			29.0	
Actuated g/C Ratio		0.43			0.43			0.50			0.48	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Lane Grp Cap (vph)		716			822			1235			925	
v/s Ratio Prot												
v/s Ratio Perm		c0.36			0.19			0.14			c0.29	
v/c Ratio		0.82			0.44			0.28			0.60	
Uniform Delay, d1		15.0			11.9			8.7			11.3	
Progression Factor		1.00			1.00			1.00			0.63	
Incremental Delay, d2		10.4			1.7			0.6			2.3	
Delay (s)		25.4			13.6			9.3			9.4	
Level of Service		C			B			A			A	
Approach Delay (s)		25.4			13.6			9.3			9.4	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	5.0
Intersection Capacity Utilization	94.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
28: Second St. & Bryant St.
5/28/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	157	476	106	0	0	0	0	224	251	22	417	0
Ideal Flow (vphpl)	1000	1000	1000	1800	1800	1800	1000	1000	1000	1800	1800	1800
Total Lost time (s)	2.0	2.0						2.0	2.0		2.0	
Lane Util. Factor	*0.60	*0.60						*0.60	0.91		0.95	
Frpb, ped/bikes	1.00	0.94						0.90	0.67		1.00	
Flpb, ped/bikes	1.00	1.00						1.00	1.00		0.99	
Frt	1.00	0.97						0.95	0.85		1.00	
Flt Protected	0.95	1.00						1.00	1.00		1.00	
Satd. Flow (prot)	899	1336						875	444		2669	
Flt Permitted	0.95	1.00						1.00	1.00		0.92	
Satd. Flow (perm)	899	1336						875	444		2455	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	185	560	125	0	0	0	0	264	295	26	491	0
RTOR Reduction (vph)	0	29	0	0	0	0	0	4	5	0	0	0
Lane Group Flow (vph)	185	656	0	0	0	0	0	381	169	0	517	0
Confl. Peds. (#/hr)	160		560	160		160	160		560	560		160
Confl. Bikes (#/hr)			1						17			
Parking (#/hr)	10	10	10								10	
Turn Type	Split	NA						NA	Perm	Perm	NA	
Protected Phases	2	2						4			4	
Permitted Phases									4	4		
Actuated Green, G (s)	27.0	27.0						26.0	26.0		26.0	
Effective Green, g (s)	28.5	28.5						27.5	27.5		27.5	
Actuated g/C Ratio	0.48	0.48						0.46	0.46		0.46	
Clearance Time (s)	3.5	3.5						3.5	3.5		3.5	
Lane Grp Cap (vph)	427	634						401	203		1125	
v/s Ratio Prot	0.21	c0.49						c0.44				
v/s Ratio Perm									0.38		0.21	
v/c Ratio	0.43	1.03						0.95	0.83		0.46	
Uniform Delay, d1	10.4	15.8						15.6	14.2		11.2	
Progression Factor	1.00	1.00						0.91	0.92		1.00	
Incremental Delay, d2	3.2	44.8						31.6	28.4		1.4	
Delay (s)	13.6	60.6						45.8	41.5		12.5	
Level of Service	B	E						D	D		B	
Approach Delay (s)		50.6			0.0			44.5			12.5	
Approach LOS		D			A			D			B	

Intersection Summary			
HCM 2000 Control Delay	38.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	90.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

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OFF-SITE ALTERNATIVE AT PIERS 30/32 & SWL 330
TRAFFIC CONTRIBUTIONS TO LOS E OR LOS F

PIER 30-32: EXISTING PLUS PROJECT WITH BASKETBALL GAME, WEEKDAY PM PEAK, NO GIANTS

Intersection	Critical Movement Operating at E or F	Project Contribution	2040 Total Volumes[1]	% Project Contribution	Impact?
4: Howard St / The Embarcadero	**NBL/U**	**48**	**197**	**24.4%**	**Yes**
	SBT	**64**	**963**	**6.6%**	**Yes**
7: Bryant St / The Embarcadero	**EBT/R**	**19**	**250**	**7.6%**	**Yes**
	NBT/R	**167**	**930**	**18.0%**	**Yes**
	SBT	27	1155	2.3%	No
10: Townsend St / The Embarcadero	SBT/R	29	1005	2.9%	No
11: King St/ Second St	EBL	0	196	0.0%	No
	WBT/R	29	867	3.3%	No
14: King St/ I-280 Ramps / Fifth St	**EBT/R**	**133**	**1960**	**6.8%**	**Yes**
15: Harrison St / Main St	WBL/T/R	30	650	4.6%	No
21: Harrison / Fourth St	WBL	7	703	1.0%	No
	SBR	9	1180	0.8%	No
24: Bryant St / Fourth St	SBT	26	610	4.3%	No
28: Bryant St / Second St	**EBT/R**	**33**	**642**	**5.1%**	**Yes**
	NBT	0	512	0.0%	No

PIER 30-32: EXISTING PLUS PROJECT WITH NO EVENT, WEEKDAY PM PEAK, NO GIANTS

Intersection	Critical Movement Operating at E or F	Project Contribution	2040 Total Volumes[1]	% Project Contribution	Impact?
4: Howard St / The Embarcadero	**NBL/U**	**10**	**159**	**6.3%**	**Yes**
	SBT	18	917	2.0%	No
5: Folsom St / The Embarcadero	NBL/U	0	94	0.0%	No
	SBT/R	18	1038	1.7%	No
7: Bryant St / The Embarcadero	**NBL/U**	**117**	**308**	**38.0%**	**Yes**
	SBT	42	1170	3.6%	No
10: Townsend St / The Embarcadero	SBT/R	15	991	1.5%	No
11: King St/ Second St	EBL	0	196	0.0%	No
	WBT/R	15	853	1.8%	No
14: King St/ I-280 Ramps / Fifth St	EBT/R	27	1854	1.5%	No
15: Harrison St / Main St	WBL/T/R	0	620	0.0%	No
21: Harrison / Fourth St	SBR	0	1171	0.0%	No
24: Bryant St / Fourth St	SBT	0	584	0.0%	No
28: Bryant St / Second St	EBT/R	15	624	2.4%	No
	NBT	0	512	0.0%	No

APPENDIX TR-13
PROJECT VARIANT PARKING TABLE

VARIANT (75 fewer on-site spaces; assume they park at UCSF 3rd St Garage)
No Giants

Parking Facility Grouping	No Event		Convention Event		Basketball Game	
	Midday	Evening	Midday	Evening	Midday	Evening
Weekday Conditions						
Existing Demand	5,409	2,111	5,409	2,111	5,409	2,111
Project Demand	1,049	489	1,906	669	1,072	4,270
Total Demand	6,458	2,600	7,315	2,780	6,481	6,381
Total Supply	8,610	6,130	8,610	6,130	8,610	7,530
Total Parking Occupancy	75%	42%	85%	45%	75%	85%
Surplus/(Shortfall)a	2,152	3,530	1,295	3,350	2,129	1,149
Shortfall if Additional Facilities Not Open	None closed	No shortfall	None closed	No shortfall	None closed	**(176)**
Shortfall if UCSF Facilities Not Open	No shortfall	No shortfall	No shortfall	No shortfall	No shortfall	No shortfall
Saturday Conditions						
Existing Demand	1,159	919	—	—	1,159	919
Project Demand	589	462	—	—	598	4,573
Total Demand	1,748	1,381	—	—	1,757	5,492
Total Supply	6,130	6,130	—	—	6,130	7,530
Total Parking Occupancy	29%	23%	—	—	29%	73%
Surplus/(Shortfall)	4,382	4,749	—	—	4,373	2,038
Shortfall if Additional Facilities Not Open	No shortfall	No shortfall	—	—	No shortfall	No shortfall
Shortfall if UCSF Facilities Not Open	No shortfall	No shortfall	—	—	No shortfall	No shortfall

APPENDIX NO

Noise Supporting Information

Existing Weekday PM (4pm - 6pm)

ROAD SEGMENT Calveno Peak			TOTAL # VEHICLES	VEHICLE TYPE %						VEHICLE SPEED						NOISE LEVEL (dBA)			CALCULATED NOISE LEVEL (15 meters from roadway center)
	from:	to:		Auto %	Auto	MT %	MT	HT %	HT	Auto	k/h	MT	k/h	HT	k/h	Auto	MT	HT	
3rd Street	South	China B	1,420	95	1349	3	42.6	2	28.4	35	56	35	56	35	56	65.6	60.3	65.3	69.1
3rd Street	16th	Mariposa	1,706	95	1620.7	3	51.18	2	34.12	35	56	35	56	35	56	66.4	61.1	66.1	69.9
Illinois	Mariposa	20th	250	95	237.5	3	7.5	2	5	30	48	30	48	30	48	56.1	51.7	57.1	60.3
Tery Fran	South	China B	443	97	429.71	2	8.86	1	4.43	25	40	25	40	25	40	56.4	51.2	55.9	59.8
16th	3rd	I-280	1,010	95	959.5	3	30.3	2	20.2	30	48	30	48	30	48	62.2	57.8	63.2	66.4
Mariposa	3rd	I-280	819	95	778.05	3	24.57	2	16.38	30	48	30	48	30	48	61.3	56.9	62.3	65.5

Assumptions: Traffic data from Adavant

Existing Weekday PM + Convention

ROAD SEGMENT Calveno Peak			TOTAL # VEHICLES	VEHICLE TYPE %						VEHICLE SPEED						NOISE LEVEL (dBA)			CALCULATED NOISE LEVEL (15 meters from roadway center)
	from:	to:		Auto %	Auto	MT %	MT	HT %	HT	Auto	k/h	MT	k/h	HT	k/h	Auto	MT	HT	
3rd Street	South	China B	1,688	95	1603.6	3	50.64	2	33.76	35	56	35	56	35	56	66.4	61.1	66.0	69.8
3rd Street	16th	Mariposa	1,706	95	1620.7	3	51.18	2	34.12	35	56	35	56	35	56	66.4	61.1	66.1	69.9
Illinois	Mariposa	20th	605	95	574.75	3	18.15	2	12.1	30	48	30	48	30	48	60.0	55.6	61.0	64.2
Tery Fran	South	China B	443	97	429.71	2	8.86	1	4.43	25	40	25	40	25	40	56.4	51.2	55.9	59.8
16th	3rd	I-280	1,307	95	1241.7	3	39.21	2	26.14	30	48	30	48	30	48	63.3	58.9	64.3	67.5
Mariposa	3rd	I-280	1,091	95	1036.5	3	32.73	2	21.82	30	48	30	48	30	48	62.5	58.1	63.5	66.7

Assumptions: Traffic data from Adavant

Existing Weekday Evening (6pm - 8pm)

ROAD SEGMENT Calveno Peak			TOTAL # VEHICLES	VEHICLE TYPE %						VEHICLE SPEED						NOISE LEVEL (dBA)			CALCULATED NOISE LEVEL (15 meters from roadway center)
	from:	to:		Auto %	Auto	MT %	MT	HT %	HT	Auto	k/h	MT	k/h	HT	k/h	Auto	MT	HT	
3rd Street	South	China B	1,231	95	1169.5	3	36.93	2	24.62	35	56	35	56	35	56	65.0	59.7	64.7	68.5
3rd Street	16th	Mariposa	1,423	95	1351.9	3	42.69	2	28.46	35	56	35	56	35	56	65.6	60.3	65.3	69.1
Illinois	Mariposa	20th	155	95	147.25	3	4.65	2	3.1	30	48	30	48	30	48	54.1	49.7	55.0	58.2
Tery Fran	South	China B	261	97	253.17	2	5.22	1	2.61	25	40	25	40	25	40	54.1	48.9	53.6	57.5
16th	3rd	I-280	851	95	808.45	3	25.53	2	17.02	30	48	30	48	30	48	61.5	57.1	62.4	65.6
Mariposa	3rd	I-280	801	95	760.95	3	24.03	2	16.02	30	48	30	48	30	48	61.2	56.8	62.2	65.4

Assumptions: Traffic data from Adavant

Existing Weekday Evening + Baketball Game

ROAD SEGMENT Calveno Peak			TOTAL # VEHICLES	VEHICLE TYPE %						VEHICLE SPEED						NOISE LEVEL (dBA)			CALCULATED NOISE LEVEL (15 meters from roadway center)
	from:	to:		Auto %	Auto	MT %	MT	HT %	HT	Auto	k/h	MT	k/h	HT	k/h	Auto	MT	HT	
3rd Street	South	China B	1,652	95	1569.7	3	49.57	2	33.05	35	56	35	56	35	56	66.3	61.0	65.9	69.7
3rd Street	16th	Mariposa	1,430	95	1358.5	3	42.9	2	28.6	35	56	35	56	35	56	65.6	60.4	65.3	69.1
Illinois	Mariposa	20th	474	95	450.57	3	14.23	2	9.486	30	48	30	48	30	48	58.9	54.5	59.9	63.1
Tery Fran	South	China B	286	97	277.55	2	5.723	1	2.861	25	40	25	40	25	40	54.5	49.3	54.0	57.9
16th	3rd	I-280	1,163	95	1105.2	3	34.9	2	23.27	30	48	30	48	30	48	62.8	58.4	63.8	67.0
Mariposa	3rd	I-280	1,327	95	1260.4	3	39.8	2	26.54	30	48	30	48	30	48	63.4	59.0	64.4	67.6

Assumptions: Traffic data from Adavant

Existing Weekday Late (9pm - 11pm)

ROAD SEGMENT Calveno Peak	from:	to:	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	MT %	MT	HT %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL (15 meters from roadway center)
3rd Street	South	China B	388	95	368.6	3	11.64	2	7.76	35	56	35	56	35	56	60.0	54.7	59.6	63.4
3rd Street	16th	Mariposa	409	95	388.55	3	12.27	2	8.18	35	56	35	56	35	56	60.2	54.9	59.9	63.7
Illinois	Mariposa	20th	38	95	36.1	3	1.14	2	0.76	30	48	30	48	30	48	48.0	43.6	48.9	52.1
Tery Fran	South	China B	101	97	97.97	2	2.02	1	1.01	25	40	25	40	25	40	50.0	44.8	49.4	53.4
16th	3rd	I-280	245	95	232.75	3	7.35	2	4.9	30	48	30	48	30	48	56.0	51.7	57.0	60.2
Mariposa	3rd	I-280	215	95	204.25	3	6.45	2	4.3	30	48	30	48	30	48	55.5	51.1	56.5	59.7

Assumptions: Traffic data from Adavant

Existing Weekday Late + Basketball Game

ROAD SEGMENT Calveno Peak	from:	to:	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	MT %	MT	HT %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL (15 meters from roadway center)
3rd Street	South	China B	312	95	296.05	3	9.349	2	6.233	35	56	35	56	35	56	59.0	53.7	58.7	62.5
3rd Street	16th	Mariposa	412	95	391.77	3	12.37	2	8.248	35	56	35	56	35	56	60.2	55.0	59.9	63.7
Illinois	Mariposa	20th	390	95	370.43	3	11.7	2	7.798	30	48	30	48	30	48	58.1	53.7	59.0	62.2
Tery Fran	South	China B	481	97	466.57	2	9.62	1	4.81	25	40	25	40	25	40	56.8	51.6	56.2	60.2
16th	3rd	I-280	501	95	476.34	3	15.04	2	10.03	30	48	30	48	30	48	59.2	54.8	60.1	63.3
Mariposa	3rd	I-280	644	95	612.07	3	19.33	2	12.89	30	48	30	48	30	48	60.2	55.9	61.2	64.4

Assumptions: Traffic data from Adavant

Existing Saturday Evening (6pm - 8pm)

ROAD SEGMENT Calveno Peak	from:	to:	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	MT %	MT	HT %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL (15 meters from roadway center)
3rd Street	South	China B	519	95	493.05	3	15.57	2	10.38	35	56	35	56	35	56	61.2	56.0	60.9	64.7
3rd Street	16th	Mariposa	569	95	540.55	3	17.07	2	11.38	35	56	35	56	35	56	61.6	56.4	61.3	65.1
Illinois	Mariposa	20th	69	95	65.55	3	2.07	2	1.38	30	48	30	48	30	48	50.5	46.1	51.5	54.7
Tery Fran	South	China B	116	97	112.52	2	2.32	1	1.16	25	40	25	40	25	40	50.6	45.4	50.0	54.0
16th	3rd	I-280	319	95	303.05	3	9.57	2	6.38	30	48	30	48	30	48	57.2	52.8	58.2	61.4
Mariposa	3rd	I-280	256	95	243.2	3	7.68	2	5.12	30	48	30	48	30	48	56.2	51.8	57.2	60.4

Assumptions: Traffic data from Adavant

Existing Saturday Evening + Baketball Game

ROAD SEGMENT Calveno Peak	from:	to:	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	MT %	MT	HT %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL (15 meters from roadway center)
3rd Street	South	China B	902	95	856.59	3	27.05	2	18.03	35	56	35	56	35	56	63.6	58.4	63.3	67.1
3rd Street	16th	Mariposa	575	95	546.56	3	17.26	2	11.51	35	56	35	56	35	56	61.7	56.4	61.4	65.2
Illinois	Mariposa	20th	358	95	339.89	3	10.73	2	7.156	30	48	30	48	30	48	57.7	53.3	58.7	61.9
Tery Fran	South	China B	143	97	138.8	2	2.862	1	1.431	25	40	25	40	25	40	51.5	46.3	51.0	54.9
16th	3rd	I-280	584	95	554.66	3	17.52	2	11.68	30	48	30	48	30	48	59.8	55.4	60.8	64.0
Mariposa	3rd	I-280	723	95	687.22	3	21.7	2	14.47	30	48	30	48	30	48	60.8	56.4	61.7	64.9

Assumptions: Traffic data from Adavant

Cumulative Weekday

ROAD SEGMENT			TOTAL # VEHICLES	VEHICLE TYPE % Auto		MT		HT		VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL (15 meters from roadway center)
Calveno Peak	from:	to:		%	Auto	%	MT	%	HT										
3rd Street	South	China B	2,670	95	2536.1	3	80.09	2	53.39	35	56	35	56	35	56	68.4	63.1	68.0	71.8
3rd Street	16th	Mariposa	2,687	95	2552.7	3	80.61	2	53.74	35	56	35	56	35	56	68.4	63.1	68.0	71.8
Illinois	Mariposa	20th	309	95	294.01	3	9.285	2	6.19	30	48	30	48	30	48	57.1	52.7	58.0	61.2
Tery Fran	South	China B	721	97	699.37	2	14.42	1	7.21	25	40	25	40	25	40	58.5	53.3	58.0	61.9
16th	3rd	I-280	1,229	95	1167.1	3	36.86	2	24.57	30	48	30	48	30	48	63.1	58.7	64.0	67.2
Mariposa	3rd	I-280	1,186	95	1126.4	3	35.57	2	23.71	30	48	30	48	30	48	62.9	58.5	63.9	67.1

Assumptions: Traffic data from Adavant

Cumulative Weekday + Convention

ROAD SEGMENT			TOTAL # VEHICLES	VEHICLE TYPE % Auto		MT		HT		VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL (15 meters from roadway center)
Calveno Peak	from:	to:		%	Auto	%	MT	%	HT										
3rd Street	South	China B	2,938	95	2791.1	3	88.14	2	58.76	35	56	35	56	35	56	68.8	63.5	68.4	72.2
3rd Street	16th	Mariposa	2,687	95	2552.7	3	80.61	2	53.74	35	56	35	56	35	56	68.4	63.1	68.0	71.8
Illinois	Mariposa	20th	665	95	631.75	3	19.95	2	13.3	30	48	30	48	30	48	60.4	56.0	61.4	64.6
Tery Fran	South	China B	721	97	699.37	2	14.42	1	7.21	25	40	25	40	25	40	58.5	53.3	58.0	61.9
16th	3rd	I-280	1,524	95	1447.8	3	45.72	2	30.48	30	48	30	48	30	48	64.0	59.6	65.0	68.2
Mariposa	3rd	I-280	1,458	95	1385.1	3	43.74	2	29.16	30	48	30	48	30	48	63.8	59.4	64.8	68.0

Assumptions: Traffic data from Adavant

Cumulative Weekday + Basketball Game

ROAD SEGMENT			TOTAL # VEHICLES	VEHICLE TYPE % Auto		MT		HT		VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL (15 meters from roadway center)
Calveno Peak	from:	to:		%	Auto	%	MT	%	HT										
3rd Street	South	China B	2,818	95	2677.1	3	84.54	2	56.36	35	56	35	56	35	56	68.6	63.3	68.3	72.1
3rd Street	16th	Mariposa	2,692	95	2557.4	3	80.76	2	53.84	35	56	35	56	35	56	68.4	63.1	68.1	71.9
Illinois	Mariposa	20th	531	95	504.45	3	15.93	2	10.62	30	48	30	48	30	48	59.4	55.0	60.4	63.6
Tery Fran	South	China B	739	97	716.83	2	14.78	1	7.39	25	40	25	40	25	40	58.7	53.4	58.1	62.0
16th	3rd	I-280	1,449	95	1376.6	3	43.47	2	28.98	30	48	30	48	30	48	63.8	59.4	64.7	67.9
Mariposa	3rd	I-280	1,393	95	1323.4	3	41.79	2	27.86	30	48	30	48	30	48	63.6	59.2	64.6	67.8

Assumptions: Traffic data from Adavant

Cumulative Saturday Evening + Baketball Game

ROAD SEGMENT			TOTAL # VEHICLES	VEHICLE TYPE % Auto		MT		HT		VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL (15 meters from roadway center)
Calveno Peak	from:	to:		%	Auto	%	MT	%	HT										
3rd Street	South	China B	1,364	95	1295.8	3	40.92	2	27.28	35	56	35	56	35	56	65.4	60.2	65.1	68.9
3rd Street	16th	Mariposa	977	95	928.15	3	29.31	2	19.54	35	56	35	56	35	56	64.0	58.7	63.7	67.5
Illinois	Mariposa	20th	430	95	408.5	3	12.9	2	8.6	30	48	30	48	30	48	58.5	54.1	59.5	62.7
Tery Fran	South	China B	329	97	319.13	2	6.58	1	3.29	25	40	25	40	25	40	55.1	49.9	54.6	58.5
16th	3rd	I-280	673	95	639.35	3	20.19	2	13.46	30	48	30	48	30	48	60.4	56.0	61.4	64.6
Mariposa	3rd	I-280	904	95	858.8	3	27.12	2	18.08	30	48	30	48	30	48	61.7	57.3	62.7	65.9

Assumptions: Traffic data from Adavant

Cumulative Saturday Evening No Project

ROAD SEGMENT Calveno Peak	from:	to:	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	MT %	MT	HT %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	NOISE LEVEL 15 meters from roadway center)
3rd Street	South	China B	981	95	932.33	3	29.44	2	19.63	35	56	35	56	35	56	64.0	58.7	63.7	67.5
3rd Street	16th	Mariposa	947	95	899.65	3	28.41	2	18.94	35	56	35	56	35	56	63.8	58.6	63.5	67.3
Illinois	Mariposa	20th	141	95	133.57	3	4.218	2	2.812	30	48	30	48	30	48	53.6	49.2	54.6	57.8
Tery Fran	South	China B	302	97	292.94	2	6.04	1	3.02	25	40	25	40	25	40	54.8	49.6	54.2	58.2
16th	3rd	I-280	408	95	387.45	3	12.24	2	8.157	30	48	30	48	30	48	58.3	53.9	59.2	62.4
Mariposa	3rd	I-280	436	95	414.58	3	13.09	2	8.728	30	48	30	48	30	48	58.6	54.2	59.5	62.7

Assumptions: Traffic data from Adavant

Existing Weekday PM + No Project Alternative

ROAD SEGMENT Calveno Peak	from:	to:	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	MT %	MT	HT %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL 15 meters from roadway center)
3rd Street	South	China B	1,509	95	1433.6	3	45.27	2	30.18	35	56	35	56	35	56	65.9	60.6	65.5	69.3
3rd Street	16th	Mariposa	1,724	95	1637.8	3	51.72	2	34.48	35	56	35	56	35	56	66.5	61.2	66.1	69.9
Illinois	Mariposa	20th	444	95	421.8	3	13.32	2	8.88	30	48	30	48	30	48	58.6	54.2	59.6	62.8
Tery Fran	South	China B	443	97	429.71	2	8.86	1	4.43	25	40	25	40	25	40	56.4	51.2	55.9	59.8
16th	3rd	I-280	1,154	95	1096.3	3	34.62	2	23.08	30	48	30	48	30	48	62.8	58.4	63.8	67.0
Mariposa	3rd	I-280	971	95	922.45	3	29.13	2	19.42	30	48	30	48	30	48	62.0	57.6	63.0	66.2

Assumptions: Traffic data from Adavant

Existing Saturday eve + No Project Alternative

ROAD SEGMENT Calveno Peak	from:	to:	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	MT %	MT	HT %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL 15 meters from roadway center)
3rd Street	South	China B	528	95	501.6	3	15.84	2	10.56	35	56	35	56	35	56	61.3	56.0	61.0	64.8
3rd Street	16th	Mariposa	575	95	546.25	3	17.25	2	11.5	35	56	35	56	35	56	61.7	56.4	61.4	65.2
Illinois	Mariposa	20th	89	95	84.55	3	2.67	2	1.78	30	48	30	48	30	48	51.7	47.3	52.6	55.8
Tery Fran	South	China B	116	97	112.52	2	2.32	1	1.16	25	40	25	40	25	40	50.6	45.4	50.0	54.0
16th	3rd	I-280	344	95	326.8	3	10.32	2	6.88	30	48	30	48	30	48	57.5	53.1	58.5	61.7
Mariposa	3rd	I-280	269	95	255.55	3	8.07	2	5.38	30	48	30	48	30	48	56.5	52.1	57.4	60.6

Assumptions: Traffic data from Adavant

Existing Weekday PM + Reduced Density Alternative

ROAD SEGMENT Calveno Peak	from:	to:	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	MT %	MT	HT %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL 15 meters from roadway center)
3rd Street	South	China B	1,650	95	1567.5	3	49.5	2	33	35	56	35	56	35	56	66.3	61.0	65.9	69.7
3rd Street	16th	Mariposa	1,727	95	1640.7	3	51.81	2	34.54	35	56	35	56	35	56	66.5	61.2	66.1	69.9
Illinois	Mariposa	20th	500	95	475	3	15	2	10	30	48	30	48	30	48	59.1	54.7	60.1	63.3
Tery Fran	South	China B	443	97	429.71	2	8.86	1	4.43	25	40	25	40	25	40	56.4	51.2	55.9	59.8
16th	3rd	I-280	1,233	95	1171.4	3	36.99	2	24.66	30	48	30	48	30	48	63.1	58.7	64.0	67.2
Mariposa	3rd	I-280	1,037	95	985.15	3	31.11	2	20.74	30	48	30	48	30	48	62.3	57.9	63.3	66.5

Assumptions: Traffic data from Adavant

Existing Saturday eve + Reduced Density Alternative

Calveno Peak

ROAD SEGMENT	from:	to:	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	MT %	MT	HT %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL 15 meters from roadway center)
3rd Street	South	China B	859	95	816.35	3	25.78	2	17.19	35	56	35	56	35	56	63.4	58.1	63.1	66.9
3rd Street	16th	Mariposa	600	95	569.71	3	17.99	2	11.99	35	56	35	56	35	56	61.9	56.6	61.5	65.3
Illinois	Mariposa	20th	297	95	282.32	3	8.915	2	5.944	30	48	30	48	30	48	56.9	52.5	57.9	61.1
Tery Fran	South	China B	142	97	137.8	2	2.841	1	1.421	25	40	25	40	25	40	51.5	46.3	50.9	54.9
16th	3rd	I-280	559	95	531.5	3	16.78	2	11.19	30	48	30	48	30	48	59.6	55.2	60.6	63.8
Mariposa	3rd	I-280	683	95	649.18	3	20.5	2	13.67	30	48	30	48	30	48	60.5	56.1	61.5	64.7

Assumptions: Traffic data from Adavant

Existing Weekday Evening + No TSP Baketball Game

Calveno Peak

ROAD SEGMENT	from:	to:	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	MT %	MT	HT %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL 15 meters from roadway center)
3rd Street	South	China B	1,815	95	1724.6	3	54.46	2	36.31	35	56	35	56	35	56	66.7	61.4	66.3	70.1
3rd Street	16th	Mariposa	1,469	95	1395.5	3	44.07	2	29.38	35	56	35	56	35	56	65.8	60.5	65.4	69.2
Illinois	Mariposa	20th	536	95	509.34	3	16.08	2	10.72	30	48	30	48	30	48	59.5	55.1	60.4	63.6
Tery Fran	South	China B	289	97	279.91	2	5.771	1	2.886	25	40	25	40	25	40	54.6	49.4	54.0	58.0
16th	3rd	I-280	1,241	95	1178.9	3	37.23	2	24.82	30	48	30	48	30	48	63.1	58.7	64.1	67.3
Mariposa	3rd	I-280	1,439	95	1367	3	43.17	2	28.78	30	48	30	48	30	48	63.7	59.3	64.7	67.9

Assumptions: Traffic data from Adavant

Existing Weekday Late + No TSP Basketball Game

Calveno Peak

ROAD SEGMENT	from:	to:	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	MT %	MT	HT %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL 15 meters from roadway center)
3rd Street	South	China B	327	95	311.02	3	9.822	2	6.548	35	56	35	56	35	56	59.2	54.0	58.9	62.7
3rd Street	16th	Mariposa	451	95	428.39	3	13.53	2	9.019	35	56	35	56	35	56	60.6	55.3	60.3	64.1
Illinois	Mariposa	20th	358	95	339.75	3	10.73	2	7.153	30	48	30	48	30	48	57.7	53.3	58.7	61.9
Tery Fran	South	China B	473	97	458.35	2	9.451	1	4.725	25	40	25	40	25	40	56.7	51.5	56.1	60.1
16th	3rd	I-280	747	95	709.29	3	22.4	2	14.93	30	48	30	48	30	48	60.9	56.5	61.9	65.1
Mariposa	3rd	I-280	736	95	699.21	3	22.08	2	14.72	30	48	30	48	30	48	60.8	56.4	61.8	65.0

Assumptions: Traffic data from Adavant

Existing Saturday Evening + No TSP Baketball Game

Calveno Peak

ROAD SEGMENT	from:	to:	TOTAL # VEHICLES	VEHICLE TYPE % Auto %	Auto	MT %	MT	HT %	HT	VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL 15 meters from roadway center)
3rd Street	South	China B	1,050	95	997.25	3	31.49	2	20.99	35	56	35	56	35	56	64.3	59.0	64.0	67.8
3rd Street	16th	Mariposa	605	95	574.53	3	18.14	2	12.1	35	56	35	56	35	56	61.9	56.6	61.6	65.4
Illinois	Mariposa	20th	416	95	395.54	3	12.49	2	8.327	30	48	30	48	30	48	58.4	54.0	59.3	62.5
Tery Fran	South	China B	145	97	140.91	2	2.905	1	1.453	25	40	25	40	25	40	51.6	46.4	51.0	55.0
16th	3rd	I-280	646	95	613.77	3	19.38	2	12.92	30	48	30	48	30	48	60.3	55.9	61.2	64.4
Mariposa	3rd	I-280	824	95	783.07	3	24.73	2	16.49	30	48	30	48	30	48	61.3	56.9	62.3	65.5

Assumptions: Traffic data from Adavant

OffSite Alternative Existing Weekday PM (4pm - 6pm)

ROAD SEGMENT			TOTAL # VEHICLES	VEHICLE TYPE % Auto		MT		HT		VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL 15 meters from roadway center)
Calveno Peak	from:	to:		%	Auto	%	MT	%	HT										
Embarcad	Harrison	Bryant	2,022	95	1920.9	3	60.66	2	40.44	30	48	30	48	30	48	65.2	60.8	66.2	69.4
Embarcad	Brannan	Townsnd	1,871	95	1777.5	3	56.13	2	37.42	30	48	30	48	30	48	64.9	60.5	65.9	69.1
Brannan	Delancey	Embarco	598	97	580.06	2	11.96	1	5.98	25	40	25	40	25	40	57.7	52.5	57.2	61.1
Bryant	Rincon	Embarco	540	97	523.8	2	10.8	1	5.4	25	40	25	40	25	40	57.3	52.1	56.7	60.7

Assumptions: Traffic data from Adavant

OffSite Alternative Existing Weekday PM + Convention

ROAD SEGMENT			TOTAL # VEHICLES	VEHICLE TYPE % Auto		MT		HT		VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL 15 meters from roadway center)
Calveno Peak	from:	to:		%	Auto	%	MT	%	HT										
Embarcad	Harrison	Bryant	2,131	95	2024.6	3	63.93	2	42.62	30	48	30	48	30	48	65.4	61.0	66.4	69.6
Embarcad	Brannan	Townsnd	1,946	95	1848.4	3	58.37	2	38.91	30	48	30	48	30	48	65.0	60.7	66.0	69.2
Brannan	Delancey	Embarco	635	97	615.95	2	12.7	1	6.35	25	40	25	40	25	40	58.0	52.8	57.4	61.4
Bryant	Rincon	Embarco	701	97	680.29	2	14.03	1	7.013	25	40	25	40	25	40	58.4	53.2	57.9	61.8

Assumptions: Traffic data from Adavant

OffSite Alternative Existing Weekday Late (9pm - 11pm)

ROAD SEGMENT			TOTAL # VEHICLES	VEHICLE TYPE % Auto		MT		HT		VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL 15 meters from roadway center)
Calveno Peak	from:	to:		%	Auto	%	MT	%	HT										
Embarcad	Harrison	Bryant	1,221	95	1160	3	36.63	2	24.42	30	48	30	48	30	48	63.0	58.6	64.0	67.2
Embarcad	Brannan	Townsnd	1,285	95	1220.8	3	38.55	2	25.7	30	48	30	48	30	48	63.2	58.8	64.2	67.4
Brannan	Delancey	Embarco	145	97	140.65	2	2.9	1	1.45	25	40	25	40	25	40	51.6	46.4	51.0	55.0
Bryant	Rincon	Embarco	227	97	220.19	2	4.54	1	2.27	25	40	25	40	25	40	53.5	48.3	53.0	56.9

Assumptions: Traffic data from Adavant

OffSite Alternative Existing Weekday Late + Basketball Game

ROAD SEGMENT			TOTAL # VEHICLES	VEHICLE TYPE % Auto		MT		HT		VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL 15 meters from roadway center)
Calveno Peak	from:	to:		%	Auto	%	MT	%	HT										
Embarcad	Harrison	Bryant	1,887	95	1792.2	3	56.6	2	37.73	30	48	30	48	30	48	64.9	60.5	65.9	69.1
Embarcad	Brannan	Townsnd	1,456	95	1383.5	3	43.69	2	29.13	30	48	30	48	30	48	63.8	59.4	64.8	68.0
Brannan	Delancey	Embarco	181	97	175.59	2	3.62	1	1.81	25	40	25	40	25	40	52.5	47.3	52.0	55.9
Bryant	Rincon	Embarco	214	97	207.87	2	4.286	1	2.143	25	40	25	40	25	40	53.3	48.1	52.7	56.7

Assumptions: Traffic data from Adavant

OffSite Alternative Existing Saturday Evening (6pm - 8pm)

ROAD SEGMENT			TOTAL # VEHICLES	VEHICLE TYPE % Auto		MT		HT		VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL 15 meters from roadway center)
Calveno Peak	from:	to:		%	Auto	%	MT	%	HT										
Embarcad	Harrison	Bryant	1,344	95	1276.8	3	40.32	2	26.88	30	48	30	48	30	48	63.4	59.0	64.4	67.6
Embarcad	Brannan	Townsnd	1,382	95	1312.9	3	41.46	2	27.64	30	48	30	48	30	48	63.6	59.2	64.5	67.7
Brannan	Delancey	Embarco	304	97	294.88	2	6.08	1	3.04	25	40	25	40	25	40	54.8	49.6	54.2	58.2
Bryant	Rincon	Embarco	299	97	290.03	2	5.98	1	2.99	25	40	25	40	25	40	54.7	49.5	54.2	58.1

Assumptions: Traffic data from Adavant

OffSite Alternative Existing Saturday Evening + Baketball Game

ROAD SEGMENT			TOTAL # VEHICLES	VEHICLE TYPE % Auto		MT		HT		VEHICLE SPEED Auto	k/h	MT	k/h	HT	k/h	NOISE LEVEL (dBA) Auto	MT	HT	CALCULATED NOISE LEVEL 15 meters from roadway center)
Calveno Peak	from:	to:		%	Auto	%	MT	%	HT										
Embarcad	Harrison	Bryant	1,513	95	1437	3	45.38	2	30.25	30	48	30	48	30	48	64.0	59.6	64.9	68.1
Embarcad	Brannan	Townsnd	1,763	95	1675.3	3	52.9	2	35.27	30	48	30	48	30	48	64.6	60.2	65.6	68.8
Brannan	Delancey	Embarco	440	97	427.28	2	8.81	1	4.405	25	40	25	40	25	40	56.4	51.2	55.8	59.8
Bryant	Rincon	Embarco	279	97	270.17	2	5.571	1	2.785	25	40	25	40	25	40	54.4	49.2	53.8	57.8

Assumptions: Traffic data from Adavant

Calculated Ldn from long-term noise monitoring data

		TIME	dBA	Remove LOG	10 dBA Penalized Values	5 dBA Penalized Values
10/8/2014	Midnight	0 / 24	68.5	7079458	70794578	22387211
	am 1:00	100	67.5	5623413	56234133	17782794
	2:00	200	62.2	1659587	16595869	5248075
	3:00	300	58.6	724436	7244360	2290868
	4:00	400	62.5	1778279	17782794	5623413
	5:00	500	69.9	9772372	97723722	30902954
	6:00	600	71.4	13803843	138038426	43651583
	7:00	700	71.4	13803843	138038426	43651583
	8:00	800	71.9	15488166	154881662	48977882
	9:00	900	71.9	15488166	154881662	48977882
	10:00	1000	71.7	14791084	147910839	46773514
	11:00	1100	71.5	14125375	141253754	44668359
	12:00	1200	72.5	17782794	177827941	56234133
	pm 1:00	1300	72.5	17782794	177827941	56234133
	2:00	1400	71.5	14125375	141253754	44668359
	3:00	1500	71.9	15488166	154881662	48977882
	4:00	1600	71.1	12882496	128824955	40738028
	5:00	1700	71.1	12882496	128824955	40738028
	6:00	1800	70.6	11481536	114815362	36307805
	7:00	1900	69.2	8317638	83176377	26302680
	8:00	2000	69.4	8709636	87096359	27542287
	9:00	2100	67.9	6165950	61659500	19498446
	10:00	2200	67.8	6025596	60255959	19054607
	pm 11:00	2300	68.3	6760830	67608298	21379621

Leq Morning Peak Hour 7:00-10:00 a.m.
72 dBA

Leq Evening Peak Hour 4:00-8:00 p.m.
71 dBA

Leq Nighttime 10:00 pm-7:00 a.m. (not penalized)
68 dBA

Leq Daytime 7:00 am-10:00 p.m.
71.2 dBA

Leq 24-Hour
70 dBA

Ldn: 10 dBA penalty for noise between 10:00 p.m. and 7:00 a.m.
75 dBA

CNEL: 5 dBA penalty for noise between 7:00p.m. and 10:00 p.m., and 10 dBA penalty for noise between 10:00 p.m. and 7:00 a.m.
75 dBA

CNEL - Ldn	0.2879454

Calculated Ldn from long-term noise monitoring data

		TIME	dBA	Remove LOG	10 dBA Penalized Values	5 dBA Penalized Values
10/9/2014	Midnight	0 / 24	68.0	6309573	63095734	19952623
	am 1:00	100	66.4	4365158	43651583	13803843
	2:00	200	61.9	1548817	15488166	4897788
	3:00	300	58.8	758578	7585776	2398833
	4:00	400	65.7	3715352	37153523	11748976
	5:00	500	67.8	6025596	60255959	19054607
	6:00	600	70.4	10964782	109647820	34673685
	7:00	700	71.2	13182567	131825674	41686938
10/7/2014	8:00	800	72.3	16982437	169824365	53703180
	9:00	900	73.4	21877616	218776162	69183097
	10:00	1000	72.0	15848932	158489319	50118723
	11:00	1100	71.6	14454398	144543977	45708819
	12:00	1200	71.0	12589254	125892541	39810717
	pm 1:00	1300	71.0	12589254	125892541	39810717
	2:00	1400	71.0	12589254	125892541	39810717
	3:00	1500	71.1	12882496	128824955	40738028
	4:00	1600	71.4	13803843	138038426	43651583
	5:00	1700	71.1	12882496	128824955	40738028
	6:00	1800	70.3	10715193	107151931	33884416
	7:00	1900	69.7	9332543	93325430	29512092
	8:00	2000	69.1	8128305	81283052	25703958
	9:00	2100	70.5	11220185	112201845	35481339
	10:00	2200	69.3	8511380	85113804	26915348
	pm 11:00	2300	70.2	10471285	104712855	33113112

Leq Morning Peak Hour 7:00-10:00 a.m.
72 dBA

Leq Evening Peak Hour 4:00-8:00 p.m.
71 dBA

Leq Nighttime 10:00 pm-7:00 a.m. (not penalized)
68 dBA

Leq Daytime 7:00 am-10:00 p.m.
71 dBA

Leq 24-Hour
70 dBA

Ldn: 10 dBA penalty for noise between 10:00 p.m. and 7:00 a.m.
75 dBA

CNEL: 5 dBA penalty for noise between 7:00p.m. and 10:00 p.m., and 10 dBA penalty for noise between 10:00 p.m. and 7:00 a.m.
75 dBA

CNEL - Ldn 0.35608783

Addition of Construction Noise Levels from Concurrent Phases

Event Center At Mission Bay

Receptor 1: Madrone Bayside Residential Towers			
	Excavation Phase	Compaction Phase	Pile Installation
Noise Source	63.8	64	67.7
Remove LOG	2398832.919	2511886.432	5888436.554
	63.8	64	67.7
Summation of Noise Sources	70.9		

Receptor 2: Agua Vista Pier			
	Excavation Phase	Compaction Phase	Pile Installation
Noise Source	71.5	71.7	75.4
Remove LOG	14125375.45	14791083.88	34673685.05
	71.5	71.7	75.4
Summation of Noise Sources	78.6		

Receptor 3: UCSF Mission Bay Housing			
	Excavation Phase	Compaction Phase	Pile Installation
Noise Source	69.9	70	73.8
Remove LOG	9772372.21	10000000	23988329.19
	69.9	70	73.8
Summation of Noise Sources	78.0		

Receptor 4: UCSF Hospital			
	Excavation Phase	Compaction Phase	Pile Installation
Noise Source	72.4	72.5	76.3
Remove LOG	17378008.29	17782794.1	42657951.88
	72.4	72.5	76.3
Summation of Noise Sources	80.1		

Shoring	Existing
61.6	70.1
1445439.771	10232930
61.6	

Shoring	Existing
69.2	60.3
8317637.711	1071519
69.2	

Shoring	Existing
67.6	71.2
5754399.373	13182567
67.6	

Shoring	Existing
70.1	71.6
10232929.92	14454398
70.1	

Addition of Construction Noise from Multiple Construction Activities

Note: Pile istallation is assumed to occur at the nearest distance (200 feet for UCSF Housing and 560 feet for Hospital)
All other activities are assumed to occut at a further 200 feet in distance
No adjustment assumed for Madrone Tower

Receptor 1: Madrone Residential Towers

Noise Source	Excavation	Compaction	Pile Installation	Shoring
Noise Level (RCNM)	63.8	64	67.7	61.6
Remove Logarithm	2398832.919	2511886.43	5888436.554	1445439.77
Logarithmic sum	70.87944449			

Receptor 2: UCSF Housing Tower

Noise Source	Excavation	Compaction	Pile Installation	Shoring
Noise Level (RCNM)	69.9	69.7	79.8	67.6
Remove Logarithm	9772372.21	9332543.01	95499258.6	5754399.37
Logarithmic sum	80.80477031			

Receptor 3: UCSF Hospital

Noise Source	Excavation	Compaction	Pile Installation	Shoring
Noise Level (RCNM)	64.3	64.1	70.8	62
Remove Logarithm	2691534.804	2570395.78	12022644.35	1584893.19
Logarithmic sum	72.75759659			

RCNM Output Compaction
Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 03/11/2015
Case Description: Warriors Arena Compaction

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
UCSF Housing	Residential	71.0	71.0	68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Mounted Impact Hammer (hoe ram)	Yes	20	90.0		200.0	0.0
Mounted Impact Hammer (hoe ram)	Yes	20	90.0		200.0	0.0
Mounted Impact Hammer (hoe ram)	Yes	20	90.0		200.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Mounted Impact Hammer (hoe ram)	78.0	71.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mounted Impact Hammer (hoe ram)	78.0	71.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mounted Impact Hammer (hoe ram)	78.0	71.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	78.0	75.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

RCNM Output Compaction

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Madrone	Residential	71.0	71.0	68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Mounted Impact Hammer (hoe ram)	Yes	20	90.0		800.0	0.0
Mounted Impact Hammer (hoe ram)	Yes	20	90.0		800.0	0.0
Mounted Impact Hammer (hoe ram)	Yes	20	90.0		800.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Mounted Impact Hammer (hoe ram)	65.9	58.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mounted Impact Hammer (hoe ram)	65.9	58.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mounted Impact Hammer (hoe ram)	65.9	58.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	65.9	63.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #3 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
UCSF Hospital	Commercial	71.0	71.0	68.0

Equipment

RCNM Output Compaction

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Mounted Impact Hammer (hoe ram)	Yes	20	90.0		560.0	0.0
Mounted Impact Hammer (hoe ram)	Yes	20	90.0		560.0	0.0
Mounted Impact Hammer (hoe ram)	Yes	20	90.0		560.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Mounted Impact Hammer (hoe ram)	69.0	62.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mounted Impact Hammer (hoe ram)	69.0	62.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mounted Impact Hammer (hoe ram)	69.0	62.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	69.0	66.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

RCNM Output Construction
Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 03/11/2015
Case Description: Warriors Arena Building Construction

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
UCSF Housing	Residential	71.0	71.0	68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Crane	No	16		80.6	200.0	0.0
Crane	No	16		80.6	200.0	0.0
Crane	No	16		80.6	200.0	0.0
Crane	No	16		80.6	200.0	0.0
Crane	No	16		80.6	200.0	0.0
Crane	No	16		80.6	200.0	0.0
Crane	No	16		80.6	200.0	0.0
Crane	No	16		80.6	200.0	0.0
Gradall	No	40		83.4	200.0	0.0
Gradall	No	40		83.4	200.0	0.0
Gradall	No	40		83.4	200.0	0.0
Gradall	No	40		83.4	200.0	0.0
Pumps	No	50		80.9	200.0	0.0
Pumps	No	50		80.9	200.0	0.0
Tractor	No	40	84.0		200.0	0.0

Results

Calculated (dBA)	Noise Limits (dBA) Day	Evening	Night	Noise Limit Exceedance (dBA) Day	Evening	Night

Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Tractor	72.0	68.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	68.7	64.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	68.7	64.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	68.7	64.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	68.7	64.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	68.5	60.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	68.5	60.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	68.5	60.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	68.5	60.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	68.5	60.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	68.5	60.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	68.5	60.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	68.5	60.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Gradall	71.4	67.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Gradall	71.4	67.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Gradall	71.4	67.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Gradall	71.4	67.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pumps	68.9	65.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pumps	68.9	65.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	72.0	68.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	72.0	78.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

RCNM Output Construction

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Madrone	Residential	71.0	71.0	68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		800.0	0.0
Excavator	No	40		80.7	800.0	0.0
Excavator	No	40		80.7	800.0	0.0
Excavator	No	40		80.7	800.0	0.0
Excavator	No	40		80.7	800.0	0.0
Crane	No	16		80.6	800.0	0.0
Crane	No	16		80.6	800.0	0.0
Crane	No	16		80.6	800.0	0.0
Crane	No	16		80.6	800.0	0.0
Crane	No	16		80.6	800.0	0.0
Crane	No	16		80.6	800.0	0.0
Crane	No	16		80.6	800.0	0.0
Crane	No	16		80.6	800.0	0.0
Gradall	No	40		83.4	800.0	0.0
Gradall	No	40		83.4	800.0	0.0
Gradall	No	40		83.4	800.0	0.0
Gradall	No	40		83.4	800.0	0.0
Pumps	No	50		80.9	800.0	0.0
Pumps	No	50		80.9	800.0	0.0
Tractor	No	40	84.0		800.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Tractor	59.9	55.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	56.6	52.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				

											N/A	N/A	N/A	N/A
Excavator	56.6	52.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	56.6	52.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	56.6	52.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	56.5	48.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	56.5	48.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	56.5	48.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	56.5	48.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	56.5	48.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	56.5	48.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	56.5	48.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	56.5	48.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Gradall	59.3	55.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Gradall	59.3	55.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Gradall	59.3	55.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Gradall	59.3	55.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pumps	56.9	53.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pumps	56.9	53.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	59.9	55.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	59.9	66.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
UCSF Hospital	Commercial	71.0	71.0	68.0

Equipment

RCNM Output Construction

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Tractor	No	40	84.0		560.0	0.0
Excavator	No	40		80.7	560.0	0.0
Excavator	No	40		80.7	560.0	0.0
Excavator	No	40		80.7	560.0	0.0
Excavator	No	40		80.7	560.0	0.0
Crane	No	16		80.6	560.0	0.0
Crane	No	16		80.6	560.0	0.0
Crane	No	16		80.6	560.0	0.0
Crane	No	16		80.6	560.0	0.0
Crane	No	16		80.6	560.0	0.0
Crane	No	16		80.6	560.0	0.0
Crane	No	16		80.6	560.0	0.0
Crane	No	16		80.6	560.0	0.0
Gradall	No	40		83.4	560.0	0.0
Gradall	No	40		83.4	560.0	0.0
Gradall	No	40		83.4	560.0	0.0
Gradall	No	40		83.4	560.0	0.0
Pumps	No	50		80.9	560.0	0.0
Pumps	No	50		80.9	560.0	0.0
Tractor	No	40	84.0		560.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Tractor	63.0	59.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	59.7	55.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	59.7	55.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	59.7	55.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	59.7	55.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Crane	59.6	51.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	59.6	51.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	59.6	51.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	59.6	51.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	59.6	51.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	59.6	51.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	59.6	51.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	59.6	51.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Gradall	62.4	58.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Gradall	62.4	58.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Gradall	62.4	58.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Gradall	62.4	58.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pumps	60.0	56.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pumps	60.0	56.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	63.0	59.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	63.0	69.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

RCNM Output Excavation
Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 03/11/2015
Case Description: Warriors Arena Demo/Excavation

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
UCSF Housing	Residential	71.0	71.0	68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Vacuum Street Sweeper	No	10		81.6	200.0	0.0
Vacuum Street Sweeper	No	10		81.6	200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Scraper	No	40		83.6	200.0	0.0
Scraper	No	40		83.6	200.0	0.0
Scraper	No	40		83.6	200.0	0.0
Dozer	No	40		81.7	200.0	0.0
Dozer	No	40		81.7	200.0	0.0
Dozer	No	40		81.7	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Vacuum Street Sweeper	69.5	59.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vacuum Street Sweeper	69.5	59.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A			

												N/A	N/A	N/A
Excavator	68.7	64.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	68.7	64.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	68.7	64.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	71.5	67.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	71.5	67.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	71.5	67.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	69.6	65.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	69.6	65.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	69.6	65.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	71.5	75.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Madrone	Residential	71.0	71.0	68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Vacuum Street Sweeper	No	10		81.6	800.0	0.0
Vacuum Street Sweeper	No	10		81.6	800.0	0.0
Excavator	No	40		80.7	800.0	0.0
Excavator	No	40		80.7	800.0	0.0
Excavator	No	40		80.7	800.0	0.0
Scraper	No	40		83.6	800.0	0.0
Scraper	No	40		83.6	800.0	0.0
Scraper	No	40		83.6	800.0	0.0
Dozer	No	40		81.7	800.0	0.0
Dozer	No	40		81.7	800.0	0.0
Dozer	No	40		81.7	800.0	0.0

RCNM Output Excavation

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Vacuum Street Sweeper	57.5	47.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vacuum Street Sweeper	57.5	47.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	56.6	52.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	56.6	52.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	56.6	52.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	59.5	55.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	59.5	55.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	59.5	55.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	57.6	53.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	57.6	53.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	57.6	53.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	59.5	63.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
UCSF Hospital	Commercial	71.0	71.0	68.0

Equipment

RCNM Output Excavation

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Vacuum Street Sweeper	No	10		81.6	560.0	0.0
Vacuum Street Sweeper	No	10		81.6	560.0	0.0
Excavator	No	40		80.7	560.0	0.0
Excavator	No	40		80.7	560.0	0.0
Excavator	No	40		80.7	560.0	0.0
Scraper	No	40		83.6	560.0	0.0
Scraper	No	40		83.6	560.0	0.0
Scraper	No	40		83.6	560.0	0.0
Dozer	No	40		81.7	560.0	0.0
Dozer	No	40		81.7	560.0	0.0
Dozer	No	40		81.7	560.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Vacuum Street Sweeper	60.6	50.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vacuum Street Sweeper	60.6	50.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	59.7	55.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	59.7	55.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	59.7	55.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	62.6	58.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	62.6	58.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Scraper	62.6	58.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

RCNM Output Excavation

Dozer	60.7	56.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	60.7	56.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	60.7	56.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	62.6	66.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

RCNM Output Pile Installation
Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 03/11/2015
Case Description: Warriors Arena Pile Installation

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
UCSF Housing	Residential	71.0	71.0	68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	200.0	0.0
Auger Drill Rig	No	20		84.4	200.0	0.0
Auger Drill Rig	No	20		84.4	200.0	0.0
Auger Drill Rig	No	20		84.4	200.0	0.0
Crane	No	16		80.6	200.0	0.0
Crane	No	16		80.6	200.0	0.0
Crane	No	16		80.6	200.0	0.0
Crane	No	16		80.6	200.0	0.0
All Other Equipment > 5 HP	No	50	85.0		200.0	0.0
All Other Equipment > 5 HP	No	50	85.0		200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Concrete Saw	No	20		89.6	200.0	0.0
Concrete Saw	No	20		89.6	200.0	0.0
Concrete Saw	No	20		89.6	200.0	0.0
Concrete Saw	No	20		89.6	200.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Calculated (dBA) Day Evening Night Day
Evening Night

Equipment Lmax Leq Lmax Leq Lmax Leq Lmax Leq Lmax Leq
Lmax Leq Lmax Leq

Auger Drill Rig	72.3	65.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Auger Drill Rig	72.3	65.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Auger Drill Rig	72.3	65.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Auger Drill Rig	72.3	65.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Crane	68.5	60.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Crane	68.5	60.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Crane	68.5	60.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Crane	68.5	60.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
All Other Equipment > 5 HP	73.0	69.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
All Other Equipment > 5 HP	73.0	69.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Excavator	68.7	64.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Excavator	68.7	64.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Excavator	68.7	64.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Excavator	68.7	64.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Concrete Saw	77.5	70.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Concrete Saw	77.5	70.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Concrete Saw	77.5	70.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Concrete Saw	77.5	70.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
Total	77.5	79.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Madrone	Residential	71.0	71.0	68.0

Equipment

RCNM Output Pile Installation

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	800.0	0.0
Auger Drill Rig	No	20		84.4	800.0	0.0
Auger Drill Rig	No	20		84.4	800.0	0.0
Auger Drill Rig	No	20		84.4	800.0	0.0
Crane	No	16		80.6	800.0	0.0
Crane	No	16		80.6	800.0	0.0
Crane	No	16		80.6	800.0	0.0
Crane	No	16		80.6	800.0	0.0
All Other Equipment > 5 HP	No	50	85.0		800.0	0.0
All Other Equipment > 5 HP	No	50	85.0		800.0	0.0
Excavator	No	40		80.7	800.0	0.0
Excavator	No	40		80.7	800.0	0.0
Excavator	No	40		80.7	800.0	0.0
Excavator	No	40		80.7	800.0	0.0
Concrete Saw	No	20		89.6	800.0	0.0
Concrete Saw	No	20		89.6	800.0	0.0
Concrete Saw	No	20		89.6	800.0	0.0
Concrete Saw	No	20		89.6	800.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Noise Limits (dBA) Evening		Noise Limits (dBA) Night		Noise Limit Exceedance (dBA) Day		Noise Limit Exceedance (dBA) Evening		Noise Limit Exceedance (dBA) Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	60.3	53.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Auger Drill Rig	60.3	53.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Auger Drill Rig	60.3	53.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Auger Drill Rig	60.3	53.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	56.5	48.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	56.5	48.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				

											N/A	N/A	N/A	N/A
Crane	56.5	48.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	56.5	48.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	60.9	57.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	60.9	57.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	56.6	52.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	56.6	52.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	56.6	52.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	56.6	52.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Saw	65.5	58.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Saw	65.5	58.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Saw	65.5	58.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Saw	65.5	58.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	65.5	67.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
UCSF Hospital	Commercial	71.0	71.0	68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	560.0	0.0
Auger Drill Rig	No	20		84.4	560.0	0.0
Auger Drill Rig	No	20		84.4	560.0	0.0
Auger Drill Rig	No	20		84.4	560.0	0.0
Crane	No	16		80.6	560.0	0.0
Crane	No	16		80.6	560.0	0.0
Crane	No	16		80.6	560.0	0.0
Crane	No	16		80.6	560.0	0.0

All Other Equipment > 5 HP	No	50	85.0		560.0	0.0
All Other Equipment > 5 HP	No	50	85.0		560.0	0.0
Excavator	No	40		80.7	560.0	0.0
Excavator	No	40		80.7	560.0	0.0
Excavator	No	40		80.7	560.0	0.0
Excavator	No	40		80.7	560.0	0.0
Concrete Saw	No	20		89.6	560.0	0.0
Concrete Saw	No	20		89.6	560.0	0.0
Concrete Saw	No	20		89.6	560.0	0.0
Concrete Saw	No	20		89.6	560.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	63.4	56.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Auger Drill Rig	63.4	56.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Auger Drill Rig	63.4	56.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Auger Drill Rig	63.4	56.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	59.6	51.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	59.6	51.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	59.6	51.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	59.6	51.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	64.0	61.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
All Other Equipment > 5 HP	64.0	61.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	59.7	55.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	59.7	55.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

RCNM Output Pile Installation

Excavator	59.7	55.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	59.7	55.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Saw	68.6	61.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Saw	68.6	61.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Saw	68.6	61.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Concrete Saw	68.6	61.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	68.6	70.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

RCNM Output Shoring
Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 03/11/2015
Case Description: Warriors Arena Pile Shoring

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
UCSF Housing	Residential	71.0	71.0	68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	200.0	0.0
Auger Drill Rig	No	20		84.4	200.0	0.0
Crane	No	16		80.6	200.0	0.0
Crane	No	16		80.6	200.0	0.0
Slurry Plant	No	100		78.0	200.0	0.0
Slurry Plant	No	100		78.0	200.0	0.0
Excavator	No	40		80.7	200.0	0.0
Excavator	No	40		80.7	200.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	72.3	65.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Auger Drill Rig	72.3	65.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	68.5	60.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Crane	68.5	60.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slurry Plant	66.0	66.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slurry Plant	66.0	66.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	68.7	64.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	68.7	64.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	72.3	73.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #2 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Madrone	Residential	71.0	71.0	68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	800.0	0.0
Auger Drill Rig	No	20		84.4	800.0	0.0
Crane	No	16		80.6	800.0	0.0
Crane	No	16		80.6	800.0	0.0
Slurry Plant	No	100		78.0	800.0	0.0
Slurry Plant	No	100		78.0	800.0	0.0
Excavator	No	40		80.7	800.0	0.0
Excavator	No	40		80.7	800.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq

RCNM Output Shoring

Auger Drill Rig	60.3	53.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Auger Drill Rig	60.3	53.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	56.5	48.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	56.5	48.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slurry Plant	53.9	53.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slurry Plant	53.9	53.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	56.6	52.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	56.6	52.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	60.3	61.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**** Receptor #3 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
UCSF Hospital	Commercial	71.0	71.0	68.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20		84.4	560.0	0.0
Auger Drill Rig	No	20		84.4	560.0	0.0
Crane	No	16		80.6	560.0	0.0
Crane	No	16		80.6	560.0	0.0
Slurry Plant	No	100		78.0	560.0	0.0
Slurry Plant	No	100		78.0	560.0	0.0
Excavator	No	40		80.7	560.0	0.0
Excavator	No	40		80.7	560.0	0.0

Results

Noise Limits (dBA) Noise Limit Exceedance (dBA)

RCNM Output Shoring

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Auger Drill Rig	63.4	56.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Auger Drill Rig	63.4	56.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	59.6	51.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	59.6	51.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slurry Plant	57.0	57.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slurry Plant	57.0	57.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	59.7	55.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	59.7	55.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	63.4	64.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

APPENDIX AQ

Air Quality Supporting Information

Air Quality Appendix

1 Introduction

At the request of Environmental Science Associates (ESA), on behalf of the Golden State Warriors (GSW or Sponsor), ENVIRON International Corporation (ENVIRON) conducted a California Environmental Quality Act (CEQA) analysis of criteria air pollutants (CAPs) and precursor emissions associated with the proposed construction of a multi-purpose event center and ancillary development Mission Bay Blocks 29-32 in San Francisco, CA ("Project" or "Site").[1] The analysis prepared by ENVIRON will be used to inform preparation of the Subsequent Environmental Impact Report (SEIR) on the project. This Air Quality Protocol describes the methodology used for evaluation of air quality impacts from construction and operational sources.

The proposed project is not located in an Air Pollution Exposure Zone (APEZ) as defined by the San Francisco Planning Department, Environmental Planning Division (SFEP). However, in the event that the proposed project could result in increased emissions over those assumed for prior approved development for the site in the Mission Bay Final Subsequent Environmental Impact Report (FSEIR), the project impacts could be substantial enough to create a new APEZ. Therefore, preparation of a construction health risk assessment (HRA) and operational HRA are included as part of the air quality impact analysis to demonstrate that the Project will not create an APEZ at nearby sensitive receptors.

1.1 Project Understanding

The proposed Project would be located at Blocks 29-32 of Mission Bay, as designated in the Mission Bay Redevelopment Area. The Mission Bay Redevelopment Area has a Final Supplemental Environmental Impact Report (FSEIR) from1998.

Two alternatives to the project are also considered, as discussed below.

1.1.1 Proposed Project

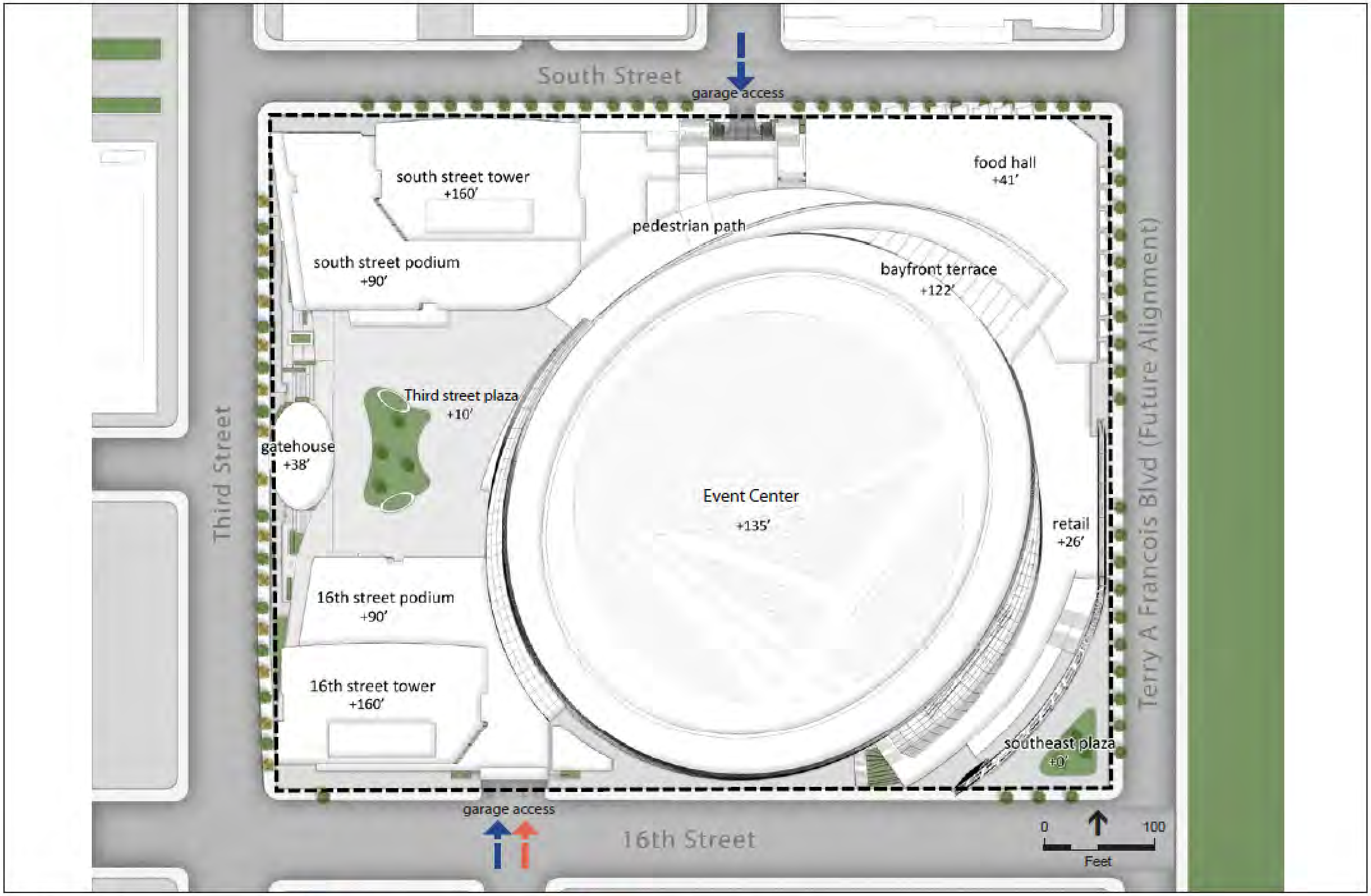
The Project would be located at Blocks 29-32 of Mission Bay within the Mission Bay Redevelopment Area of San Francisco. The rectangular site is bound by Third Street to the west, South Street to the north, Terry Francois Boulevard to the east, and 16th Street to the south. Blocks 29-32 are approximately 11 acres, which are currently vacant. Currently, there are residential land uses to the northwest and south of the proposed Project site, but none immediately adjacent to the site.

The GSW, the Project proponent, propose to create a new approximately 18,000-seat multi-purpose event center and ancillary development including multiple office buildings, retail, restaurants, structured parking, plaza areas, and other amenities. Based on data provided by the GSW, the Project build-out for Blocks 29-32 would include approximately 750,000 gross square feet (gsf) for a multi-use events center and 25,000 gsf for the GSW offices; 580,000 gsf of non-GSW office space; 475,000 gsf of parking (950 spaces); 125,000 gsf of retail space including sit-down restaurants, quick-service restaurants, and soft goods retail.[2] The privately

[1] A separate greenhouse gas inventory will be prepared using similar methods as part of an application for judicial streamlining under Public Resources Code 21178-21189.3.

[2] Notice of Preparation, Table 1. November 19, 2014.

Figure 1. Conceptual Design Site Plan



Project Site Boundary
Auto Access Location
Truck Loading Access

financed events center would host the Bay Area's National Basketball Association (NBA) basketball team, the GSW, during the NBA season, as well as provide a year-round venue for a variety of other uses, including, but not limited to, concerts, cultural events, family shows, conferences, and conventions. The preliminary, conceptual layout is shown in Figure 1 of this Air Quality Protocol. The Project will also include new back-up engines.

Construction of the Project is anticipated to proceed with the offices and arena being built concurrently. The air quality analysis used the construction schedule and phases proposed by the Project Sponsor to estimate construction impacts.

1.1.2 Project Alternatives

The SEIR alternatives analysis included the No Project Alternative (the currently approved development on Blocks 29-32) and one other alternative, a reduced intensity project. These alternatives are analyzed qualitatively in this study.

Alternative A: No Project

- Under the first alternative, all aspects of the current operation at Oracle Arena in Oakland are retained.
- In Alternative A, the No Project Alternative, 1,056,000 square feet of office space would be constructed at the Project site instead of the proposed arena plus office buildings and other uses. As part of the 1998 Mission Bay Redevelopment Area SEIR, Blocks 29-32 are entitled for up to 1,056,000 square feet of office space. Alternative A also includes up to 31,700 gsf of retail use.
- ENVIRON evaluated construction and operation of Alternative A to an equal level of detail as the Project. ENVIRON modeled construction emissions using accepted methodologies such as modeling with California Emissions Estimator Model (CalEEMod®). Because there is no change at the Oracle Arena in Alternative A, the sole impacts come from the office and retail space at Blocks 29-32. As such, only the office and retail space is considered in the impacts analysis.

Alternative B: Reduced Intensity at Blocks 29-32

- Under Alternative B, Blocks 29-32 adjustments will be made to retail uses, office uses, and parking spaces at Blocks 29-32. All other aspects of the proposed Project will remain unchanged.
- From an air quality perspective, this Alternative is expected to have reduced impacts from those of the Project because of its reduced scope.

1.2 Objective

The purpose of the air quality analysis is to assess potential criteria pollutant emissions and ozone precursor emissions that would result from construction and operation of the proposed Project consistent with guidelines and methodologies from air quality agencies, specifically, the Bay Area Air Quality Management District (BAAQMD), the California Air Resources Board (ARB), and the US Environmental Protection Agency (USEPA).

Consistent with CEQA requirements, this Air Quality Analysis evaluates mass emissions of CAPs from both construction and operational activities (including traffic generated from the proposed Project). The scope of this Air Quality Analysis also includes a construction HRA and operational HRA to determine whether the Project contributes to cumulative effects at nearby receptors over the significance thresholds used by SFEP.

1.3 Project Methodology

Construction emissions associated with the Project would be from off-road construction equipment and on-road mobile sources. There would also be operational emissions associated with the Project from traffic-related sources and stationary sources such as boilers and five standby emergency generators. An equivalent level of detail was used in analyzing the Project and the Alternatives. To that extent, the “Project Methodology” discussed throughout this document applies to all Alternatives.

The City of San Francisco, in conjunction with the BAAQMD, has recently completed a City-wide HRA to evaluate cumulative cancer risks and fine particulate matter less than 2.5 micrometer in diameter ($PM_{2.5}$) concentrations from existing stationary and mobile sources. The construction HRA and operational HRA in this Air Quality Analysis was conducted to be consistent with the City-wide HRA.

1.3.1 Project Impacts

The following three sources of emissions were analyzed in the Project build-out year of 2018. For the construction years, ENVIRON assumed uncontrolled emissions based on the construction fleet statewide average for that year. For example, in 2015, the fleet-average emission factor for 2015 were used, and in 2016 the fleet-average emission factor for 2016 were used. Estimation of trip lengths relied on state survey data and season ticket holder addresses.

The three sources of emissions considered are:

1. Project construction (both without implementation of measures to reduce Project impacts and with such measures in place as per Section 5 of this Analysis);
2. Project stationary source emissions in the first Project operation year; and
3. Project traffic emissions in the first Project operation year.

2 Emissions Estimates

The methods used to estimate the emissions of CAPs and Toxic Air Contaminants (TACs) from the Project are described here. Because estimation techniques are different for construction and operation, they are discussed separately below.

2.1 Calculation Methodologies for Construction Emission Sources

Construction emission calculation methodologies cover off-road equipment, which is primarily diesel-fueled, on-road vehicles, and architectural coatings. Calculation methodologies for each type of emissions are explained separately. The methodology used to calculate emissions from each category is presented in Table 1: Emissions Calculations Methodology.

2.1.1 Off-road Diesel Equipment

Project-specific construction equipment inventories that include details on the type, quantity, construction schedule, and hours of operation anticipated for each piece of equipment for each construction phase were provided by the Sponsor. For the diesel-fueled equipment, ENVIRON used methodologies consistent with CalEEMod® to estimate emissions.[3] Where Project-specific equipment information is not available, CalEEMod® default values were used. Load factors for each piece of equipment were based on the default load factor in ARB's 2011 Off-Road Equipment Model (OFFROAD2011).

2.1.2 On-road Haul Trucks and Delivery Trucks and Vans

On-road truck emissions were calculated using the total number of trucks provided by the Sponsor as part of the SEIR project description and emission factors from ARB's EMission FACtor model (EMFAC2011) model. For haul trucks, a 20-mile one-way trip length was used, based on CalEEMod® default truck trip lengths, and for vendor trucks a 7.3-mile trip length was used, based on the regional default vendor trip length from CalEEMod®. The emission factors for running emissions for criteria pollutants were generated with the last version of the EMFAC2011, released on September 30, 2011, and updated in January 2013. The model includes updated information on California's car and truck fleets and travel activity.

Emissions reported by the model were converted to units of grams of pollutant emitted per vehicle mile traveled (VMT) using the daily VMT for running emissions, or grams of pollutant emitted per trip for idling, starting, and evaporative emissions.

2.1.3 Construction Worker Commuting Vehicles

Worker commute trip emissions were included in the emissions inventory for construction. The number of trips by workers was estimated based on data received from ESA in coordination with the Sponsor with regard to construction phasing. ENVIRON used emission factors from EMFAC2011 and default construction worker trip lengths from CalEEMod® to estimate worker trip emissions.

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[3] http://caleemod.com/

Table 1: Emissions Calculations Methodology
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Type	Source	Methodology and Formula	Reference
Construction Equipment	Off-Road Equipment[1]	$Ec = \Sigma(EFc * HP * LF * Hr * C)$	ARB/USEPA Engine Standards USEPA NONROAD
Construction and Operational On-Road Mobile Sources[2]	Running Exhaust and Running Losses	$E_R = \Sigma(EF_R * VMT * C)$, where $VMT = Trip Length * Trip Number$	EMFAC2011
	Starting Exhaust and Evaporative ROG	$E_S = \Sigma(EF_S * Trip Number * C)$	EMFAC2011
	Idling Exhaust	$E_I = \Sigma(EF_I * Trip Number * T_I * C)$	EMFAC2011
Operational On-Road Mobile Sources	Fugitive Road Dust from Paved Roads[3]	$E_{ext} = [k*(sL)^{0.91}*(W)^{1.02}]*(1-P/4N)$	USEPA 2011
Operation	Generator[4]	$E = EF * HP * Hr$	ARB/USEPA Off-Road Engine Standards

Notes:

1. E_C: off-road equipment exhaust emissions (lb).

2. On-road mobile sources include all diesel truck trips

E_R: running exhaust and running losses emissions (lb).

E_S: vehicle starting exhaust and evaporative ROG emissions (lb).

E_I: vehicle idling emissions (lb).
EF_I: vehicle idling emission factor (g/hr-trip). From EMFAC2011.
T_I: idling time
C: unit conversion factor.

3. E_{ext}: annual or other long-term average emission factor (lb/VMT).
k: particle size multiplier for particle size range (lb/VMT); sL: road surface silt loading (g/m^2); W: average weight (tons) of all the vehicles traveling the road; P: number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period; N: number of days in the averaging period (365 for annual).

4. E: generator engine emissions
EF: compression-ignition (diesel) engine emission factor. ARB/USEPA engine PM standard based on engine tier will be used.
HP: generator horsepower; Hr: generator hours. Assume 50 hours of operation annually as a conservative assumption.

Other Abbreviations:
ARB: California Air Resources Board; BAAQMD: Bay Area Air Quality Management District;; EF: Emission Factor; EMFAC: Emission Factor Model EP: Environmental Planning; g: gram; HP: Horsepower; lb: pound; LF: Load Factor; mi: mile; USEPA: United States Environmental Protection Agency; VMT: vehicle miles traveled

References:
ARB/USEPA. 2013. Table 1: ARB and USEPA Off-Road Compression-Ignition (Diesel) Engine Standards. Available online at: http://www.arb.ca.gov/msprog/ordiesel/documents/Off-Road_Diesel_Stds.xls
ARB. 2011. EMission FACtors Model, 2011 (EMFAC2011).
USEPA. 2011. AP 42, Volume I, Fifth Edition. §13.2.1. Paved Roads. Available online at: http://www.epa.gov/ttnchie1/ap42/ch13/final/c13s0201.pdf

2.1.4 Architectural Coating and Consumer Products Emissions

ENVIRON used CalEEMod® to estimate reactive organic gas (ROG) emissions from architectural coating. Compliance with BAAQMD regulations restricting the volatile organic compound (VOC) content of commercial paints was assumed. ENVIRON used the San Francisco-specific area source emission factors developed by SFEP for ROG from consumer products which is 1.51E-05 lb/ROG/sqft/day.

2.1.5 Summary of Project Construction Criteria Pollutant Emissions

CAPs from Project construction phases were added and then normalized over the number of days in the construction period.

2.2 Calculation Methodologies for Operational Emission Sources

Operational emission calculation methodologies are divided into stationary, area, and mobile sources. For each category, emissions are estimated based on data from the Project Sponsor. The methodology used to calculate operational emissions from each category is presented in Table 1: Emissions Calculations Methodology.

2.2.1 Stationary Sources

The proposed Project will include new natural gas-fired boilers and five diesel back-up engines. Emissions were calculated based on information provided by the Project Sponsor and assume Tier 4 ARB and USEPA off-road diesel engine standards (ARB 2013). It should be noted that these stationary sources will be permitted with the BAAQMD and all sources are expected to comply with applicable Best Available Control Technology (BACT) and Best Available Control Technology for Toxics (TBACT) requirements.

2.2.2 Area Sources

The proposed Project includes area sources such architectural coatings, landscape equipment, and consumer products use. These emissions were estimated using CalEEMod®, based on the type and size of land uses associated with the Project. ENVIRON used San Francisco-specific area source emission factors developed by SFEP for ROG from consumer products.

2.2.3 Mobile Sources

The proposed Project would generate vehicle trips, which were provided by SEIR transportation analysts in coordination with ESA. Project traffic was evaluated using EMFAC2011 for the vehicle fleet mix in the San Francisco Bay Area. Additionally, Project-specific types of traffic such as delivery trucks were evaluated using vehicle-type specific emission factors from EMFAC2011, based on Project-specific traffic data as provided by ESA in coordination with the Sponsor. Fugitive road dust emissions are estimated using methodologies consistent with CalEEMod®. The methodologies used to calculate operational mobile emissions can be found in Table 1: Emissions Calculations Methodology.

3 Health Risk Assessment

3.1 Introduction

The objective of the HRA is to evaluate the potential impacts of construction and operation of the Project on off-site receptors in the Mission Bay neighborhood of San Francisco. The criterion for whether or not the Project presents a significant air quality impact under the CEQA is if the Project will "expose sensitive receptors to substantial pollutant concentrations," from Appendix G of the CEQA Guidelines.[4] To evaluate impacts in San Francisco, SFEP requires an HRA for an Environmental Impact Report (EIR) if a project is within an APEZ,[5] defined as an area in which modeled air pollution exceeds "either: (1) a cancer risk of greater than 100 per one million exposed, and/or (2) $PM_{2.5}$ concentrations in excess of 10 microgram per cubic meter (µg/m^3) (including ambient)."[6]

The Project is not in an APEZ, based on air dispersion modeling performed by the San Francisco Department of Public Health in conjunction with SFEP and the BAAQMD.[7] The Project is not bounded by an APEZ, either, with the nearest APEZ falling over the University of California, San Francisco (UCSF) Mission Bay campus, to the west of the Project. The parcels immediately surrounding the Project have average excess cancer risks below 50 in one million persons, with lower risks to the east of Third Street. The nearest residential parcel is the UCSF dormitory to the northwest of the Project; risks at this parcel are below 26 in one million, although the average period of residence in the dormitory is less than the 70 years assumed in excess cancer risk calculations. Another sensitive receptor is located at the UCSF Medical Center at Mission Bay to the southwest of the Project; risks at this parcel are below 45 in one million, but again the average period of residence is less than 70 years. At the dormitory, background $PM_{2.5}$ concentration from the City-wide modeling is 8.5 µg/m^3. At the UCSF Medical Center, background $PM_{2.5}$ concentration is 8.6 µg/m^3.

Since the Project is not in an APEZ, the subsequent criterion of significance is whether or not the Project will create an APEZ. The Project's excess cancer risk and $PM_{2.5}$ contribution is evaluated for contributions from two schemes, construction and operation. A lifetime cumulative risk and annual average $PM_{2.5}$ concentration including both construction and operation is considered and compared against the APEZ thresholds. Annual average $PM_{2.5}$ concentration

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4 Appendix G to the CEQA Guidelines, California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000-15387.

5 San Francisco Planning Department, Environmental Planning. AQ Interim Standard Language – Negative Declarations and Environmental Impact Reports.

6 Department of Public Health, Environmental Health, City and County of San Francisco. 2014. Memorandum to file Re 2014 Air Pollutant Exposure Zone Map. April 9.

7 See Air Pollutant Exposure Zone map (http://www.sfdph.org/dph/files/EHSdocs/AirQuality/AirPollutantExposureZoneMap.pdf) and DPH website (http://www.sfdph.org/dph/eh/Air/Article38.asp).

For parcel-specific information, see the Zoning designation for Mission Bay South Redevelopment Plan Blocks 29-32; Assessor's Block 8722, Lots 001 and 008. This is the parcel bounded by South Street on the north, Third Street on the west, 16th Street on the south, and roughly by the future planned realigned Terry A. Francois Boulevard on the east.

The Project is not in a "health vulnerability layer" as defined in the 2014 Air Pollutant Exposure Zone Map memorandum, either, as it is not in the affected zip codes or within 500 feet of a freeway.

during both construction and after operation of the Project as considered individually and compared against the APEZ thresholds.

To show that the Project will not create an APEZ at nearby residential or sensitive receptors, ENVIRON performed a construction HRA using the USEPA AERMOD model[8] and performed an operational HRA using the BAAQMD screening tools and the USEPA SCREEN3 model.[9]

Many elements of the HRA are designed to provide conservative (that is, health protective) overestimates of impacts to off-site receptors. For residential receptors, the assumption of 24 hours per day of exposure represents a maximum exposure, since based on USEPA activity studies people spend on average 58 to 82% of their time at home, depending on age group (USEPA 2011). In addition, indoor air concentrations are not the same as outdoor air concentrations, however this analysis assumes that there is no filtration or attenuation in the indoor air. Other conservative assumptions made here include the use of BAAQMD screening tables for on-road traffic and the maximum generator risk of 30 in one million, assuming the generators are permitted as three separate projects. The BAAQMD HRA guidelines are also designed to be protective of human health, for example relying on the 80th percentile breathing rate for adults rather than the average and the upper 95th percentile breathing rate for children rather than the average (BAAQMD 2010).

3.2 Estimated Air Concentrations for Construction HRA

Consistent with the City-wide HRA, the air toxics analysis evaluated health risks and $PM_{2.5}$ concentrations resulting from the Project upon the surrounding community. Project construction is planned for a 27-month period starting in late 2015. The Project Sponsor provided ENVIRON with the proposed construction off-road equipment list, count, and activity; and on-road vehicle traffic. ARB tools and methods were used to estimate emissions of diesel particulate matter (DPM) and other TACs from the off- and on-road equipment list.

3.2.1 Chemical Selection

The cancer risk analysis in the construction HRA is based on DPM concentrations and total organic gases (TOGs) from diesel equipment and on-road vehicles. Diesel exhaust, a complex mixture that includes hundreds of individual constituents (California Environmental Protection Agency [Cal/EPA] 1998), is identified by the State of California as a known carcinogen (Cal/EPA 2014). Under California regulatory guidelines, DPM is used as a surrogate measure of carcinogen exposure for the mixture of chemicals that make up diesel exhaust as a whole (Cal/EPA 2014). Cal/EPA and other proponents of using the surrogate approach to quantifying cancer risks associated with the diesel mixture indicate that this method is preferable to a component-based approach. A component-based approach involves estimating risks for each of the individual components of a mixture. Critics of the component-based approach believe it will underestimate the risks associated with diesel as a whole because the identity of all chemicals in the mixture may not be known or exposure and health effects information for all chemicals identified within the mixture may not be available. Furthermore, Cal/EPA has concluded that “potential cancer risk from inhalation exposure to whole diesel exhaust will exceed the multi-

[8] Available at http://www.epa.gov/ttn/scram/dispersion_prefrec.htm#aermod.

[9] Available at http://www.epa.gov/ttn/scram/dispersion_screening.htm.

pathway cancer risk from the speciated components (Cal/EPA 2003)." The analysis of DPM for this Project is based on the surrogate approach, as recommended by Cal/EPA.

3.2.2 Project Sources

Near-field air dispersion modeling of DPM and $PM_{2.5}$ from Project construction sources was conducted using the USEPA AERMOD model.[10] For each receptor location, the model generates average air concentrations that result from emissions from multiple sources.

Air dispersion models such as AERMOD require a variety of inputs such as source parameters, meteorological parameters, topography information, and receptor parameters. When site-specific information was unknown, ENVIRON used default parameter sets that are designed to produce conservative (i.e., overestimated) air concentrations.

3.2.3 Meteorological Data

Air dispersion modeling applications require the use of meteorological data that ideally are spatially and temporally representative of conditions in the immediate vicinity of the site under consideration. For this HRA, BAAQMD's Mission Bay meteorological data for the year 2008 was used, which aligns with the San Francisco City-wide HRA Methodology (BAAQMD 2012).

3.2.4 Terrain Considerations

Elevation and land use data was imported from the National Elevation Dataset (NED) maintained by the United States Geological Survey (USGS 2013). An important consideration in an air dispersion modeling analysis is the selection of whether or not to model an urban area. Due to the urban nature of San Francisco, the site was modeled with the urban population of 805,235, corresponding to the 2010 US Census.

3.2.5 Emission Rates

Emitting activities were modeled to reflect the actual hours of construction. Emissions were modeled using the χ/Q ("chi over q") method, such that each phase has unit emission rates (i.e., 1 gram per second [g/s]), and the model estimates dispersion factors (with units of [$\mu g/m^3$]/[g/s]).

For annual average ambient air concentrations, the estimated annual average dispersion factors are multiplied by the annual average emission rates. The emission rates will vary day to day, with some days having no emissions. For simplicity, the model assumed a constant emission rate during the entire year.

In the construction model, modeled meteorological hours of the day are restricted to 7:00 am to 1:00 am, the likely hours for emissions to occur. This way, only representative meteorological data was considered in determining the dispersion factors. Emission rates are adjusted such that on average, unit emission rates are modeled, i.e. 1 g/s for 24 hours a day, 7 days a week. Thus, the model provides an annual average concentration that can be incorporated directly into the health risk calculations assuming 24 hours of daily exposure.

[10] On November 9, 2005, the USEPA promulgated final revisions to the federal Guideline on Air Quality Models, in which it recommended that AERMOD be used for dispersion modeling evaluations of criteria air pollutant and toxic air pollutant emissions from typical industrial facilities.

3.2.6 Source Parameters

Source location and parameters are necessary to model the dispersion of air emissions. The duration of construction on Blocks 29-32 is anticipated to be up to 27 months, with arena and office building construction proceeding concurrently. At any given time there will be multiple emissions sources associated with construction equipment within the construction zone.

Table 2: Modeling Parameters summarizes the source parameters associated with the construction HRA. The construction area was modeled as an Area source encompassing the entire Project site, following City-wide HRA Methodology. The Area source model included emissions from both off-road construction equipment and off-site trucks (trucks going to and from construction zones[11]). A release height of 5 meters was used, with an initial vertical dimension of 1.4 meters. Emissions were distributed uniformly throughout the area source representing construction of that phase.

Table 2: Modeling Parameters
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Period	Source	Source Dimension	Number of Sources[1,2]	Release Height[3]	Initial Vertical Dimension[4]	Initial Lateral Dimension
		[m]		[m]	[m]	[m]
Construction	Construction Equipment and On-Road Trucks	Project Area	2	5.0	1.4	N/A

Notes:
1. Due to lack of specific instructions on modeling of construction emissions from BAAQMD, ENVIRON used methodology from the City-wide HRA when setting up the model. According to the City-wide HRA methodology, construction sources are modeled as area sources.
2. The number of sources is to be determined based on the geometry of the truck routes.
3. According to the City-wide HRA methodology, release height of the modeled construction was set to 5 meters
4. According to the City-wide HRA methodology, initial vertical dimension of the modeled construction sources was set to 1.4 meters.

Abbreviations:
BAAQMD: Bay Area Air Quality Management District
HRA: Health Risk Assessment
K: Kelvin
m: meter
s: second

Reference:
BAAQMD, 2012. *The San Francisco Community Risk Reduction Plan: Technical Support Documentation, V9.*

[11] ENVIRON assumed a 20 mile one-way trip length for Construction Hauling, based on CalEEMod™ default values, if Project-specific data is not available.

3.2.7 Receptors

Offsite receptors were placed at locations collocated with the grid receptors used in the City-wide HRA and within 2,000 feet of the Project site. Receptors were modeled at a height of 1.8 meters above terrain height, a default breathing height for ground-floor receptors, consistent with the City-wide HRA analysis. As discussed previously, average annual dispersion factors were estimated for each receptor location.

3.2.8 Modeling Adjustment Factors

Cal/EPA (2003) recommends applying an adjustment factor to the annual average concentration modeled assuming continuous emissions (i.e., 24 hours per day, 7 days per week), when the actual emissions are less than 24 hours per day and exposures are concurrent with construction activities occurring at the Project.

Off-site residents are assumed to be exposed to construction emissions 24 hours per day, seven days per week. This assumption is consistent with the modeled emission rates (24 hours per day, 7 days per week), even though actual construction operations may occur for fewer than 24 hours per day and fewer than 7 days per week. Thus, the annual average concentration need not be adjusted. This approach simplifies the model set up, yet does not underestimate exposure since ENVIRON is evaluating chronic health risk impacts and follows City-wide HRA Methodology.

3.3 Risk Characterization Methods for Construction HRA

The following sections discuss in detail the various components required to conduct the HRA.

3.3.1 Exposure Assessment

3.3.1.1 Potentially Exposed Populations

The Construction HRA conservatively evaluated impacts at the off-site receptors assuming child residents.[12] As the residential exposure assumptions are more conservative than those for other sensitive receptor types, a conservative approach of considering all receptors as residential receptors was used. In addition, for the purposes of the cumulative APEZ analysis, the HRA also evaluated impacts at the UCSF Medical Center at Mission Bay assuming a child receptor. The impacts at the hospital consider outdoor air concentrations only, although indoor air at hospitals is filtered to lower indoor air particulate matter concentrations versus outdoor air.

3.3.1.2 Exposure Assumptions

The exposure parameters used to estimate excess lifetime cancer risks for all potentially exposed populations for the construction and operation scenarios are based on risk assessment guidelines from Cal/EPA (2003) and BAAQMD (2010), unless otherwise noted, and are presented in Table 3: Exposure Parameters.

[12] As Child Resident exposure assumptions are more conservative than those for Adult Residents, a conservative approach of considering all off-site receptors as Child Residents during Construction scenario is used in this HRA.

Table 3: Exposure Parameters
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Exposure Parameter	Units	Construction	
		Child Resident	Hospital Child
Daily Breathing Rate (DBR)[1]	[L/kg-day]	581	581
Exposure Time (ET)[2]	[hours/24 hours]	24	24
Exposure Frequency (EF)[3]	[days/year]	350	365
Exposure Duration (ED)[4]	[years]	2	1
Averaging Time (AT)	[days]	25,550	25,550
Intake Factor, Inhalation (IF_{inh})	[m^3/kg-day]	0.016	0.0083

Notes:
1. Daily breathing rate for child resident reflects default breathing rate from BAAQMD 2010.
2. Exposure time for child resident reflects default exposure time from BAAQMD 2010.
3. Exposure frequency for child resident reflects default exposure frequency from BAAQMD 2010.
4 The exposure duration was assumed to be 2 years for child resident reflecting the actual construction duration. Exposure time was conservatively assumed to be 1 year for hospital child.

Abbreviations:
BAAQMD = Bay Area Air Quality Management District; L = liter; kg = kilogram; m^3 = cubic meter

Reference:
BAAQMD. 2010. Air Toxics NSR Program Health Risk Screening Analysis (HRSA) Guidelines. January.

3.3.1.3 Calculation of Intake

The dose estimated for each exposure pathway is a function of the concentration of a chemical and the intake of that chemical. The intake factor for inhalation, IF_{inh}, can be calculated as follows:

$$IF_{inh} = \frac{DBR * ET * EF * ED * CF}{AT}$$

Where:

IF_{inh}	=	Intake Factor for Inhalation (m^3/kg-day)
DBR	=	Daily Breathing Rate (L/kg-day)
ET	=	Exposure Time (hours/24 hours)
EF	=	Exposure Frequency (days/year)
ED	=	Exposure Duration (years)
AT	=	Averaging Time (days)
CF	=	Conversion Factor, 0.001 (m^3/L)

The chemical intake or dose is estimated by multiplying the inhalation intake factor, IF_{inh}, by the chemical concentration in air, C_i. When coupled with the chemical concentration, this calculation is mathematically equivalent to the dose algorithm given in Office of Environmental Health Hazard Assessment (OEHHA) Hot Spots guidance (Cal/EPA 2003).

3.3.2 Toxicity Assessment

The toxicity assessment characterizes the relationship between the magnitude of exposure and the nature and magnitude of adverse health effects that may result from such exposure.

Following City-wide HRA Methodology for cancer risk calculations, ENVIRON included toxicity for DPM for all source categories, and additionally included organic gases from on-road gasoline-powered vehicles. Toxicity values are summarized in Table 4: Carcinogenic Toxicity Values.

Table 4: Carcinogenic Toxicity Values
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Source	Analysis	Chemical	Cancer Potency Factor
			[mg/kg-day]$^{-1}$
Construction Diesel Vehicles	Cancer Risk	Diesel PM	1.1
Construction Gasoline Vehicles	Cancer Risk	1,3-Butadiene	0.6
		Acetaldehyde	0.01
		Benzene	0.1
		Ethylbenzene	0.0087
		Formaldehyde	0.021
		Naphthalene	0.12

Abbreviations:
ARB: Air Resources Board; Cal/EPA: California Environmental Protection Agency; mg/kg-day: per milligram per kilogram-day; OEHHA - Office of Environmental Health Hazard Assessment; PM: Particulate Matter

Reference:
Cal/EPA. 2014. OEHHA/ARB Consolidated Table of Approved Risk Assessment Health Values. July.

3.3.3 Calculated Age-Specific Sensitivity Factors

The estimated excess lifetime cancer risks for a resident child were adjusted using the age sensitivity factors (ASFs) recommended in the Cal/EPA OEHHA Technical Support Document (TSD) (2009) and the cancer risk adjustment factors (CRAFs) recommended by BAAQMD (2010). This approach accounts for an “anticipated special sensitivity to carcinogens” of infants and children. Cancer risk estimates are weighted by a factor of 10 for exposures that occur from the third trimester of pregnancy to two years of age and by a factor of three for exposures that occur from two years through 15 years of age. No weighting factor (i.e., an ASF of one, which is equivalent to no adjustment) is applied to ages 16 to 70 years.

3.3.4 Estimation of Cancer Risks

Excess lifetime cancer risks are estimated as the upper-bound incremental probability that an individual will develop cancer over a lifetime as a direct result of exposure to potential carcinogens. The estimated risk is expressed as a unitless probability. The cancer risk attributed to a chemical is calculated by multiplying the chemical intake or dose at the human exchange boundaries (*e.g.,* lungs) by the chemical-specific Cancer Potency Factor (CPF).

The equation used to calculate the potential excess lifetime cancer risk for the inhalation pathway is as follows:

$$Risk_{inh} = C_i \times CF \times IF_{inh} \times CPF \times ASF$$

Where:

$Risk_{inh}$	=	Cancer Risk; the incremental probability of an individual developing cancer as a result of inhalation exposure to a particular potential carcinogen (unitless)
C_i	=	Annual Average Air Concentration for $Chemical_i$ ($\mu g/m^3$)
CF	=	Conversion Factor (mg/µg)
IF_{inh}	=	Intake Factor for Inhalation (m^3/kg-day)
CPF_I	=	Cancer Potency Factor for $Chemical_i$ (mg chemical/kg body weight-day)$^{-1}$
ASF	=	Age Sensitivity Factor (unitless)

3.4 Operational Traffic Screening

BAAQMD on-road traffic tools were used along with Project-specific data to estimate $PM_{2.5}$ and health-risk impacts from on-road traffic. The BAAQMD San Francisco County Surface Street Screening Tables[13] provide screening risk estimates for this level of traffic for north-south roadways and east-west roadways in San Francisco County. All traffic generated by the Project was assumed to travel along the four segments surrounding the Project Site, resulting in a conservative estimate of impacts from mobile sources, as all Project traffic may not take these routes.

3.5 Operational Stationary Sources

The Project will include new natural gas-fired boilers to provide heating to the proposed arena. According to the BAAQMD,[14] non-diesel boilers are regarded as minor, low-impact sources that can be excluded from the CEQA process. The Project will also include 5 stationary emergency diesel engines which will require stationary source permits from the BAAQMD. BAAQMD Rule 2-5-302 limits project risks to 10 in one million, so for screening purposes incremental risk from the generators is assumed to be 10 in one million. In the worst case, the generators might have up to 3 different owners, resulting in 3 permits with risks of up to 10 in one million each, for a total potential generator risk of 30 in one million.

$PM_{2.5}$ impacts were modeled using the USEPA SCREEN3 model. SCREEN3 is a Gaussian air dispersion model that uses a worst-case, not site-specific, meteorological dataset to estimate maximum impacts.

[13] BAAQMD. 2011. Roadway Screening Analysis Tables. December. Available online at : http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/County%20Surface%20Street%20Screening%20Tables%20Dec%202011.ashx?la=en

[14] BAAQMD. 2012. Recommended Methods for Screening and Modeling Local Risks and Hazards. Available online at : http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Risk%20Modeling%20Approach%20May%202012.ashx?la=en

4 Measures to Reduce Project Impacts

Based on the analysis above, a consultation was conducted with OCII, EP, ESA, and the Project sponsor to identify and develop feasible control measures that would reduce Project impacts. For construction emissions two compliance levels of emissions control measures were assessed: use of construction equipment with EPA Tier 2 engines with Level 3 Verifiable Diesel Emission Control Strategy (VDECS) and EPA Tier 4 engines. While use of equipment with Tier 4 would be the most effective emissions control strategy, the analysis also considers a minimum compliance scenario using use of equipment with EPA Tier 2 engines with Level 3 VDECS, acknowledging that there may be instances where a particular piece of off-road equipment with a Tier 4 engine is: (1) technically not feasible, (2) would not produce desired emissions reductions due to expected operating modes, or (3) there is a compelling emergency need to use off-road equipment that do not have Tier 4 engines.

5 References

Bay Area Air Quality Management District (BAAQMD). 2010. Air Toxics NSR Program Health Risk Screening Analysis (HRSA) Guidelines. January. Available online at: http://www.baaqmd.gov/~/media/Files/Engineering/Air%20Toxics%20Programs/hrsa_guidelines.ashx.

BAAQMD. 2011. California Environmental Quality Act Air Quality Guidelines. Updated May 2011.

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Cal/EPA. 2003. The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments. Office of Environmental Health Hazard Assessment (OEHHA). August. Available online at: http://oehha.ca.gov/air/hot_spots/hraguidefinal.html.

Cal/EPA. 2009. Technical Support Document for Cancer Potency Factors: Methodologies for Derivation, Listing of Available Values, and Adjustment to Allow for Early Life Stage Exposures. May. Available online at: http://oehha.ca.gov/air/hot_spots/2009/TSDCancerPotency.pdf.

Cal/EPA. 2014. OEHHA/ARB Consolidated Table of Approved Risk Assessment Health Values. July. Available online at: http://www.arb.ca.gov/toxics/healthval/contable.pdf.

United States Geological Survey (USGS). National Elevation Dataset. Available online at: http://www.mrlc.gov/viewerjs.

6 Results

Project Tables

Average Daily Construction-related Emissions

	Average Daily Construction Emissions (pounds/day)			
	ROG	NOx	PM_{10}	$PM_{2.5}$
Off-road Equipment Emissions	13	175	7.1	7.1
Truck and Vehicle emissions	14.6	70	1.45	1.34
Architectural Coating Emissions	39	0	0	0
Total[a]	**66**	**246**	**8.6**	**8.5**

Controlled Average Daily Construction-related Emissions

	Average Daily Construction Emissions (pounds/day)			
	ROG	NOx	PM10	PM2.5
With Tier 4 Off-road Equipment				
Off-road Equipment Emissions	2.5	22	0.37	0.37
Truck and Vehicle emissions	14.6	70	1.45	1.34
Architectural Coating Emissions	39	0	0	0
Total[a]	**56**	**93**	**1.8**	**1.7**
With Tier 2 + ARB NOx VDECS Off-road Equipment				
Off-road Equipment Emissions	0.52	93	0.59	0.59
Truck and Vehicle emissions	14.6	70	1.45	1.34
Architectural Coating Emissions	39	0	0	0
Total[a]	**54.2**	**164**	**2.0**	**1.9**

Average Daily and Maximum Annual Operational Emissions

	Average Daily Emissions (pounds/day)			
	ROG	**NOx**	**PM10**	**PM2.5**
Emission Source				
Mobile (Project - GSW Trips)	42	108	77	22
Standby Diesel Generators	0.30	0.97	0.04	0.04
Boilers	2.1	14	2.9	2.9
Area Sources	35	<0.01	<0.01	<0.01
Total (Project - GSW Trips)	79	124	80	25
	Maximum Annual Emissions (short tons/year)			
	ROG	**NOx**	**PM10**	**PM2.5**
Emission Source				
Mobile (Project - GSW Trips)	7.6	20	14	4.0
Standby Diesel generators	0.055	0.18	0.0072	0.0072
Boilers	0.38	2.6	0.52	0.52
Area Sources	6.4	<0.01	<0.01	<0.01
Total (Project - GSW Trips)	14.4	23	14.6	4.5

Lifetime Excess Cancer Risk at off-site Receptors

Source	Excess Cancer Risk (in one million)			
	UCSF Hearst Tower		UCSF Hospital Receptor	Uber/ARE Receptor
	Child Resident	Adult Resident	Child Resident	Daycare Child
Background at the maximally impacted receptor	26	26	44	20
Uncontrolled Construction Contribution	54	2.8	28	73
Controlled (Tier 2 + NOx VDECS) Construction Contribution	9.2	0.48	4.8	12.5
Project Operations – Generators	30	30	30	30
Project Operations – Mobile Sources	7.2	7.2	7.2	7.2
Cumulative Total (Uncontrolled/with Mitigation)	117/ 72	66/ 64	109/ 86	131/ 70
Significance Threshold	100	100	100	100
Significant (Uncontrolled/with Mitigation)?	Yes/ No	No/ No	Yes/ No	Yes/ No

NOTE: The cumulative total risks may not sum precisely due to rounding of subtotals.

Annual Average PM2.5 Concentrations at off-site Receptors

Source	$PM_{2.5}$ Concentration ($\mu g/m^3$, Annual Average)		
	UCSF Hearst Tower Receptor	UCSF Hospital Receptor	Uber/ARE Receptor
Construction			
Background at the maximally impacted receptor	8.5	8.6	8.4
Uncontrolled Construction Contribution	0.31	0.31	1.2
Controlled (Tier 2 + NOx VDECS) Construction Contribution	0.053	0.053	0.21
Cumulative Total (Uncontrolled/with Mitigation)	8.8/ 8.5	8.9/ 8.7	9.6/ 8.6
Significance Threshold	10	10	10
Significant?	No	No	No
Operation			
Background at the maximally impacted receptor	8.5	8.6	8.4
Project Operations – Generators	0.055	0.055	0.055
Project Operations – Mobile Sources	0.32	0.32	0.32
Cumulative Total (Project, Uncontrolled)	8.9	9.0	8.7
Significance Threshold	10	10	10
Significant?	No	No	No

NOTE: The cumulative total concentrations may not sum precisely due to rounding of subtotals.

Table 6.1-1
Toxicity-Weighted Construction Emissions
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Chemical	Unit Risk Factor[1] $(ug/m^3)^{-1}$	Uncontrolled Project Emissions[3] (lb/project)	Weighted (lb/project)-(m^3/μg)	Percent Contribution to Risk
Diesel PM[4]	3.0E-04	4,112	1.2	99.8%
TACs from Speciated Gasoline TOG due to Tailpipe Emissions[2]	1.81E-06	1,263	0.0023	0.18%
TACs from Speciated Gasoline TOG due to Evaporative Losses[2]	1.07E-07	1,861	0.0002	0.02%

Chemical	Unit Risk Factor[1] $(ug/m^3)^{-1}$	Controlled Tier 4 Project Emissions[3] (lb/project)	Weighted (lb/project)-(m^3/μg)	Percent Contribution to Risk
Diesel PM[4]	3.0E-04	586	0.18	98.6%
TACs from Speciated Gasoline TOG due to Tailpipe Emissions[2]	1.81E-06	1,263	0.0023	1.3%
TACs from Speciated Gasoline TOG Evaporative Losses[2]	1.07E-07	1,861	0.0002	0.1%

Notes:

1. From Cal/EPA 2013.
2. From BAAQMD 2012.
3. Emissions estimates are subject to change before publication of draft Environmental Impact Report.
4. Includes DPM emissions from off-road equiment and on-road sources. Emissions in the controlled scenario reflect the use of Tier 4 off-road equipment.

Abbreviations:

PM: particulate matter
lb: pound
g: gram
s: second
TOG: Total Organic Gas
µg: microgram

References:

Bay Area Air Quality Management District (BAAQMD). 2012. Recommended Methods for Screening and Modeling Local Risks and Hazards. May. http://baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Risk%20Modeling%20Approach%20May%202012.ashx?la=en

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Table 6.1-2
Construction Particulate Matter Emissions
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Emissions	Units	Uncontrolled Scenario	Controlled Tier 4 Scenario	Controlled Tier 2 + ARB NOx VDECS Scenario
Project construction $PM_{2.5}$ emissions[1]	[lb/project]	4,118	592	706
Project construction DPM emissions[1]	[lb/project]	4,112	586	701
Construction duration	[years]	2	2	2
Annual DPM emissions	[lb/year]	2,056	293	350.25
Average $PM_{2.5}$ emissions	[g/s]	0.030	0.004	0.005
Average DPM emissions	[g/s]	0.030	0.004	0.005

Notes:
1. Includes emissions from off-road equiment and on-road sources. Emissions in the controlled scenario reflect the use of Tier 4 or Tier 2 + ARB NOx VDECS off-road equipment.

Abbreviations:
DPM: Diesel particulate matter
lb: pound
g: gram
s: second

Table 6.1-3
Annual Average Daily Traffic from Project Operation
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Trip Type	Scenario	Days Per Year	Daily One-way Vehicle Trips[1]
Mission Bay, Weekday Trips	Basketball Event Days	30	13,691
	Concert Event Days[2]	45	13,691
	Convention Event Days	61	9,023
	No Event Days	125	6,990
Mission Bay, Weekend Trips	Basketball Event Days	30	12,330
	Concert Event Days[2]	55	12,330
	No Event Days	19	5,877
		Annual One-way Vehicle Trips:	3,610,691
		Annual Average Daily Traffic (AADT):	**9,892**

Notes:
1. Based on preliminary traffic data from Adavant Consulting.
2. Trips conservatively assumed to be equal to basketball event days.

Table 6.1-4
Screening $PM_{2.5}$ Concentrations and Cancer Risks from Operational Traffic
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Impact[1]	North-South Roadway Impact	East-West Roadway Impact	Total Impact from 4 Adjacent Roadways
$PM_{2.5}$ Concentration (ug/m^3)	0.080	0.078	0.32
Lifetime Cancer Risk (in a million)	2.2	1.4	7.2

Notes:

1. Based on BAAQMD County Surface Street Screening Tables for San Francisco County. A distance of 10 feet from the roadway is conservatively assumed and impacts are interpolated for estimated traffic volume.

References:

Bay Area Air Quality Management District (BAAQMD). 2011. Roadway Screening Analysis Tables. December. Available online at : http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/County%20Surface%20Street%20Screening%20Tables%20Dec%202011.ashx?la=en

Table 6.1-5
AERMOD Construction Screening Inputs and Outputs
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Parameter	**Inputs and Outputs**		
Source	Construction		
Source Type	Area		
Emission Rate (g/s-m^2)	2.19869E-05		
Release Height (m)	5		
Area (m^2)	45481.57185		
Receptor Height (m)	1.8		
Urban/Rural (U/R)	U		
Meteorological Station	Mission Bay 2008		
Dispersion Factor (µg/m^3 per g/s)			
Annual Average Dispersion Factor at Dormitory Receptor	**10.4**		
Annual Average Dispersion Factor at Hospital Receptor	**10.4**		
Concentration	**Uncontrolled**	**Tier 4 Controlled**	**Tier 2 + ARB NOx VDECS Controlled**
$PM_{2.5}$ Emission Rate (g/s)	0.030	0.0043	0.0051
Annual Maximum $PM_{2.5}$ Conc at Dormitory Receptor (µg/m^3)	**0.31**	**0.044**	**0.053**
Annual Maximum $PM_{2.5}$ Conc at Hospital Receptor (µg/m^3)	**0.31**	**0.044**	**0.053**
Diesel PM Emission Rate (g/s)	0.030	0.0042	0.0050
Annual Maximum DPM Conc at Dormitory Receptor (µg/m^3)	**0.31**	**0.044**	**0.052**
Annual Maximum DPM Conc at Hospital Receptor (µg/m^3)	**0.31**	**0.044**	**0.052**

Abbreviations:
g: gram
m: meter
m^2: square meter
m^3: cubic meter
PM: particulate matter
s: second
µg: microgram

Table 6.1-6
Screening $PM_{2.5}$ Concentration Results
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Scenario	Concentration [μg/m³]		
	Dormitory Receptor	Hospital Receptor	Daycare Receptor
Construction			
$PM_{2.5}$ Concentration from Uncontrolled Construction Emissions	0.31	0.31	1.2
$PM_{2.5}$ Concentration from Tier 4 Controlled Construction Emissions	0.044	0.044	0.17
$PM_{2.5}$ Concentration from Tier 2 + ARB NOx VDECS Controlled Construction Emissions	0.053	0.053	0.21
2014 Background $PM_{2.5}$ Concentration[1]	8.5	8.6	8.4
Total $PM_{2.5}$ Concentration (Construction, Uncontrolled scenario)	8.8	8.9	9.6
Total $PM_{2.5}$ Concentration (Construction, Tier 4 Controlled scenario)	8.5	8.7	8.5
Total $PM_{2.5}$ Concentration (Construction, Tier 2 + ARB NOx VDECS Controlled scenario)	8.5	8.7	8.6
Cumulative Threshold[2]	10	10	10
Total $PM_{2.5}$ Concentration Exceeds Threshold? (Uncontrolled scenario)	No	No	No
Total $PM_{2.5}$ Concentration Exceeds Threshold? (Tier 4 Controlled scenario)	No	No	No
Total $PM_{2.5}$ Concentration Exceeds Threshold? (Tier 2 + ARB NOx VDECS Controlled scenario)	No	No	No
Operational			
$PM_{2.5}$ Concentration from Operational Traffic	0.32	0.32	0.32
$PM_{2.5}$ Concentration from Emergency Diesel Generators[3]	0.055	0.055	0.055
2014 Background $PM_{2.5}$ Concentration[1]	8.5	8.6	8.4
Total $PM_{2.5}$ Concentration (Operational)	8.9	9.0	8.7
Cumulative Threshold[2]	10	10	10
Total $PM_{2.5}$ Concentration Exceeds Threshold? (Operational)	No	No	No

Notes:
1. 2014 background risk from the Citywide HRA database for all receptors.
2. Cumulative threshold is the threshold for creating an Air Pollutant Exposure Zone (APEZ), as defined by the San Francisco Planning Department, Environmental Planning.
3. Back-calculated assuming a cancer risk of 10 in a million for each of the three generators (total of 30 in a million). The cancer risk of 10 in a million is the maximum allowable Project cancer risk from toxic air contaminants in the BAAQMD, and exposure assumptions for a 70-year resident.

Abbreviations:
BAAQMD: Bay Area Air Quality Management District
HRA: Health Risk Assessment
μg: microgram
m^3: cubic meter

Table 6.1-7
Exposure Parameters and Cancer Risk Adjustment Factors
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Exposure Parameter	Units	Construction			
		Child Resident	Adult Resident	Hospital Child	Daycare Child
Daily Breathing Rate (DBR)[1]	[L/kg-day]	581	302	581	581
Exposure Time (ET)[2]	[hours/24 hours]	24	24	24	11
Exposure Frequency (EF)[3]	[days/year]	350	350	365	253
Exposure Duration (ED)[4]	[years]	2.0	2.0	1.0	0.67
Averaging Time (AT)	[days]	25,550	25,550	25,550	25,550
Intake Factor, Inhalation (IF_{inh})	[m^3/kg-day]	0.016	0.0083	0.0083	0.0018
Cancer Risk Adjustment Factor[5]	[-]	10	1.0	10	10
Modeling Adjustment Factor[6]	[-]	N/A	N/A	N/A	3.15

Notes:

1. Daily breathing rate reflects default breathing rate from BAAQMD 2010.
2. Exposure time reflects default exposure time from BAAQMD 2010.
3. Exposure frequency reflects default exposure frequency from BAAQMD 2010.
4. Assumes all construction-related emissions will be emitted within the first two years. Operation of the daycare center is not expected to take place until mid- to late-2017; since Project construction will be largely completed by that time, an exposure duration of 8 months was used as a conservative estimate.
5. Based on BAAQMD 2010.
6. Construction emissions are conservatively assumed to occur concurrently with the operation of the daycare center. As such, a modeling adjustment factor of (365/253)*(24/11) = 3.15 is applied for the daycare child receptor.

Calculation:

IF_{inh} = DBR * ET * EF * ED * CF / AT

CF = 0.001 (m^3/L)

Abbreviations:

BAAQMD: Bay Area Air Quality Management District
L: liter
kg: kilogram
m^3: cubic meter

References:

BAAQMD. 2010. BAAQMD Air Toxics NSR Program Health Risk Screening Analysis (HRSA) Guidelines. January.
http://baaqmd.gov/~/media/Files/Engineering/Air%20Toxics%20Programs/hrsa_guidelines.ashx?la=en

Table 6.1-8
Screening Cancer Risk Results
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Scenario	Units	Dormitory Receptor		Hospital Child Receptor	Daycare Child Receptor
		Child Resident	Adult Resident		
Diesel PM Cancer Potency Factor (CPF)[1]	$[mg/kg\text{-}day]^{-1}$	1.1	1.1	1.1	1.1
Excess Cancer Risk from Uncontrolled Construction Emissions[2]	[in a million]	54	2.8	28	73
Excess Cancer Risk from Tier 4 Controlled Construction Emissions[2]	[in a million]	7.7	0.40	4.0	10.4
Excess Cancer Risk from Tier 2 + ARB NOx VDECS Controlled Construction Emissions[2]	[in a million]	9.2	0.48	4.8	12.5
Excess Cancer Risk from Operational Traffic Emissions[3]	[in a million]	7.2	7.2	7.2	7.2
Excess Cancer Risk from Emergency Diesel Generators[4]	[in a million]	30	30	30	30
2014 Background Risk[5]	[in a million]	26	26	44	20
Total Excess Cancer Risk (Uncontrolled Scenario)	[in a million]	117	66	109	131
Total Excess Cancer Risk (Tier 4 Controlled Scenario)	[in a million]	71	64	85	68
Total Excess Cancer Risk (Tier 2 + ARB NOx VDECS) Controlled Scenario)	[in a million]	72	64	86	70
Cumulative Threshold[6]	[in a million]	100	100	100	100
Total Risk Exceeds Threshold? (Uncontrolled Scenario)	-	Yes	No	Yes	Yes
Total Risk Exceeds Threshold? (Tier 4 Controlled Scenario)	-	No	No	No	No
Total Risk Exceeds Threshold? (Tier 2 + ARB NOx VDECS Controlled Scenario)	-	No	No	No	No

Notes:
1. From Cal/EPA 2013.
2. Represent health impacts for a residential receptor at the dormitory, hospital, or daycare.
3. The screening values reflect a 70-year cancer risk with age sensitivity factors applied (BAAQMD 2012).
4. A cancer risk of 10 in a million, the maximum allowable Project cancer risk from toxic air contaminants in the BAAQMD, is conservatively assumed.
5. 2014 background risk from the Citywide HRA database for all receptors.
6. Cumulative threshold is the threshold for creating an Air Pollutant Exposure Zone (APEZ), as defined by the San Francisco Planning Department, Environmental Planning.

Calculation:
Cancer Risk = [AnnualConc] × [CF] × [IF_{inh}] × [CPF] x [CRAF] x [MAF]
CF = 0.001 (mg/µg)

Abbreviations:
BAAQMD: Bay Area Air Quality Management District
Cal/EPA: California Environmental Protection Agency
CRAF: Cancer Risk Adjustment Factor
HRA: Health Risk Assessment
IF_{inh}: Intake Factor, Inhalation
kg: kilogram
mg: milligram
PM: Particulate Matter
µg: microgram

References:

Cal/EPA. 2013. OEHHA/ARB Consolidated Table of Approved Risk Assessment Health Values. August. Available online at: http://www.arb.ca.gov/toxics/healthval/contable.pdf

Bay Area Air Quality Management District (BAAQMD). 2012. Recommended Methods for Screening and Modeling Local Risks and Hazards. May. Available online at: http://baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Risk%20Modeling%20Approach%20May%202012.ashx?la=en

Data Request Instructions for Mission Bay Site

Table 1: Off-Road Construction Equipment List

Phase Name	Project Equipment at Site	Horsepower	Equipment Quantity	Usage Hours per Workday	Equipment Start Date (Month #)	Equipment End Date (Month #)	Workdays per Week
Demolition/Mass Excavation	Street Sweeper	285	2	7	1	10	5
Mass Excavation	Large Excavator	523	3	7	1	3	5
Mass Excavation	Scraper	500	3	7	1	3	5
Mass Excavation	Wheel Loader	211	3	7	1	3	5
Mass Excavation	Track Type Tractor Blde/Ripper	150	2	7	1	3	5
Rapid Impact Compaction	Track type tractor with hammer	150	3	7	1	3	5
Pile Installation	Drill Rig (for installation of Auger Cast piles)	1205	4	7	2	4	5
Pile Installation	Crawler Cranes	530	4	7	2	4	5
Pile Installation	Large Forklifts	93	2	7	2	4	5
Pile Installation	Bobcat or small excavators	71	4	7	2	4	5
Pile Installation	Cutting and chopping saws		4	7	2	4	5
Shoring	Drill Rig	150	2	7	2	4	5
Shoring	Support Crane	530	2	7	2	4	5
Shoring	Grout-mixing plant	20	2	7	2	4	5
Shoring	Small Excavator	71	2	7	2	4	5
Shoring	Cut off wall (CDSM) equipment	150	4	7	1	2	5
Building Construction (including arena)	Concrete Boom Pumps	480	2	7	2	13	5
Building Construction (including arena)	Bobcat	71	2	7	2	23	5
Building Construction (including arena)	Small Excavator	404	2	7	2	23	5
Building Construction (including arena)	Large Excavator	523	2	7	2	13	5
Building Construction (including arena)	Crawler Cranes	530	4	7	3	16	5
Building Construction (including arena)	Mobile Cranes	530	4	7	3	23	5
Building Construction (including arena)	Grandall-type Forklifts	93	8	7	3	24	5
Building Construction (including arena)	Cutting/chopping saws		15	7	3	24	5
Building Construction (including arena)	Tile cutting saws		10	7	8	24	5
Building Construction (including arena)	Drywall stud impact guns		25	7	8	20	5

Construction Equipment List

Table 6.1-9

Phase ID	Phase	Project Equipment	OFFROAD Equipment	HP	OFFROAD HP Bin	Tier HP Bin	LF	Quantity	Total Hours	Calendar Year	Construction Year	Fuel
1	Demolition/Mass Excavation	Street Sweeper	Sweepers/Scrubbers	285	500	300	0.4556	2	3,042	2015	1	Diesel
2	Mass Excavation	Large Excavator	Excavators	523	750	600	0.3819	3	1,369	2015	1	Diesel
2	Mass Excavation	Scraper	Scrapers	500	500	600	0.4824	3	1,369	2015	1	Diesel
2	Mass Excavation	Wheel Loader	Tractors/Loaders/Backhoes	211	250	300	0.3685	3	1,369	2015	1	Diesel
2	Mass Excavation	Track Type Tractor Blde/Ripper	Tractors/Loaders/Backhoes	150	175	175	0.3685	2	913	2015	1	Diesel
3	Rapid Impact Compaction	Track type tractor with hammer	Tractors/Loaders/Backhoes	150	175	175	0.3685	3	1,369	2015	1	Diesel
4	Pile Installation	Drill Rig (for installation of Auger Cast piles)	Bore/Drill Rigs	1,205	9,999	2,000	0.5025	4	1,825	2015	1	Diesel
4	Pile Installation	Crawler Cranes	Cranes	530	750	600	0.2881	4	1,825	2015	1	Diesel
4	Pile Installation	Large Forklifts	Forklifts	93	120	120	0.201	2	913	2015	1	Diesel
4	Pile Installation	Bobcat or small excavators	Rubber Tired Loaders	71	120	75	0.3618	4	1,825	2015	1	Diesel
4	Pile Installation	Cutting and chopping saws	Other Construction Equipment	0	50	11	0.4154	4	1,825	2015	1	Electric
5	Shoring	Drill Rig	Bore/Drill Rigs	150	175	175	0.5025	2	913	2015	1	Diesel
5	Shoring	Support Crane	Cranes	530	750	600	0.2881	2	913	2015	1	Diesel
5	Shoring	Grout-mixing plant	Other Material Handling Equipment	20	50	25	0.3953	2	913	2015	1	Diesel
5	Shoring	Small Excavator	Excavators	71	120	75	0.3819	2	913	2015	1	Diesel
5	Shoring	Cut off wall (CDSM) equipment	Bore/Drill Rigs	150	175	175	0.5025	4	1,217	2015	1	Diesel
6	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	480	500	600	0.4154	2	3,346	2015	1	Diesel
6	Building Construction (including arena)	Bobcat	Rubber Tired Loaders	71	120	75	0.3618	2	3,346	2015	1	Diesel
6	Building Construction (including arena)	Small Excavator	Excavators	404	500	600	0.3819	2	3,346	2015	1	Diesel
6	Building Construction (including arena)	Large Excavator	Excavators	523	750	600	0.3819	2	3,346	2015	1	Diesel
6	Building Construction (including arena)	Crawler Cranes	Cranes	530	750	600	0.2881	4	6,083	2015	1	Diesel
6	Building Construction (including arena)	Mobile Cranes	Cranes	530	750	600	0.2881	4	6,083	2015	1	Diesel
6	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	93	120	120	0.201	8	12,167	2015	1	Diesel
6	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	0	50	11	0.4154	15	22,813	2015	1	Electric
6	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	0	50	11	0.4154	10	7,604	2015	1	Electric
6	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	0	50	11	0.4154	25	19,010	2015	1	Electric
6	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	480	500	600	0.4154	2	304	2016	2	Diesel
6	Building Construction (including arena)	Bobcat	Rubber Tired Loaders	71	120	75	0.3618	2	3,346	2016	2	Diesel
6	Building Construction (including arena)	Small Excavator	Excavators	404	500	600	0.3819	2	3,346	2016	2	Diesel
6	Building Construction (including arena)	Large Excavator	Excavators	523	750	600	0.3819	2	304	2016	2	Diesel
6	Building Construction (including arena)	Crawler Cranes	Cranes	530	750	600	0.2881	4	2,433	2016	2	Diesel
6	Building Construction (including arena)	Mobile Cranes	Cranes	530	750	600	0.2881	4	6,692	2016	2	Diesel
6	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	93	120	120	0.201	8	14,600	2016	2	Diesel
6	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	0	50	11	0.4154	15	27,375	2016	2	Electric
6	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	0	50	11	0.4154	10	18,250	2016	2	Electric
6	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	0	50	11	0.4154	25	30,417	2016	2	Electric

Uncontrolled Offroad Equipment Activities and Emissions

Table 6.1-10

Construction Year	Phase ID	Phase	Project Equipment	OFFROAD Equipment	Total Hours	HP	OFFROAD HP Bin	Tier HP Bin	Fuel	Emissions	Units	Pollutant	Engine Tier Uncontrolled	DPF Uncontrolled
1	6	Building Construction (including arena)	Crawler Cranes	Cranes	6,083	530	750	600	Diesel	8,830	lb	Nox	OFFROAD	0
1	6	Building Construction (including arena)	Crawler Cranes	Cranes	6,083	530	750	600	Diesel	311	lb	PM	OFFROAD	0
1	6	Building Construction (including arena)	Crawler Cranes	Cranes	6,083	530	750	600	Diesel	586	lb	ROG	OFFROAD	0
1	6	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	22,813	0	50	11	Electric	0,000	lb	Nox	OFFROAD	0
1	6	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	22,813	0	50	11	Electric	0.0	lb	PM	OFFROAD	0
1	6	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	22,813	0	50	11	Electric	0.0	lb	ROG	OFFROAD	0
1	6	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	19,010	0	50	11	Electric	0,000	lb	Nox	OFFROAD	0
1	6	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	19,010	0	50	11	Electric	0	lb	PM	OFFROAD	0
1	6	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	19,010	0	50	11	Electric	0.0	lb	ROG	OFFROAD	0
1	6	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	12167	93	120	120	Diesel	3310	lb	Nox	OFFROAD	0
1	6	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	12167	93	120	120	Diesel	278.0	lb	PM	OFFROAD	0
1	6	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	12167	93	120	120	Diesel	385.3	lb	ROG	OFFROAD	0
1	6	Building Construction (including arena)	Large Excavator	Excavators	3,346	523	750	600	Diesel	5117	lb	Nox	OFFROAD	0
1	6	Building Construction (including arena)	Large Excavator	Excavators	3,346	523	750	600	Diesel	166.4	lb	PM	OFFROAD	0
1	6	Building Construction (including arena)	Large Excavator	Excavators	3,346	523	750	600	Diesel	356.6	lb	ROG	OFFROAD	0
1	6	Building Construction (including arena)	Mobile Cranes	Cranes	6,083	530	750	600	Diesel	8830	lb	Nox	OFFROAD	0
1	6	Building Construction (including arena)	Mobile Cranes	Cranes	6,083	530	750	600	Diesel	310.9	lb	PM	OFFROAD	0
1	6	Building Construction (including arena)	Mobile Cranes	Cranes	6,083	530	750	600	Diesel	585.6	lb	ROG	OFFROAD	0
1	6	Building Construction (including arena)	Small Excavator	Excavators	3,346	404	500	600	Diesel	3658	lb	Nox	OFFROAD	0
1	6	Building Construction (including arena)	Small Excavator	Excavators	3,346	404	500	600	Diesel	118.6	lb	PM	OFFROAD	0
1	6	Building Construction (including arena)	Small Excavator	Excavators	3,346	404	500	600	Diesel	264.1	lb	ROG	OFFROAD	0
1	6	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	7,604	0	50	11	Electric	0,000	lb	Nox	OFFROAD	0
1	6	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	7,604	0	50	11	Electric	0.0	lb	PM	OFFROAD	0
1	6	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	7,604	0	50	11	Electric	0.0	lb	ROG	OFFROAD	0
2	6	Building Construction (including arena)	Bobcat	Rubber Tired Loaders	3,346	71	120	75	Diesel	1247	lb	Nox	OFFROAD	0
2	6	Building Construction (including arena)	Bobcat	Rubber Tired Loaders	3,346	71	120	75	Diesel	107	lb	PM	OFFROAD	0
2	6	Building Construction (including arena)	Bobcat	Rubber Tired Loaders	3,346	71	120	75	Diesel	152	lb	ROG	OFFROAD	0
2	6	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	0,304	0,480	0,500	0,600	Diesel	0,547	lb	Nox	OFFROAD	0
2	6	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	0,304	0,480	0,500	0,600	Diesel	20	lb	PM	OFFROAD	0
2	6	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	0,304	0,480	0,500	0,600	Diesel	41	lb	ROG	OFFROAD	0
2	6	Building Construction (including arena)	Crawler Cranes	Cranes	2433	530	750	600	Diesel	3534	lb	Nox	OFFROAD	0
2	6	Building Construction (including arena)	Crawler Cranes	Cranes	2433	530	750	600	Diesel	125.2	lb	PM	OFFROAD	0
2	6	Building Construction (including arena)	Crawler Cranes	Cranes	2433	530	750	600	Diesel	239.35	lb	ROG	OFFROAD	0
2	6	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	27,375	0	50	11	Electric	0	lb	Nox	OFFROAD	0
2	6	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	27,375	0	50	11	Electric	0.0	lb	PM	OFFROAD	0
2	6	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	27,375	0	50	11	Electric	0.0	lb	ROG	OFFROAD	0
1	1	Demolition/Mass Excavation	Street Sweeper	Sweepers/Scrubbers	3042	285	500	300	Diesel	5265.4	lb	Nox	OFFROAD	0
1	1	Demolition/Mass Excavation	Street Sweeper	Sweepers/Scrubbers	3042	285	500	300	Diesel	228.7	lb	PM	OFFROAD	0
1	1	Demolition/Mass Excavation	Street Sweeper	Sweepers/Scrubbers	3042	285	500	300	Diesel	0,406	lb	ROG	OFFROAD	0
1	2	Mass Excavation	Large Excavator	Excavators	1369	523	750	600	Diesel	2093.1	lb	Nox	OFFROAD	0
1	2	Mass Excavation	Large Excavator	Excavators	1369	523	750	600	Diesel	68.07	lb	PM	OFFROAD	0
1	2	Mass Excavation	Large Excavator	Excavators	1369	523	750	600	Diesel	0,146	lb	ROG	OFFROAD	0
1	2	Mass Excavation	Scraper	Scrapers	1369	500	500	600	Diesel	4429.5	lb	Nox	OFFROAD	0
1	2	Mass Excavation	Scraper	Scrapers	1369	500	500	600	Diesel	178.9	lb	PM	OFFROAD	0
1	2	Mass Excavation	Scraper	Scrapers	1369	500	500	600	Diesel	0,344	lb	ROG	OFFROAD	0
1	2	Mass Excavation	Track Type Tractor Blde/Ripper	Tractors/Loaders/Backhoes	913	150	175	175	Diesel	537.8	lb	Nox	OFFROAD	0
1	2	Mass Excavation	Track Type Tractor Blde/Ripper	Tractors/Loaders/Backhoes	913	150	175	175	Diesel	27.2	lb	PM	OFFROAD	0
1	2	Mass Excavation	Track Type Tractor Blde/Ripper	Tractors/Loaders/Backhoes	0,913	150	175	175	Diesel	0,047	lb	ROG	OFFROAD	0
1	2	Mass Excavation	Wheel Loader	Tractors/Loaders/Backhoes	1,369	211	250	300	Diesel	1122.2	lb	Nox	OFFROAD	0
1	2	Mass Excavation	Wheel Loader	Tractors/Loaders/Backhoes	1,369	211	250	300	Diesel	36.5	lb	PM	OFFROAD	0
1	2	Mass Excavation	Wheel Loader	Tractors/Loaders/Backhoes	1,369	211	250	300	Diesel	0,076	lb	ROG	OFFROAD	0
1	3	Rapid Impact Compaction	Track type tractor with hammer	Tractors/Loaders/Backhoes	1,369	150	175	175	Diesel	807	lb	Nox	OFFROAD	0
1	3	Rapid Impact Compaction	Track type tractor with hammer	Tractors/Loaders/Backhoes	1,369	150	175	175	Diesel	41	lb	PM	OFFROAD	0
1	3	Rapid Impact Compaction	Track type tractor with hammer	Tractors/Loaders/Backhoes	1,369	150	175	175	Diesel	0,070	lb	ROG	OFFROAD	0
1	4	Pile Installation	Bobcat or small excavators	Rubber Tired Loaders	1,825	71	120	75	Diesel	725	lb	Nox	OFFROAD	0
1	4	Pile Installation	Bobcat or small excavators	Rubber Tired Loaders	1,825	71	120	75	Diesel	63	lb	PM	OFFROAD	0

Uncontrolled Offroad Equipment Activities and Emissions

Construction Year	Phase ID	Phase	Project Equipment	OFFROAD Equipment	Total Hours	HP	OFFROAD HP Bin	Tier HP Bin	Fuel	Emissions	Units	Pollutant	Engine Tier Uncontrolled	DPF Uncontrolled
1	4	Pile Installation	Bobcat or small excavators	Rubber Tired Loaders	1,825	71	120	75	Diesel	88	lb	ROG	OFFROAD	0
1	4	Pile Installation	Crawler Cranes	Cranes	1,825	530	750	600	Diesel	2649	lb	Nox	OFFROAD	0
1	4	Pile Installation	Crawler Cranes	Cranes	1,825	530	750	600	Diesel	93	lb	PM	OFFROAD	0
1	4	Pile Installation	Crawler Cranes	Cranes	1,825	530	750	600	Diesel	176	lb	ROG	OFFROAD	0
1	4	Pile Installation	Cutting and chopping saws	Other Construction Equipment	1,825	0	50	11	Electric	0	lb	Nox	OFFROAD	0
1	4	Pile Installation	Cutting and chopping saws	Other Construction Equipment	1,825	0	50	11	Electric	0	lb	PM	OFFROAD	0
1	4	Pile Installation	Cutting and chopping saws	Other Construction Equipment	1,825	0	50	11	Electric	0,000	lb	ROG	OFFROAD	0
1	4	Pile Installation	Drill Rig (for installation of Auger Cast piles)	Bore/Drill Rigs	1,825	1205	9999	2000	Diesel	10387	lb	Nox	OFFROAD	0
1	4	Pile Installation	Drill Rig (for installation of Auger Cast piles)	Bore/Drill Rigs	1,825	1205	9999	2000	Diesel	255	lb	PM	OFFROAD	0
1	4	Pile Installation	Drill Rig (for installation of Auger Cast piles)	Bore/Drill Rigs	1,825	1205	9999	2000	Diesel	0,434	lb	ROG	OFFROAD	0
1	4	Pile Installation	Large Forklifts	Forklifts	0,913	93	120	120	Diesel	248	lb	Nox	OFFROAD	0
1	4	Pile Installation	Large Forklifts	Forklifts	0,913	93	120	120	Diesel	21	lb	PM	OFFROAD	0
1	4	Pile Installation	Large Forklifts	Forklifts	0,913	93	120	120	Diesel	0,029	lb	ROG	OFFROAD	0
1	5	Shoring	Cut off wall (CDSM) equipment	Bore/Drill Rigs	1,217	150	175	175	Diesel	789	lb	Nox	OFFROAD	0
1	5	Shoring	Cut off wall (CDSM) equipment	Bore/Drill Rigs	1,217	150	175	175	Diesel	35	lb	PM	OFFROAD	0
1	5	Shoring	Cut off wall (CDSM) equipment	Bore/Drill Rigs	1,217	150	175	175	Diesel	0,061	lb	ROG	OFFROAD	0
1	5	Shoring	Drill Rig	Bore/Drill Rigs	0,913	150	175	175	Diesel	592	lb	Nox	OFFROAD	0
1	5	Shoring	Drill Rig	Bore/Drill Rigs	0,913	150	175	175	Diesel	27	lb	PM	OFFROAD	0
1	5	Shoring	Drill Rig	Bore/Drill Rigs	0,913	150	175	175	Diesel	46	lb	ROG	OFFROAD	0
1	5	Shoring	Grout-mixing plant	Other Material Handling Equipment	0,913	20	50	25	Diesel	92	lb	Nox	OFFROAD	0
1	5	Shoring	Grout-mixing plant	Other Material Handling Equipment	0,913	20	50	25	Diesel	9	lb	PM	OFFROAD	0
1	5	Shoring	Grout-mixing plant	Other Material Handling Equipment	0,913	20	50	25	Diesel	0,028	lb	ROG	OFFROAD	0
1	5	Shoring	Small Excavator	Excavators	0,913	71	120	75	Diesel	273.8	lb	Nox	OFFROAD	0
1	5	Shoring	Small Excavator	Excavators	0,913	71	120	75	Diesel	20.4	lb	PM	OFFROAD	0
1	5	Shoring	Small Excavator	Excavators	913	71	120	75	Diesel	0,028	lb	ROG	OFFROAD	0
1	5	Shoring	Support Crane	Cranes	913	530	750	600	Diesel	1324.5	lb	Nox	OFFROAD	0
1	5	Shoring	Support Crane	Cranes	913	530	750	600	Diesel	46.6	lb	PM	OFFROAD	0
1	5	Shoring	Support Crane	Cranes	0,913	530	750	600	Diesel	0,088	lb	ROG	OFFROAD	0
1	6	Building Construction (including arena)	Bobcat	Rubber Tired Loaders	3,346	71	120	75	Diesel	1329	lb	Nox	OFFROAD	0
1	6	Building Construction (including arena)	Bobcat	Rubber Tired Loaders	3,346	71	120	75	Diesel	115	lb	PM	OFFROAD	0
1	6	Building Construction (including arena)	Bobcat	Rubber Tired Loaders	3,346	71	120	75	Diesel	162	lb	ROG	OFFROAD	0
1	6	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	3,346	480	500	600	Diesel	6494	lb	Nox	OFFROAD	0
1	6	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	3,346	480	500	600	Diesel	239	lb	PM	OFFROAD	0
1	6	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	3,346	480	500	600	Diesel	477	lb	ROG	OFFROAD	0
2	6	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	30,417	0	50	11	Electric	0	lb	Nox	OFFROAD	0
2	6	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	30,417	0	50	11	Electric	0	lb	PM	OFFROAD	0
2	6	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	30,417	0	50	11	Electric	0	lb	ROG	OFFROAD	0
2	6	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	14,600	93	120	120	Diesel	3,744	lb	Nox	OFFROAD	0
2	6	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	14,600	93	120	120	Diesel	313	lb	PM	OFFROAD	0
2	6	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	14,600	93	120	120	Diesel	435	lb	ROG	OFFROAD	0
2	6	Building Construction (including arena)	Large Excavator	Excavators	304	523	750	600	Diesel	450	lb	Nox	OFFROAD	0
2	6	Building Construction (including arena)	Large Excavator	Excavators	304	523	750	600	Diesel	14.8	lb	PM	OFFROAD	0
2	6	Building Construction (including arena)	Large Excavator	Excavators	304	523	750	600	Diesel	32.4	lb	ROG	OFFROAD	0
2	6	Building Construction (including arena)	Mobile Cranes	Cranes	6,692	530	750	600	Diesel	9,718	lb	Nox	OFFROAD	0
2	6	Building Construction (including arena)	Mobile Cranes	Cranes	6,692	530	750	600	Diesel	344	lb	PM	OFFROAD	0
2	6	Building Construction (including arena)	Mobile Cranes	Cranes	6,692	530	750	600	Diesel	658	lb	ROG	OFFROAD	0
2	6	Building Construction (including arena)	Small Excavator	Excavators	3,346	404	500	600	Diesel	3,203	lb	Nox	OFFROAD	0
2	6	Building Construction (including arena)	Small Excavator	Excavators	3,346	404	500	600	Diesel	103	lb	PM	OFFROAD	0
2	6	Building Construction (including arena)	Small Excavator	Excavators	3,346	404	500	600	Diesel	243	lb	ROG	OFFROAD	0
2	6	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	18,250	0	50	11	Electric	0	lb	Nox	OFFROAD	0
2	6	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	18,250	0	50	11	Electric	0	lb	PM	OFFROAD	0
2	6	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	18,250	0	50	11	Electric	0	lb	ROG	OFFROAD	0

Controlled Offroad Equipment Activities and Emissions (Tier 4)

Table 6.1-11

Construction Year	Phase ID	Phase	Project Equipment	OFFROAD Equipment	Total Hours	HP	OFFROAD HP Bin	Tier HP Bin	Fuel	Emissions	Units	Pollutant	Engine Tier Controlled	DPF Controlled
1	1	Demolition/Mass Excavation	Street Sweeper	Sweepers/Scrubbers	3,042	285	500	300	Diesel	0,226	lb	Nox	Tier 4	0
1	1	Demolition/Mass Excavation	Street Sweeper	Sweepers/Scrubbers	3,042	285	500	300	Diesel	7	lb	PM10	Tier 4	0
1	1	Demolition/Mass Excavation	Street Sweeper	Sweepers/Scrubbers	3,042	285	500	300	Diesel	52	lb	ROG	Tier 4	0
1	2	Mass Excavation	Large Excavator	Excavators	1,369	523	750	600	Diesel	0,157	lb	Nox	Tier 4	0
1	2	Mass Excavation	Large Excavator	Excavators	1,369	523	750	600	Diesel	4.8	lb	PM10	Tier 4	0
1	2	Mass Excavation	Large Excavator	Excavators	1,369	523	750	600	Diesel	36.2	lb	ROG	Tier 4	0
1	2	Mass Excavation	Scraper	Scrapers	1,369	500	500	600	Diesel	0,189	lb	Nox	Tier 4	0
1	2	Mass Excavation	Scraper	Scrapers	1,369	500	500	600	Diesel	6	lb	PM10	Tier 4	0
1	2	Mass Excavation	Scraper	Scrapers	1,369	500	500	600	Diesel	43.7	lb	ROG	Tier 4	0
1	2	Mass Excavation	Track Type Tractor Blde/Ripper	Tractors/Loaders/Backhoes	913	150	175	175	Diesel	29	lb	Nox	Tier 4	0
1	2	Mass Excavation	Track Type Tractor Blde/Ripper	Tractors/Loaders/Backhoes	913	150	175	175	Diesel	0.9	lb	PM10	Tier 4	0
1	2	Mass Excavation	Track Type Tractor Blde/Ripper	Tractors/Loaders/Backhoes	913	150	175	175	Diesel	6.7	lb	ROG	Tier 4	0
1	2	Mass Excavation	Wheel Loader	Tractors/Loaders/Backhoes	1,369	211	250	300	Diesel	61	lb	Nox	Tier 4	0
1	2	Mass Excavation	Wheel Loader	Tractors/Loaders/Backhoes	1,369	211	250	300	Diesel	1.9	lb	PM10	Tier 4	0
1	2	Mass Excavation	Wheel Loader	Tractors/Loaders/Backhoes	1,369	211	250	300	Diesel	14.1	lb	ROG	Tier 4	0
1	3	Rapid Impact Compaction	Track type tractor with hammer	Tractors/Loaders/Backhoes	1,369	150	175	175	Diesel	43	lb	Nox	Tier 4	0
1	3	Rapid Impact Compaction	Track type tractor with hammer	Tractors/Loaders/Backhoes	1,369	150	175	175	Diesel	1.3	lb	PM10	Tier 4	0
1	3	Rapid Impact Compaction	Track type tractor with hammer	Tractors/Loaders/Backhoes	1,369	150	175	175	Diesel	10.0	lb	ROG	Tier 4	0
1	4	Pile Installation	Bobcat or small excavators	Rubber Tired Loaders	1,825	71	120	75	Diesel	283	lb	Nox	Tier 4	0
1	4	Pile Installation	Bobcat or small excavators	Rubber Tired Loaders	1,825	71	120	75	Diesel	0.8	lb	PM10	Tier 4	0
1	4	Pile Installation	Bobcat or small excavators	Rubber Tired Loaders	1,825	71	120	75	Diesel	12.4	lb	ROG	Tier 4	0
1	4	Pile Installation	Crawler Cranes	Cranes	1,825	530	750	600	Diesel	0,160	lb	Nox	Tier 4	0
1	4	Pile Installation	Crawler Cranes	Cranes	1,825	530	750	600	Diesel	4.9	lb	PM10	Tier 4	0
1	4	Pile Installation	Crawler Cranes	Cranes	1,825	530	750	600	Diesel	36.9	lb	ROG	Tier 4	0
1	4	Pile Installation	Cutting and chopping saws	Other Construction Equipment	1,825	0	50	11	Electric	0	lb	Nox	Tier 4	0
1	4	Pile Installation	Cutting and chopping saws	Other Construction Equipment	1,825	0	50	11	Electric	0	lb	PM10	Tier 4	0
1	4	Pile Installation	Cutting and chopping saws	Other Construction Equipment	1,825	0	50	11	Electric	0	lb	ROG	Tier 4	0
1	4	Pile Installation	Drill Rig (for installation of Auger Cast piles)	Bore/Drill Rigs	1,825	1,205	9,999	2,000	Diesel	5,457	lb	Nox	Tier 4	0
1	4	Pile Installation	Drill Rig (for installation of Auger Cast piles)	Bore/Drill Rigs	1,825	1,205	9,999	2,000	Diesel	39	lb	PM10	Tier 4	0
1	4	Pile Installation	Drill Rig (for installation of Auger Cast piles)	Bore/Drill Rigs	1,825	1,205	9,999	2,000	Diesel	146	lb	ROG	Tier 4	0
1	4	Pile Installation	Large Forklifts	Forklifts	913	93	120	120	Diesel	10	lb	Nox	Tier 4	0
1	4	Pile Installation	Large Forklifts	Forklifts	913	93	120	120	Diesel	0.3	lb	PM10	Tier 4	0
1	4	Pile Installation	Large Forklifts	Forklifts	913	93	120	120	Diesel	2.26	lb	ROG	Tier 4	0
1	5	Shoring	Cut off wall (CDSM) equipment	Bore/Drill Rigs	1,217	150	175	175	Diesel	53	lb	Nox	Tier 4	0
1	5	Shoring	Cut off wall (CDSM) equipment	Bore/Drill Rigs	1,217	150	175	175	Diesel	1.6	lb	PM10	Tier 4	0
1	5	Shoring	Cut off wall (CDSM) equipment	Bore/Drill Rigs	1,217	150	175	175	Diesel	12.1	lb	ROG	Tier 4	0
1	5	Shoring	Drill Rig	Bore/Drill Rigs	913	150	175	175	Diesel	39	lb	Nox	Tier 4	0
1	5	Shoring	Drill Rig	Bore/Drill Rigs	913	150	175	175	Diesel	1.2	lb	PM10	Tier 4	0
1	5	Shoring	Drill Rig	Bore/Drill Rigs	913	150	175	175	Diesel	9.1	lb	ROG	Tier 4	0
1	5	Shoring	Grout-mixing plant	Other Material Handling Equipment	913	20	50	25	Diesel	85	lb	Nox	Tier 4	0
1	5	Shoring	Grout-mixing plant	Other Material Handling Equipment	913	20	50	25	Diesel	4.8	lb	PM10	Tier 4	0
1	5	Shoring	Grout-mixing plant	Other Material Handling Equipment	913	20	50	25	Diesel	4.77	lb	ROG	Tier 4	0
1	5	Shoring	Small Excavator	Excavators	913	71	120	75	Diesel	149	lb	Nox	Tier 4	0
1	5	Shoring	Small Excavator	Excavators	913	71	120	75	Diesel	0.4	lb	PM10	Tier 4	0
1	5	Shoring	Small Excavator	Excavators	913	71	120	75	Diesel	6.5	lb	ROG	Tier 4	0
1	5	Shoring	Support Crane	Cranes	913	530	750	600	Diesel	80	lb	Nox	Tier 4	0
1	5	Shoring	Support Crane	Cranes	913	530	750	600	Diesel	2.5	lb	PM10	Tier 4	0
1	5	Shoring	Support Crane	Cranes	913	530	750	600	Diesel	18.4	lb	ROG	Tier 4	0
1	6	Building Construction (including arena)	Bobcat	Rubber Tired Loaders	3,346	71	120	75	Diesel	519	lb	Nox	Tier 4	0
1	6	Building Construction (including arena)	Bobcat	Rubber Tired Loaders	3,346	71	120	75	Diesel	1.5	lb	PM10	Tier 4	0
1	6	Building Construction (including arena)	Bobcat	Rubber Tired Loaders	3,346	71	120	75	Diesel	22.7	lb	ROG	Tier 4	0
1	6	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	3,346	480	500	600	Diesel	0,382	lb	Nox	Tier 4	0
1	6	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	3,346	480	500	600	Diesel	12	lb	PM10	Tier 4	0
1	6	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	3,346	480	500	600	Diesel	88	lb	ROG	Tier 4	0
1	6	Building Construction (including arena)	Crawler Cranes	Cranes	6,083	530	750	600	Diesel	0,532	lb	Nox	Tier 4	0
1	6	Building Construction (including arena)	Crawler Cranes	Cranes	6,083	530	750	600	Diesel	16	lb	PM10	Tier 4	0

Controlled Offroad Equipment Activities and Emissions (Tier 4)

Construction Year	Phase ID	Phase	Project Equipment	OFFROAD Equipment	Total Hours	HP	OFFROAD HP Bin	Tier HP Bin	Fuel	Emissions	Units	Pollutant	Engine Tier Controlled	DPF Controlled
1	6	Building Construction (including arena)	Crawler Cranes	Cranes	6,083	530	750	600	Diesel	123	lb	ROG	Tier 4	0
1	6	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	22,813	0	50	11	Electric	0	lb	Nox	Tier 4	0
1	6	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	22,813	0	50	11	Electric	0	lb	PM10	Tier 4	0
1	6	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	22,813	0	50	11	Electric	0	lb	ROG	Tier 4	0
1	6	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	19,010	0	50	11	Electric	0	lb	Nox	Tier 4	0
1	6	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	19,010	0	50	11	Electric	0	lb	PM10	Tier 4	0
1	6	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	19,010	0	50	11	Electric	0	lb	ROG	Tier 4	0
1	6	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	12,167	93	120	120	Diesel	0,130	lb	Nox	Tier 4	0
1	6	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	12,167	93	120	120	Diesel	4	lb	PM10	Tier 4	0
1	6	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	12,167	93	120	120	Diesel	30	lb	ROG	Tier 4	0
1	6	Building Construction (including arena)	Large Excavator	Excavators	3,346	523	750	600	Diesel	0,383	lb	Nox	Tier 4	0
1	6	Building Construction (including arena)	Large Excavator	Excavators	3,346	523	750	600	Diesel	12	lb	PM10	Tier 4	0
1	6	Building Construction (including arena)	Large Excavator	Excavators	3,346	523	750	600	Diesel	88	lb	ROG	Tier 4	0
1	6	Building Construction (including arena)	Mobile Cranes	Cranes	6,083	530	750	600	Diesel	0,532	lb	Nox	Tier 4	0
1	6	Building Construction (including arena)	Mobile Cranes	Cranes	6,083	530	750	600	Diesel	16	lb	PM10	Tier 4	0
1	6	Building Construction (including arena)	Mobile Cranes	Cranes	6,083	530	750	600	Diesel	123	lb	ROG	Tier 4	0
1	6	Building Construction (including arena)	Small Excavator	Excavators	3,346	404	500	600	Diesel	0,296	lb	Nox	Tier 4	0
1	6	Building Construction (including arena)	Small Excavator	Excavators	3,346	404	500	600	Diesel	9	lb	PM10	Tier 4	0
1	6	Building Construction (including arena)	Small Excavator	Excavators	3,346	404	500	600	Diesel	68	lb	ROG	Tier 4	0
1	6	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	7,604	0	50	11	Electric	0	lb	Nox	Tier 4	0
1	6	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	7,604	0	50	11	Electric	0	lb	PM10	Tier 4	0
1	6	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	7,604	0	50	11	Electric	0	lb	ROG	Tier 4	0
2	6	Building Construction (including arena)	Bobcat	Rubber Tired Loaders	3,346	71	120	75	Diesel	519	lb	Nox	Tier 4	0
2	6	Building Construction (including arena)	Bobcat	Rubber Tired Loaders	3,346	71	120	75	Diesel	1.5	lb	PM10	Tier 4	0
2	6	Building Construction (including arena)	Bobcat	Rubber Tired Loaders	3,346	71	120	75	Diesel	22.7	lb	ROG	Tier 4	0
2	6	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	304	480	500	600	Diesel	35	lb	Nox	Tier 4	0
2	6	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	304	480	500	600	Diesel	1.1	lb	PM10	Tier 4	0
2	6	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	304	480	500	600	Diesel	8.0	lb	ROG	Tier 4	0
2	6	Building Construction (including arena)	Crawler Cranes	Cranes	2,433	530	750	600	Diesel	0,213	lb	Nox	Tier 4	0
2	6	Building Construction (including arena)	Crawler Cranes	Cranes	2,433	530	750	600	Diesel	7	lb	PM10	Tier 4	0
2	6	Building Construction (including arena)	Crawler Cranes	Cranes	2,433	530	750	600	Diesel	49	lb	ROG	Tier 4	0
2	6	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	27,375	0	50	11	Electric	0	lb	Nox	Tier 4	0
2	6	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	27,375	0	50	11	Electric	0	lb	PM10	Tier 4	0
2	6	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	27,375	0	50	11	Electric	0	lb	ROG	Tier 4	0
2	6	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	30,417	0	50	11	Electric	0	lb	Nox	Tier 4	0
2	6	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	30,417	0	50	11	Electric	0	lb	PM10	Tier 4	0
2	6	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	30,417	0	50	11	Electric	0	lb	ROG	Tier 4	0
2	6	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	14,600	93	120	120	Diesel	0,156	lb	Nox	Tier 4	0
2	6	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	14,600	93	120	120	Diesel	5	lb	PM10	Tier 4	0
2	6	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	14,600	93	120	120	Diesel	36	lb	ROG	Tier 4	0
2	6	Building Construction (including arena)	Large Excavator	Excavators	304	523	750	600	Diesel	35	lb	Nox	Tier 4	0
2	6	Building Construction (including arena)	Large Excavator	Excavators	304	523	750	600	Diesel	1.1	lb	PM10	Tier 4	0
2	6	Building Construction (including arena)	Large Excavator	Excavators	304	523	750	600	Diesel	8.0	lb	ROG	Tier 4	0
2	6	Building Construction (including arena)	Mobile Cranes	Cranes	6,692	530	750	600	Diesel	0,586	lb	Nox	Tier 4	0
2	6	Building Construction (including arena)	Mobile Cranes	Cranes	6,692	530	750	600	Diesel	18	lb	PM10	Tier 4	0
2	6	Building Construction (including arena)	Mobile Cranes	Cranes	6,692	530	750	600	Diesel	135	lb	ROG	Tier 4	0
2	6	Building Construction (including arena)	Small Excavator	Excavators	3,346	404	500	600	Diesel	0,296	lb	Nox	Tier 4	0
2	6	Building Construction (including arena)	Small Excavator	Excavators	3,346	404	500	600	Diesel	9	lb	PM10	Tier 4	0
2	6	Building Construction (including arena)	Small Excavator	Excavators	3,346	404	500	600	Diesel	68	lb	ROG	Tier 4	0
2	6	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	18,250	0	50	11	Electric	0	lb	Nox	Tier 4	0
2	6	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	18,250	0	50	11	Electric	0	lb	PM10	Tier 4	0
2	6	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	18,250	0	50	11	Electric	0	lb	ROG	Tier 4	0

Controlled Offroad Equipment Activities and Emissions (Tier 2 + ARB NOx VDECS)

Table 6.1-12

Construction Year	Phase ID	Phase	Project Equipment	OFFROAD Equipment	Total Hours	HP	OFFROAD HP Bin	Tier HP Bin	Fuel	Emissions	Units	Pollutant	Engine Tier Controlled	DPF Controlled
1	1	Demolition/Mass Excavation	Street Sweeper	Sweepers/Scrubbers	3,042	285	500	300	Diesel	2,168	lb	Nox	Tier 2	1
1	1	Demolition/Mass Excavation	Street Sweeper	Sweepers/Scrubbers	3,042	285	500	300	Diesel	11	lb	PM10	Tier 2	1
1	1	Demolition/Mass Excavation	Street Sweeper	Sweepers/Scrubbers	3,042	285	500	300	Diesel	10	lb	ROG	Tier 2	1
1	2	Mass Excavation	Large Excavator	Excavators	1,369	523	750	600	Diesel	1,371	lb	Nox	Tier 2	1
1	2	Mass Excavation	Large Excavator	Excavators	1,369	523	750	600	Diesel	8.0	lb	PM10	Tier 2	1
1	2	Mass Excavation	Large Excavator	Excavators	1,369	523	750	600	Diesel	7.2	lb	ROG	Tier 2	1
1	2	Mass Excavation	Scraper	Scrapers	1,369	500	500	600	Diesel	1,655	lb	Nox	Tier 2	1
1	2	Mass Excavation	Scraper	Scrapers	1,369	500	500	600	Diesel	10	lb	PM10	Tier 2	1
1	2	Mass Excavation	Scraper	Scrapers	1,369	500	500	600	Diesel	8.7	lb	ROG	Tier 2	1
1	2	Mass Excavation	Track Type Tractor Blde/Ripper	Tractors/Loaders/Backhoes	913	150	175	175	Diesel	278	lb	Nox	Tier 2	1
1	2	Mass Excavation	Track Type Tractor Blde/Ripper	Tractors/Loaders/Backhoes	913	150	175	175	Diesel	2.1	lb	PM10	Tier 2	1
1	2	Mass Excavation	Track Type Tractor Blde/Ripper	Tractors/Loaders/Backhoes	913	150	175	175	Diesel	2.1	lb	ROG	Tier 2	1
1	2	Mass Excavation	Wheel Loader	Tractors/Loaders/Backhoes	1,369	211	250	300	Diesel	584	lb	Nox	Tier 2	1
1	2	Mass Excavation	Wheel Loader	Tractors/Loaders/Backhoes	1,369	211	250	300	Diesel	3.1	lb	PM10	Tier 2	1
1	2	Mass Excavation	Wheel Loader	Tractors/Loaders/Backhoes	1,369	211	250	300	Diesel	2.8	lb	ROG	Tier 2	1
1	3	Rapid Impact Compaction	Track type tractor with hammer	Tractors/Loaders/Backhoes	1,369	150	175	175	Diesel	417	lb	Nox	Tier 2	1
1	3	Rapid Impact Compaction	Track type tractor with hammer	Tractors/Loaders/Backhoes	1,369	150	175	175	Diesel	3.2	lb	PM10	Tier 2	1
1	3	Rapid Impact Compaction	Track type tractor with hammer	Tractors/Loaders/Backhoes	1,369	150	175	175	Diesel	3.2	lb	ROG	Tier 2	1
1	4	Pile Installation	Bobcat or small excavators	Rubber Tired Loaders	1,825	71	120	75	Diesel	295	lb	Nox	Tier 2	1
1	4	Pile Installation	Bobcat or small excavators	Rubber Tired Loaders	1,825	71	120	75	Diesel	3.0	lb	PM10	Tier 2	1
1	4	Pile Installation	Bobcat or small excavators	Rubber Tired Loaders	1,825	71	120	75	Diesel	2.4	lb	ROG	Tier 2	1
1	4	Pile Installation	Crawler Cranes	Cranes	1,825	530	750	600	Diesel	1,397	lb	Nox	Tier 2	1
1	4	Pile Installation	Crawler Cranes	Cranes	1,825	530	750	600	Diesel	8.1	lb	PM10	Tier 2	1
1	4	Pile Installation	Crawler Cranes	Cranes	1,825	530	750	600	Diesel	7.4	lb	ROG	Tier 2	1
1	4	Pile Installation	Cutting and chopping saws	Other Construction Equipment	1,825	0	50	11	Electric	0	lb	Nox	Tier 2	1
1	4	Pile Installation	Cutting and chopping saws	Other Construction Equipment	1,825	0	50	11	Electric	0	lb	PM10	Tier 2	1
1	4	Pile Installation	Cutting and chopping saws	Other Construction Equipment	1,825	0	50	11	Electric	0	lb	ROG	Tier 2	1
1	4	Pile Installation	Drill Rig (for installation of Auger Cast piles)	Bore/Drill Rigs	1,825	1,205	9,999	2,000	Diesel	5,540	lb	Nox	Tier 2	1
1	4	Pile Installation	Drill Rig (for installation of Auger Cast piles)	Bore/Drill Rigs	1,825	1,205	9,999	2,000	Diesel	32	lb	PM10	Tier 2	1
1	4	Pile Installation	Drill Rig (for installation of Auger Cast piles)	Bore/Drill Rigs	1,825	1,205	9,999	2,000	Diesel	29	lb	ROG	Tier 2	1
1	4	Pile Installation	Large Forklifts	Forklifts	913	93	120	120	Diesel	107	lb	Nox	Tier 2	1
1	4	Pile Installation	Large Forklifts	Forklifts	913	93	120	120	Diesel	1.1	lb	PM10	Tier 2	1
1	4	Pile Installation	Large Forklifts	Forklifts	913	93	120	120	Diesel	0.86	lb	ROG	Tier 2	1
1	5	Shoring	Cut off wall (CDSM) equipment	Bore/Drill Rigs	1,217	150	175	175	Diesel	506	lb	Nox	Tier 2	1
1	5	Shoring	Cut off wall (CDSM) equipment	Bore/Drill Rigs	1,217	150	175	175	Diesel	3.9	lb	PM10	Tier 2	1
1	5	Shoring	Cut off wall (CDSM) equipment	Bore/Drill Rigs	1,217	150	175	175	Diesel	3.8	lb	ROG	Tier 2	1
1	5	Shoring	Drill Rig	Bore/Drill Rigs	913	150	175	175	Diesel	379	lb	Nox	Tier 2	1
1	5	Shoring	Drill Rig	Bore/Drill Rigs	913	150	175	175	Diesel	2.9	lb	PM10	Tier 2	1
1	5	Shoring	Drill Rig	Bore/Drill Rigs	913	150	175	175	Diesel	2.9	lb	ROG	Tier 2	1
1	5	Shoring	Grout-mixing plant	Other Material Handling Equipment	913	20	50	25	Diesel	51	lb	Nox	Tier 2	1
1	5	Shoring	Grout-mixing plant	Other Material Handling Equipment	913	20	50	25	Diesel	1.4	lb	PM10	Tier 2	1
1	5	Shoring	Grout-mixing plant	Other Material Handling Equipment	913	20	50	25	Diesel	0.48	lb	ROG	Tier 2	1
1	5	Shoring	Small Excavator	Excavators	913	71	120	75	Diesel	155	lb	Nox	Tier 2	1
1	5	Shoring	Small Excavator	Excavators	913	71	120	75	Diesel	1.6	lb	PM10	Tier 2	1
1	5	Shoring	Small Excavator	Excavators	913	71	120	75	Diesel	1.3	lb	ROG	Tier 2	1
1	5	Shoring	Support Crane	Cranes	913	530	750	600	Diesel	699	lb	Nox	Tier 2	1
1	5	Shoring	Support Crane	Cranes	913	530	750	600	Diesel	4.1	lb	PM10	Tier 2	1
1	5	Shoring	Support Crane	Cranes	913	530	750	600	Diesel	3.7	lb	ROG	Tier 2	1
1	6	Building Construction (including arena)	Bobcat	Rubber Tired Loaders	3,346	71	120	75	Diesel	540	lb	Nox	Tier 2	1
1	6	Building Construction (including arena)	Bobcat	Rubber Tired Loaders	3,346	71	120	75	Diesel	5.5	lb	PM10	Tier 2	1
1	6	Building Construction (including arena)	Bobcat	Rubber Tired Loaders	3,346	71	120	75	Diesel	4.4	lb	ROG	Tier 2	1
1	6	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	3,346	480	500	600	Diesel	3,345	lb	Nox	Tier 2	1
1	6	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	3,346	480	500	600	Diesel	19	lb	PM10	Tier 2	1
1	6	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	3,346	480	500	600	Diesel	18	lb	ROG	Tier 2	1
1	6	Building Construction (including arena)	Crawler Cranes	Cranes	6,083	530	750	600	Diesel	4,657	lb	Nox	Tier 2	1
1	6	Building Construction (including arena)	Crawler Cranes	Cranes	6,083	530	750	600	Diesel	27	lb	PM10	Tier 2	1
1	6	Building Construction (including arena)	Crawler Cranes	Cranes	6,083	530	750	600	Diesel	25	lb	ROG	Tier 2	1
1	6	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	22,813	0	50	11	Electric	0	lb	Nox	Tier 2	1

Controlled Offroad Equipment Activities and Emissions (Tier 2 + ARB NOx VDECS)

1	6	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	22,813	0	50	11	Electric	0	lb	PM10	Tier 2	1
1	6	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	22,813	0	50	11	Electric	0	lb	ROG	Tier 2	1
1	6	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	19,010	0	50	11	Electric	0	lb	Nox	Tier 2	1
1	6	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	19,010	0	50	11	Electric	0	lb	PM10	Tier 2	1
1	6	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	19,010	0	50	11	Electric	0	lb	ROG	Tier 2	1
1	6	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	12,167	93	120	120	Diesel	1,429	lb	Nox	Tier 2	1
1	6	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	12,167	93	120	120	Diesel	14	lb	PM10	Tier 2	1
1	6	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	12,167	93	120	120	Diesel	12	lb	ROG	Tier 2	1
1	6	Building Construction (including arena)	Large Excavator	Excavators	3,346	523	750	600	Diesel	3,350	lb	Nox	Tier 2	1
1	6	Building Construction (including arena)	Large Excavator	Excavators	3,346	523	750	600	Diesel	19	lb	PM10	Tier 2	1
1	6	Building Construction (including arena)	Large Excavator	Excavators	3,346	523	750	600	Diesel	18	lb	ROG	Tier 2	1
1	6	Building Construction (including arena)	Mobile Cranes	Cranes	6,083	530	750	600	Diesel	4,657	lb	Nox	Tier 2	1
1	6	Building Construction (including arena)	Mobile Cranes	Cranes	6,083	530	750	600	Diesel	27	lb	PM10	Tier 2	1
1	6	Building Construction (including arena)	Mobile Cranes	Cranes	6,083	530	750	600	Diesel	25	lb	ROG	Tier 2	1
1	6	Building Construction (including arena)	Small Excavator	Excavators	3,346	404	500	600	Diesel	2,588	lb	Nox	Tier 2	1
1	6	Building Construction (including arena)	Small Excavator	Excavators	3,346	404	500	600	Diesel	15	lb	PM10	Tier 2	1
1	6	Building Construction (including arena)	Small Excavator	Excavators	3,346	404	500	600	Diesel	14	lb	ROG	Tier 2	1
1	6	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	7,604	0	50	11	Electric	0	lb	Nox	Tier 2	1
1	6	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	7,604	0	50	11	Electric	0	lb	PM10	Tier 2	1
1	6	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	7,604	0	50	11	Electric	0	lb	ROG	Tier 2	1
2	6	Building Construction (including arena)	Bobcat	Rubber Tired Loaders	3,346	71	120	75	Diesel	540	lb	Nox	Tier 2	1
2	6	Building Construction (including arena)	Bobcat	Rubber Tired Loaders	3,346	71	120	75	Diesel	5.5	lb	PM10	Tier 2	1
2	6	Building Construction (including arena)	Bobcat	Rubber Tired Loaders	3,346	71	120	75	Diesel	4.4	lb	ROG	Tier 2	1
2	6	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	304	480	500	600	Diesel	304	lb	Nox	Tier 2	1
2	6	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	304	480	500	600	Diesel	1.8	lb	PM10	Tier 2	1
2	6	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	304	480	500	600	Diesel	1.6	lb	ROG	Tier 2	1
2	6	Building Construction (including arena)	Crawler Cranes	Cranes	2,433	530	750	600	Diesel	1,863	lb	Nox	Tier 2	1
2	6	Building Construction (including arena)	Crawler Cranes	Cranes	2,433	530	750	600	Diesel	11	lb	PM10	Tier 2	1
2	6	Building Construction (including arena)	Crawler Cranes	Cranes	2,433	530	750	600	Diesel	10	lb	ROG	Tier 2	1
2	6	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	27,375	0	50	11	Electric	0	lb	Nox	Tier 2	1
2	6	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	27,375	0	50	11	Electric	0	lb	PM10	Tier 2	1
2	6	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	27,375	0	50	11	Electric	0	lb	ROG	Tier 2	1
2	6	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	30,417	0	50	11	Electric	0	lb	Nox	Tier 2	1
2	6	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	30,417	0	50	11	Electric	0	lb	PM10	Tier 2	1
2	6	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	30,417	0	50	11	Electric	0	lb	ROG	Tier 2	1
2	6	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	14,600	93	120	120	Diesel	1,715	lb	Nox	Tier 2	1
2	6	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	14,600	93	120	120	Diesel	17	lb	PM10	Tier 2	1
2	6	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	14,600	93	120	120	Diesel	14	lb	ROG	Tier 2	1
2	6	Building Construction (including arena)	Large Excavator	Excavators	304	523	750	600	Diesel	305	lb	Nox	Tier 2	1
2	6	Building Construction (including arena)	Large Excavator	Excavators	304	523	750	600	Diesel	1.8	lb	PM10	Tier 2	1
2	6	Building Construction (including arena)	Large Excavator	Excavators	304	523	750	600	Diesel	1.6	lb	ROG	Tier 2	1
2	6	Building Construction (including arena)	Mobile Cranes	Cranes	6,692	530	750	600	Diesel	5,122	lb	Nox	Tier 2	1
2	6	Building Construction (including arena)	Mobile Cranes	Cranes	6,692	530	750	600	Diesel	30	lb	PM10	Tier 2	1
2	6	Building Construction (including arena)	Mobile Cranes	Cranes	6,692	530	750	600	Diesel	27	lb	ROG	Tier 2	1
2	6	Building Construction (including arena)	Small Excavator	Excavators	3,346	404	500	600	Diesel	2,588	lb	Nox	Tier 2	1
2	6	Building Construction (including arena)	Small Excavator	Excavators	3,346	404	500	600	Diesel	15	lb	PM10	Tier 2	1
2	6	Building Construction (including arena)	Small Excavator	Excavators	3,346	404	500	600	Diesel	14	lb	ROG	Tier 2	1
2	6	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	18,250	0	50	11	Electric	0	lb	Nox	Tier 2	1
2	6	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	18,250	0	50	11	Electric	0	lb	PM10	Tier 2	1
2	6	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	18,250	0	50	11	Electric	0	lb	ROG	Tier 2	1

Table 6.1-13
Project Construction Trip Estimates

Phase	Duration [months]	Average Number of Daily Construction Trucks[1]	Average Number of Daily Construction Workers[1]	Number of Work Days	Total One-Way Trips		
					Hauling Trips	Vendor Trips	Worker Trips
Entire Site							
Demolition (Entire Site)	1	8	10	22	352	-	440
Excavation and Shoring (Entire Site)	3	300	25	66	39,600	-	3,300
Arena							
Foundation & Below Grade Construction (Piles & Concrete)	6	20	100	131	-	5,240	26,200
Base Building	16	25	200	348	-	17,400	139,200
Exterior Finishing	10	25	50	218	-	10,900	21,800
Interior Finishing	18.5	30	150	402	-	24,120	120,600
Garage/Podium							
Foundation & Below Grade Construction (Piles & Concrete)	6	20	50	131	-	5,240	13,100
Base Building	9	20	50	196	-	7,840	19,600
NW Tower							
Base Building	8	15	40	174	-	5,220	13,920
Exterior Finishing	5	2	10	109	-	436	2,180
Interior Finishing	12	10	100	261	-	5,220	52,200
SW Tower							
Base Building	8	15	40	174	-	5,220	13,920
Exterior Finishing	5	2	10	109	-	436	2,180
Interior Finishing	12	10	100	261	-	5,220	52,200
Entire Site							
Street Improvements	5	10	40	109	-	2,180	8,720
				Total Construction Trips	39,952	94,672	489,560

Notes:

1. Proposed number of construction trucks and workers provided by Project Sponsor in a table titled "Summary of Construction Phases and Duration, and Daily Construction Trucks and Workers by Phase," dated 11/25/2014.

Table 6.1-14

Site	Year	Trip Type[1]	Vehicle Type[1]	Fuel	% of Fleet[1]	Total One-way Trips	One-way Trip Length	Running Exhaust and Running Losses Emission Factor (g/mile)				
								ROG Exhaust	*ROG Running Loss*	*NOx Exhaust*	*PM_{10} Exhaust*	*$PM_{2.5}$ Exhaust*
Mission Bay	2015	Worker	LDA	GAS	50%	489,560	12.4	0.039	0.067	0.12	0.0023	0.0021
	2015	Worker	LDT1	GAS	25%	489,560	12.4	0.079	0.22	0.27	0.0043	0.0040
	2015	Worker	LDT2	GAS	25%	489,560	12.4	0.041	0.10	0.21	0.0022	0.0020
	2015	Vendor	T6	DSL	50%	94,672	7.3	0.22	0	4.6	0.12	0.11
	2015	Vendor	T7	DSL	50%	94,672	7.3	0.29	0	7.4	0.12	0.11
	2015	Hauling	T7	DSL	100%	39,952	20	0.29	0	7.4	0.12	0.11

Notes:

1. CalEEMod default vehicle mix of light-duty auto (LDA), light-duty truck type 1 (LDT1), and light-duty truck type 2 (LDT2) for worker trips, mix of medium heavy-duty vehicles (MHDT) and heavy heavy-duty trucks (HHDT) for vendor trips, and all HHDT for hauling trips.

Table 6.1-15

Site	Year	Trip Type[1]	Vehicle Type[1]	Fuel	% of Fleet[1]	Total One-way Trips	One-way Trip Length	Running Exhaust and Running Losses Emissions (lb)				
								ROG Exhaust	*ROG Running Loss*	*NOx Exhaust*	*PM_{10} Exhaust*	*$PM_{2.5}$ Exhaust*
Mission Bay	2015	Worker	LDA	GAS	50%	489,560	12.4	263	446	797	15	14.04
	2015	Worker	LDT1	GAS	25%	489,560	12.4	264	740	888	15	13.38
	2015	Worker	LDT2	GAS	25%	489,560	12.4	137	350	692	7.4	6.83
	2015	Vendor	T6	DSL	50%	94,672	7.3	169	0	3,525	93	85.41
	2015	Vendor	T7	DSL	50%	94,672	7.3	221	0	5,609	89	81.86
	2015	Hauling	T7	DSL	100%	39,952	20	512	0	12,969	206	189.28

Notes:

1. CalEEMod default vehicle mix of light-duty auto (LDA), light-duty truck type 1 (LDT1), and light-duty truck type 2 (LDT2) for worker trips, mix of medium heavy-duty vehicles (MHDT) and heavy heavy-duty trucks (HHDT) for vendor trips, and all HHDT for hauling trips.

Table 6.1-16

								Idling Emission Factor (g/hr-vehicle)				Idling Exhaust Emissions (lb) [5 min per one-way trip for mass emissions]			
Site	Year	Trip Type[1]	Vehicle Type[1]	Fuel	% of Fleet[1]	Total One-way Trips	One-way Trip Length	*ROG*	*NOx*	*PM_{10}*	*$PM_{2.5}$*	*ROG*	*NOx*	*PM_{10}*	*$PM_{2.5}$*
Mission Bay	2015	Worker	LDA	GAS	50%	489,560	12.4	0	0	0	0	0	0	0	0.00
	2015	Worker	LDT1	GAS	25%	489,560	12.4	0	0	0	0	0	0	0	0.00
	2015	Worker	LDT2	GAS	25%	489,560	12.4	0	0	0	0	0	0	0	0.00
	2015	Vendor	T6	DSL	50%	94,672	7.3	2.0	80	0.36	0.33	18	694	3.1	2.85
	2015	Vendor	T7	DSL	50%	94,672	7.3	6.4	66	0.31	0.28	56	576	2.7	2.44
	2015	Hauling	T7	DSL	100%	39,952	20	6.4	66	0.31	0.28	47	486	2.2	2.06

Notes:

1. CalEEMod default vehicle mix of light-duty auto (LDA), light-duty truck type 1 (LDT1), and light-duty truck type 2 (LDT2) for worker trips, mix of medium heavy-duty vehicles (MHDT) and heavy heavy-duty trucks (HHDT) for vendor trips, and all HHDT for hauling trips.

Table 6.1-17

Site	Year	Trip Type[1]	Vehicle Type[1]	Fuel	% of Fleet[1]	Total One-way Trips	One-way Trip Length	Starting Exhaust Emission Factor (g/one-way trip)				Starting Exhaust Emissions (lb) [Once per one-way trip for mass emissions]			
								ROG	*NOx*	*PM_{10}*	*$PM_{2.5}$*	*ROG*	*NOx*	*PM_{10}*	*$PM_{2.5}$*
Mission Bay	2015	Worker	LDA	GAS	50%	489,560	12.4	0.22	0.18	0.0030	0.0027	118	95	1.6	1.46
	2015	Worker	LDT1	GAS	25%	489,560	12.4	0.43	0.31	0.0046	0.0042	115	82	1.2	1.14
	2015	Worker	LDT2	GAS	25%	489,560	12.4	0.28	0.34	0.0027	0.0025	74	92	0.73	0.68
	2015	Vendor	T6	DSL	50%	94,672	7.3	0	0	0	0	0	0	0	0.00
	2015	Vendor	T7	DSL	50%	94,672	7.3	0	0	0	0	0	0	0	0.00
	2015	Hauling	T7	DSL	100%	39,952	20	0	0	0	0	0	0	0	0.00

Notes:

1. CalEEMod default vehicle mix of light-duty auto (LDA), light-duty truck type 1 (LDT1), and light-duty truck type 2 (LDT2) for worker trips, mix of medium heavy-duty vehicles (MHDT) and heavy heavy-duty trucks (HHDT) for vendor trips, and all HHDT for hauling trips.

Table 6.1-18

Site	Year	Trip Type[1]	Vehicle Type[1]	Fuel	% of Fleet[1]	Total One-way Trips	One-way Trip Length	Evaporative ROG Emission Factor (g/one-way trip) *Diurnal*	*Hot-Soak*	*Resting Loss*	Evaporative ROG Emissions (lb) *Diurnal*	*Hot-Soak*	*Resting Loss*
Mission Bay	2015	Worker	LDA	GAS	50%	489,560	12.4	0.046	0.15	0.041	25	82	22
	2015	Worker	LDT1	GAS	25%	489,560	12.4	0.10	0.28	0.083	28	77	22
	2015	Worker	LDT2	GAS	25%	489,560	12.4	0.050	0.16	0.047	13	43	13
	2015	Vendor	T6	DSL	50%	94,672	7.3	0	0	0	0	0	0
	2015	Vendor	T7	DSL	50%	94,672	7.3	0	0	0	0	0	0
	2015	Hauling	T7	DSL	100%	39,952	20	0	0	0	0	0	0

Notes:

1. CalEEMod default vehicle mix of light-duty auto (LDA), light-duty truck type 1 (LDT1), and light-duty truck type 2 (LDT2) for worker trips, mix of medium heavy-duty vehicles (MHDT) and heavy heavy-duty trucks (HHDT) for vendor trips, and all HHDT for hauling trips.

Construction Area Emissions Estimates

Table 6.1-19

Venue	Floor Area [ft^2]	Building Surface Area[1] [ft^2]	Architectural Coatings: Reapplication Rate	Architectural Coatings: Indoor Paint VOC EF[2] [g/L]	Architectural Coatings: Outdoor Paint VOC EF[2] [g/L]	Architectural Coatings: Architectural Coating VOC emissions[3] [lb/yr]
Event Center	750,000	1,500,000	100%	100	150	7,823
GSW Office Space	25,000	50,000				261
Office Space	580,000	1,160,000				6,050
Retail Space	125,000	250,000				1,304
Parking and Loading	475,000	950,000				4,955

Notes:

1. Consistent with CalEEMod, residential building surface area is assumed to be 2.7 times the floor area, and non-residential 2 times the floor area.
2. Based on BAAQMD paint VOC regulations, 100 g/L for flat paints, generally used indoors, and 150 g/L for all other architectural coatings. Building area is assumed to be 75% indoors and 25% outdoors, consistent with CalEEMod.
3. Uses CalEEMod assumptions of 1 gallon of paint covers 180 square feet.

Area Sources	Total Emissions [ton/yr]: ROG	CO	NO_x	PM_{10}	$PM_{2.5}$
Architectural Coatings	10.20	--	--	--	--
Total Project Emissions:	10.20	0.00	0.00	0.00	0.00

Mobile Source CAP Emissions Estimates

Table 6.1-20
Project CAPs Emission Factors

Emission Factor[1]	Units	Pollutant				
		ROG	CO	NO_x	PM_{10}	$PM_{2.5}$
Running Exhaust	[g/mile]	0.068	1.5	0.45	0.0066	0.0060
Idling Exhaust	[g/trip]	0.013	0.1	0.09	0.0003	0.0003
Starting Exhaust	[g/trip]	0.279	3.5	0.33	0.0030	0.0028
PM Brake Wear	[g/mile]	-	-	-	0.0420	0.0180
PM Tire Wear	[g/mile]	-	-	-	0.0088	0.0022
ROG Running Loss	[g/mile]	0.079	-	-	-	-
ROG Diurnal	[g/trip]	0.052	-	-	-	-
ROG Hot-Soak	[g/trip]	0.148	-	-	-	-
ROG Resting Loss	[g/trip]	0.044	-	-	-	-

Notes:

1. From EMFAC2011, calendar year 2017, San Francisco Bay Area. Emission factors are weighted by VMT for all vehicle categories.

Mobile Source CAP Emissions Estimates

Table 6.1-21

Project CAPs Emission Calculations

Trip Type	Scenario	Daily One-way Vehicle Trips[1]			Days Per Year[2]	Weighted Trip Length [mile][3]	Emissions [ton/yr]				
		Arena	Retail	Office			ROG	CO	NO_x	PM_{10}	$PM_{2.5}$
Mission Bay, Weekend Trips	Basketball Event Days	8,715	3,106	509	30	20.1	1.4	14	3.9	0.47	0.22
	Concert Event Days	8,715	3,106	509	55	20.1	2.6	26	7.1	0.86	0.40
	No Event Days	55	5,313	509	19	7.8	0.21	1.9	0.49	0.055	0.026
Mission Bay, Weekday Trips	Basketball Event Days	8,589	2,560	2,542	30	18.7	1.5	15	4.0	0.49	0.22
	Concert Event Days	8,589	2,560	2,542	45	18.7	2.2	22	6.1	0.73	0.34
	Convention Event Days	3,921	2,560	2,542	61	15.4	1.7	16	4.5	0.54	0.25
	No Event Days	55	4,393	2,542	125	7.9	1.6	15	3.9	0.44	0.20
Total Emissions:							**11**	**110**	**30**	**3.6**	**1.6**

Notes:

1. Daily vehicle trips provided by Adavant Consulting in a final memorandum titled "Travel, Parking, and Loading Demand Estimates for the Proposed Event Center & Mixed-Use Development at Mission Bay Blocks 29-32 - Case No. 2014.1441E". Office use includes GSW offices.

2. The maximum number of home games (60) in a season was conservatively assumed. Furthermore, it is assumed that half of the games will take place on weekends. Vehicle generation associated with all concert and family show events is approximated by concert trips, while the other 61 events are assumed to be convention events on weekdays.

3. Trip length for each scenario is weighted by the number of trips in each land use category. Arena vehicle trips are assumed to have a trip length of 25 miles/trip based on season ticket holder addresses. Season ticket holders account for approximately 60% seating at Warrior games. Vehicle trips from retail and office space are assumed to have a trip length of 11.98 miles/trip, based on 2006 average commute trip length in the Bay Area (MTC 2008).

Mobile Source CAP Emissions Estimates

Table 6.1-22

Road Dust Calculations

Total Annual VMT

Trip Type	Scenario	VMT [mile/yr]
Mission Bay, Weekend Trips	Basketball Event Days	7,418,424
	Concert Event Days	13,600,444
	No Event Days	870,239
Mission Bay, Weekday Trips	Basketball Event Days	7,688,333
	Concert Event Days	11,532,500
	Convention Event Days	8,457,295
	No Event Days	6,891,904
	Total VMT	**56,459,139**

Pollutants	Emissions Factor [lb/VMT]	Emissions [ton/yr]
Fugitive PM_{10}	0.00063	17.84
Fugitive $PM_{2.5}$	0.00016	4.38

Road Dust Equation[1]

E = k*(sL)^0.91 * (W)^1.02 * (1-P/4N)

where:

E = annual average emission factor in the same units as k	
k = particle size multiplier for particle size range and units of interest	
PM_{10} (lb/VMT)	0.0022
$PM_{2.5}$ (lb/VMT)	0.00054
sL = road surface silt loading (grams per square meter) (g/m^2)	0.1
W = average weight (tons) of all the vehicles traveling the road	2.4
P = number of "wet" days with at least 0.01 in of precipitation during theaveraging period	64
N number of days in the averaging period	365

Notes:

1. Road dust equation and parameters are based on CalEEMod defaults for the San Francisco Bay Area Air Basin.

References

California Air Resources Board (ARB). 2011. EMission FACtor Model (EMFAC2011).
Available online at www.arb.ca.gov/msei/modeling.htm

Metropolitan Transportation Commission (MTC). 2008. Travel Forecasts Data Summary: Transportation 2035 Plan for
Available online at http://www.mtc.ca.gov/planning/2035_plan/Supplementary/T2035-Travel_Forecast_Data_Summary.pdf

Table 6.1-23
Mobile Source CAPs Emission Reduction

Oracle Arena and GSW Oakland HQ Vehicle Trips Calculation

Employee Commute/ Non-Commute Trips

Scenario	Total Employees[1]	Total Driving Employees[2]	% SOV[3]	% Carpool[3]	Carpool Density [people/ vehicle][4]	Trips/ Roundtrip	Total Vehicle Trips per Day	Average operating days per year[5]	Total Vehicle Trips per Year
Oracle Arena Operations Employees	71	55	86%	14%	2	2	103	260	26,859
GSW Headquarters Employees	150	128	94%	6%	2	2	248	260	64,350

Notes:

1. Oracle Arena Operations employees assumed to be the same as the estimated number of employees at the proposed event center. Number of existing GSW employees at the Oakland headquarters is based on the Project Notice of Preparation dated 11/19/2014.
2. A 78.1% driving rate was assumed for the Oracle Arena employees according to the most recent Bay Area Census data (http://www.bayareacensus.ca.gov/bayarea.htm). GSW employees who drive based on a 85% driving rate according to Ben Draa, Senior Financial Analyst, GSW.
3. Oracle Arena employees SOV and carpool rates from Bay Area Census data. GSW Headquarters SOV and carpool rates from Ben Draa, Senior Financial Analyst,
4. A carpool density of two people per vehicle is assumed to be conservative.
5. Assumes 5 days per week for 52 weeks per year.

Spectator Trips

Scenario	Total Spectators Per Event[1]	Total Driving Spectators[2]	% SOV[3]	% Carpool[3]	Carpool Density [people/ vehicle][3]	Trips/ Roundtrip	Total Vehicle Trips per Event	Event Days per Year[4]	Total Vehicle Trips per Year
Oracle Arena Game Spectators	18,250	16,250	20%	80%	3	2	15,167	47	712,833
Oracle Arena Non-game Event Spectators	9,125	9,125	20%	80%	3	2	8,517	42	357,700

Notes:

1. Average spectator count and transit riders from Ben Draa, Senior Financial Analyst, GSW.
2. Ben Draa, Senior Financial Analyst, GSW, estimated that 2,000 of the total spectators take public transit or taxis per event.
3. The carpool assumptions are conservative in that 20% of the driving spectators would drive alone, while the remaining 80% would carpool at a density of 3 people per vehicle.
4. Number of GSW games is based on the 2013-2014 season and number of non-game events is based on four-year averages (2010-2013).

Vendor and Event Staff Trips

Scenario	Total Event Staff Per Event[1]	Total Driving Staff[1]	% SOV[2]	% Carpool[2]	Carpool Density [people/ vehicle][3]	Trips/ Roundtrip	Total Vehicle Trips per Event	Event Days per Year[4]	Total Vehicle Trips per Year
Oracle Arena Game Event Staff	1,013	791	86%	14%	2	2	1,474	47	69,274
Oracle Arena Non-game Event Staff	645	504	86%	14%	2	2	939	42	39,419

Notes:

1. A 78.1% driving rate was assumed for the vendor and event staff according to the most recent Bay Area Census data (http://www.bayareacensus.ca.gov/bayarea.htm). GSW employees who drive based on a 85% driving rate according to Ben Draa, Senior Financial Analyst, GSW.
2. SOV and carpool rates from Bay Area Census data.
3. A carpool density of two people per vehicle is assumed to be conservative.
4. Number of GSW games is based on the 2013-2014 season and number of non-game events is based on four-year averages (2010-2013).

Table 6.1-24
Mobile Source CAPs Emission Reduction

Oracle Arena and GSW HQ Emission Reduction Calculations

Trip Type		Total Vehicle Trips per Year	Trip Reduction per Year[9]	Trip Length [mile]	Total VMT [mile/year]	VMT Reduction [mile/year][9]
Employee Commute Trips[1]	Oracle Arena operations employees	26,859	0	9.5	255,163	0
	GSW Headquarters	64,350	64,350	9.5	611,325	611,325
Employee Non-Commute Trips[2]	Oracle Arena operations employees	26,859	0	3	80,578	0
	GSW Headquarters	64,350	64,350	3	193,050	193,050
Spectator Trips[3]	Oracle Arena game spectators	712,833	712,833	25	17,963,400	17,963,400
	Oracle Arena non-game event spectators	357,700	0	25	9,014,040	0
Vendor and Event Staff Trips[1,4]	Oracle Arena game vendors and event staff	69,274	69,274	9.5	658,103	658,103
	Oracle Arena non-game event vendors and event staff	39,419	0	9.5	374,479	0
Opposing Team Bus trips[5,6]	Oracle Arena Opposing Team Bus trips	132	132	17.5	2,310	2,310
Delivery Trips[7,8]	GSW Headquarters	4,160	4,160	7.3	30,368	30,368
Total Oracle Arena VMT [miles/year]					**28,348,073**	**18,623,813**
Total GSW Office VMT [miles/year]					**834,743**	**834,743**
Total VMT [miles/year]					**29,182,816**	**19,458,556**

Emission Factor[11]	Units	Pollutant	
		ROG	NO_x
Running Exhaust	[g/mile]	0.068	0.45
Idling Exhaust	[g/trip]	0.013	0.09
Starting Exhaust	[g/trip]	0.279	0.33
ROG Running Loss	[g/mile]	0.079	-
ROG Diurnal	[g/trip]	0.052	-
ROG Hot-Soak	[g/trip]	0.148	-
ROG Resting Loss	[g/trip]	0.044	-

Table 6.1-25
Mobile Source CAPs Emission Reduction

Trip Type		Emission Reduction [ton/year]			
		ROG	NO_x	PM_{10}	$PM_{2.5}$
Employee Commute Trips	Oracle Arena operations employees	0	0	0	0
	GSW Headquarters	0.14	0.34	0.039	0.018
Employee Non-Commute Trips	Oracle Arena operations employees	0	0	0	0
	GSW Headquarters	0.069	0.13	0.012	0.0058
Spectator Trips	Oracle Arena game spectators	3.3	9.3	1.1	0.52
	Oracle Arena non-game event spectators	0	0	0	0
Vendor and Event Staff Trips	Oracle Arena game vendors and event staff	0.15	0.36	0.042	0.019
	Oracle Arena non-game event vendors and event staff	0	0	0	0
Opposing Team Bus trips	Oracle Arena Opposing Team Bus trips	4.5E-04	0.0012	1.5E-04	6.7E-05
Delivery Trips	GSW Headquarters	0.0074	0.017	0.0019	8.9E-04
Total		**3.7**	**10**	**1.2**	**0.57**

Notes:

1. CalEEMod Default Trip Length for Commercial-Worker trips in the San Francisco Bay Area Air Basin.
2. Non-commute trips are assumed to have a trip length of 3 miles.
3. Trip length is an estimation based on season ticket holder addresses. Season ticket holders account for approximately 60% of seating at Warrior games.
4. Annual vehicle trips based on number of vendors at each event and total number of event days per year.
5. Annual vehicle trips based on 1.5 bus trips per game, 2 trips per round trip and 44 events per year. Count of opposing team bus trips from Ben Draa, Senior Financial Analyst, GSW. Event days per year includes 3 preseason games and 41 regular-season games.
6. Trip length is the driving distance from Union Square, San Francisco, where the Opposing Team is assumed to stay, to Oracle Arena.
7 Annual vehicle trips based on a daily delivery count of 8 from Ben Draa, Senior Financial Analyst, GSW. Assume 5 days per week for 52 weeks per year.
8. CalEEMod Default Trip Length for Commercial-Nonwork trips in the San Francisco Bay Area Air Basin.
9. Represents reduction in regional VMT-related emissions due to relocation of Warriors games from Oakland to San Francisco only.
10. From EMFAC2011, calendar year 2017, San Francisco Bay Area. Emission factors are weighted by VMT for all vehicle categories.

Table 6.1-26
Mobile Source CAPs Emission Reduction

Reduction in Road Dust Emissions

Road Dust Equation[1]
E = k*(sL)^0.91 * (W)^1.02 * (1-P/4N)

where:
E = annual average emission factor in the same units as k
k = particle size multiplier for particle size range and units of interest

PM_{10} (lb/VMT)	0.0022
$PM_{2.5}$ (lb/VMT)	0.00054
sL = road surface silt loading (grams per square meter) (g/m^2)	0.1
W = average weight (tons) of all the vehicles traveling the road	2.4
P = number of "wet" days with at least 0.01 in of precipitation during theaveraging period	64
N number of days in the averaging period	365

Pollutants	Emissions Factor [lb/VMT]	VMT Reduction [mile/yr]	Emission Reduction [ton/yr]
Fugitive PM_{10}	0.00063	19,458,556	6.1
Fugitive $PM_{2.5}$	0.00016		1.5

Notes:
1. Road dust equation and parameters are based on CalEEMod defaults for the San Francisco Bay Area Air Basin.

Generator Emissions Estimates

Project Emission Calculations **Table 6.1-27**

Location	Size		Fuel Type	Operation[1] (hrs/yr)	Emission Factors[2,3]					Emissions			
					NMHC	ROG	CO	NOx	PM	ROG	CO	NOx	PM
	[kW]	[hp]			[g/bhp-hr]					[ton/yr]			
Arena Standby Emergency	1,500	2,012	diesel	50	0.14	0.15	2.6	0.50	0.020	0.017	0.29	0.055	0.0022
Arena Standby Emergency	1,500	2,012	diesel	50	0.14	0.15	2.6	0.50	0.020	0.017	0.29	0.055	0.0022
Office Tower 1	750	1006	diesel	50	0.14	0.15	2.6	0.50	0.020	0.0083	0.14	0.028	0.0011
Office Tower 2	750	1006	diesel	50	0.14	0.15	2.6	0.50	0.020	0.0083	0.14	0.028	0.0011
Marketplace	500	671	diesel	50	0.14	0.15	2.2	0.30	0.015	0.0055	0.081	0.011	0.0006
									Total Emissions:	0.055	0.95	0.18	0.0072

Notes:

1. Operation is conservatively assumed to be 50 hours per year, the maximum allowable by the Bay Area Air Quality Management District.
2. Criterial Air Pollutants emission factors based on Tier 4 standards from the ARB and USEPA Off-Road Compression-Ignition (Diesel) Engine Standards (ARB 2013). Emission factors for PM_{10} and $PM_{2.5}$ are conservatively based on the PM emission standard.
3. The emission factors for ROG were calculated from the NMHC emission factors using conversion factors for diesel engines (USEPA 1997) and assuming that VOC and ROG are equivalent (ARB 2009).

References:

U.S. Environmental Protection Agency (USEPA). 1997. *Conversion Factors for Hydrocarbon Emission Components.* November.
Available online at: http://www.epa.gov/oms/models/nonrdmdl/nr-002.pdf.

California Air Resources Board (ARB). 2013. ARB and USEPA Off-Road Compression-Ignition (Diesel) Engine Standards.
Available online at: http://www.arb.ca.gov/msprog/ordiesel/documents/Off-Road_Diesel_Stds.xls.

ARB. 2009. *Definitions of VOC and ROG.* January.
Available online at: http://www.arb.ca.gov/ei/speciate/voc_rog_dfn_1_09.pdf

Boiler Emissions Estimates

Project Emission Calculations

Table 6.1-28

Quantity[1]	Fuel Type	Size Per Boiler[1]	Higher Heating Value[2]	Fuel Consumption[3]	Operation[4] (hrs/yr)	Emission Factors[5,6,7]						Emissions			
						CO	NOx	CO	NOx	ROG	PM	CO	NOx	ROG	PM
		Btu/hr	Btu/scf	scf/hr		ppmv (dry at 3% O_2)		lb/MMBtu		lb/10^6 scf		[ton/yr]			
4	Natural Gas	4,000,000	1,020	3,922	8,760	400	30	0.30	0.037	5.5	7.6	21	2.6	0.38	0.52

Notes:
1. Quantity and Size based on Project Sponsor estimate and is consistent with the total estimated heating load.
2. Higher heating value is the average natural gas heating value in AP-42 Section 1.4.
3. Fuel consumption calculated from size and higher heating value.
4. The boiler is assumed to operate for every hour of the year.
5. CO and NOx emission factors in ppm from BAAQMD Regulation 9 Rule 7.
6. CO and NOx emission factors converted from ppm to lb/MMBtu using the F-Factor method described in USEPA Method 19 for natural gas fuel (USEPA 2001).
7. ROG and PM emission factors from AP-42 Section 1.4 Table 1.4-2.

References:

BAAQMD. 2011. Regulation 9 Rule 7. Inorganic Gaseous Pollutants Nitrogen oxides and Carbon Monoxide from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters.

USEPA. 1995. AP 42, Volume I, Fifth Edition. §1.4. Natural Gas Combustion. Available online at: http://www.epa.gov/ttn/chief/ap42/ch01/final/c01s04.pdf

USEPA. 2001. Preferred and Alternative Methods for Estimating Air Emissions from Boilers. January. Available online at: http://www.epa.gov/ttnchie1/eiip/techreport/volume02/ii02.pdf.

Area Source Emissions Adjustment

Table 6.1-29

Default Consumer Product Emission Factor[1]	2.1E-05	lb/ROG/sqft/day
Updated Consumer Product Emission Factor[2]	1.5E-05	lb/ROG/sqft/day
Default Consumer Products Emissions	7.6	tons/year
Updated Consumer Product Emissions	5.4	tons/year
Reduction in Consumer Product Emissions	2.2	tons/year
Default Area Source Emissions	8.7	tons/year
Updated Area Source Emissions	6.4	tons/year

Notes:

1. Default value from the California Emissions Estimator Model (CalEEMod®).

2. San Francisco-specific area source emission factor developed by San Francisco Environmental Planning (SFEP) for ROG from consumer products.

No Project Alternative Tables

No Project Alternative

Average Daily Construction-related Emissions

	Average Daily Construction Emissions (pounds/day)			
	ROG	**NOx**	**PM_{10}**	**$PM_{2.5}$**
Off-road Equipment Emissions	**3.6**	**32**	**2.1**	**2.0**
Truck and Vehicle emissions	**3.3**	**17**	**0.26**	**0.24**
Architectural Coating Emissions	**30**	**0**	**0**	**0**
Total	**37**	**49**	**2.3**	**2.2**
BAAQMD Threshold	54	54	82	54
Above Threshold?	No	No	No	No

No Project Alternative

Average Daily and Maximum Annual Operational Emissions

	Average Daily Emissions (pounds/day)			
	ROG	**NOx**	**PM10**	**PM2.5**
Emission Source				
Mobile	14	31	22	6.3
Area Sources	20	<0.01	<0.01	<0.01
Boilers	0.54	4.9	0.37	0.37
Standby Diesel Generators	0.30	1.0	0.039	0.039
Total	35	36	23	6.7
Threshold	54	54	82	54
Above Threshold?	No	No	No	No
	Maximum Annual Emissions (short tons/year)			
	ROG	**NOx**	**PM10**	**PM2.5**
Emission Source				
Mobile	2.6	5.6	4.0	1.2
Area Sources	3.6	<0.01	<0.01	<0.01
Boilers	0.10	0.89	0.068	0.068
Standby Diesel Generators	0.06	0.18	0.0072	0.0072
Total	6.4	6.7	4.1	1.2
Threshold	10	10	15	10
Above Threshold?	No	No	No	No

Annual Average PM2.5 Concentrations at off-site Receptors for the No Project Alternative

Source	$PM_{2.5}$ Concentration ($\mu g/m^3$, Annual Average)		
	UCSF Hearst Tower Receptor	UCSF Hospital Receptor	Uber/ARE Receptor
Construction			
Background at the maximally impacted receptor	8.5	8.6	8.4
Uncontrolled Construction Contribution	0.10	0.10	0.38
Cumulative Total (Uncontrolled)	8.6	8.7	8.7
Significance Threshold	10	10	10
Significant?	No	No	No
Operation			
Background at the maximally impacted receptor	8.5	8.6	8.7
Project Operations – Generators	0.055	0.055	0.055
Project Operations – Mobile	0.32	0.32	0.32
Cumulative Total (Uncontrolled)	8.9	9.0	9.1
Significance Threshold	10	10	10
Significant?	No	No	No

NOTE: The cumulative total concentrations may not sum precisely due to rounding of subtotals.

Lifetime Excess Cancer Risk at off-site Receptors for the No Project Alternative

Source	Excess Cancer Risk (in one million)			
	UCSF Hearst Tower Receptor		UCSF Hospital Receptor	Uber/ARE Receptor
	Child Resident	Adult Resident	Child Resident	Daycare Child
Background at the maximally impacted receptor	26	26	44	41
Uncontrolled Construction Contribution	12	0.61	8.3	22
Project Operations – Generators	30	30	30	30
Project Operations – Mobile	7.2	7.2	7.2	7.2
Cumulative Total	75	64	90	100
Significance Threshold	100	100	100	100
Significant ?	No	No	No	No

NOTE: The cumulative total risks may not sum precisely due to rounding of subtotals.

Table 6.2-1
Construction Particulate Matter Emissions
for the No Project Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Emissions	Units	Uncontrolled Scenario
Project construction $PM_{2.5}$ emissions[1]	[lb/project]	1396
Project construction DPM emissions[1]	[lb/project]	892
Construction duration	[years]	1.5
Annual $PM_{2.5}$ emissions	[lb/year]	960
Annual DPM emissions	[lb/year]	613
Average $PM_{2.5}$ emissions	[g/s]	0.014
Average DPM emissions	[g/s]	0.009

Notes:
1. Includes emissions from off-road equipment and on-road sources.

2. Annual emissions are calculated by dividing the project construction emissions by the construction duration. Average DPM emissions are calculated by converting pounds per year to grams per second using standard conversions. Average $PM_{2.5}$ emissions calculated by scaling average DPM emissions by the ratio of project construction $PM_{2.5}$ to project construction DPM.

Abbreviations:
DPM: Diesel particulate matter
lb: pound
g: gram
s: second

Table 6.2-2
Annual Average Daily Traffic from Project Operation
for the No Project Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Trip Type	Scenario	Days Per Year	Daily One-way Vehicle Trips[1]
Mission Bay, Weekday Trips	No Event Days	260	5,510
Mission Bay, Weekend Trips	No Event Days	105	2,145
		Annual One-way Vehicle Trips:	1,657,825
		Annual Average Daily Traffic (AADT):[2]	**4,542**

Notes:
1. Based on traffic data from Adavant Consulting.
2. Annual one-way vehicle trips is calculated by multiplying total daily one-way vehicle trips by total days per year. Annual one-way vehicle trips is divided by 365 days per year to get AADT.

Abbreviations:
AADT: Annual average daily traffic

Table 6.2-3
Screening $PM_{2.5}$ Concentrations and Cancer Risks from Operational Traffic
for the No Project Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Impact[1]	North-South Roadway Impact	East-West Roadway Impact	Total Impact from 4 Adjacent Roadways
$PM_{2.5}$ Concentration (ug/m^3)	0.080	0.078	0.32
Lifetime Cancer Risk (in a million)	2.2	1.4	7.2

Notes:
1. Based on BAAQMD County Surface Street Screening Tables for San Francisco County. A distance of 10 feet from the roadway and an annual average daily traffic (AADT) volume of 10,000 vehicles per day (vpd) was conservatively assumed since the AADT shown in Table 7.2-2 is less than 10,000 vpd.

Abbreviations:
AADT: annual average daily traffic
BAAQMD: Bay Area Air Quality Management District
vpd: vehicles per day

References:

Bay Area Air Quality Management District (BAAQMD). 2011. Roadway Screening Analysis Tables. December. Available online at :
http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/County%20Surface%20Street%20Screening%20Tables%20Dec%202011.ashx?la=en

Table 6.2-4
AERMOD Construction Screening Inputs and Outputs
for the No Project Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Parameter	**Inputs and Outputs**
Source	Construction
Source Type	Area
Emission Rate (g/s-m^2)	2.2E-05
Release Height (m)	5
Area (m^2)	45482
Receptor Height (m)	1.8
Urban/Rural (U/R)	U
Meteorological Station	Mission Bay 2008
Dispersion Factor (µg/m^3 per g/s)	
Annual Average Dispersion Factor at Dormitory Receptor	**10.4**
Annual Average Dispersion Factor at Hospital Receptor	**10.4**
Concentration	**Uncontrolled**
$PM_{2.5}$ Emission Rate (g/s)	0.014
Annual Maximum $PM_{2.5}$ Conc at Dormitory Receptor (µg/m^3)	**0.14**
Annual Maximum $PM_{2.5}$ Conc at Hospital Receptor (µg/m^3)	**0.14**
Diesel PM Emission Rate (g/s)	0.0088
Annual Maximum DPM Conc at Dormitory Receptor (µg/m^3)	**0.092**
Annual Maximum DPM Conc at Hospital Receptor (µg/m^3)	**0.091**

Abbreviations:
g: gram
m: meter
m^2: square meter
m^3: cubic meter
PM: particulate matter
s: second
µg: microgram

Table 6.2-5
Screening $PM_{2.5}$ Concentration Results
for the No Project Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Scenario	Concentration [µg/m^3]		
	Dormitory Receptor	Hospital Receptor	Daycare Receptor
Construction			
$PM_{2.5}$ Concentration from Uncontrolled Construction Emissions	0.10	0.10	0.38
2014 Background $PM_{2.5}$ Concentration[2]	8.5	8.6	8.4
Total $PM_{2.5}$ Concentration (Construction)	8.6	8.7	8.7
Cumulative Threshold[3]	10	10	10
Total $PM_{2.5}$ Concentration Exceeds Threshold? (Uncontrolled scenario)	No	No	No
Operational			
$PM_{2.5}$ Concentration from Operational Traffic	0.32	0.32	0.32
$PM_{2.5}$ Concentration from Emergency Diesel Generators[1]	0.055	0.055	0.055
2014 Background $PM_{2.5}$ Concentration[2]	8.5	8.6	8.7
Total $PM_{2.5}$ Concentration (Operational)	8.9	9.0	9.1
Cumulative Threshold[3]	10	10	10
Total $PM_{2.5}$ Concentration Exceeds Threshold? (Operational)	No	No	No

Notes:
1. Back-calculated assuming a cancer risk of 10 in a million for each of the three generators (total of 30 in a million). The cancer risk of 10 in a million is the maximum allowable Project cancer risk from toxic air contaminants in the BAAQMD, and exposure assumptions for a 70-year resident.
2. 2014 background risk from the Citywide HRA database for all receptors.
3. Cumulative threshold is the threshold for creating an Air Pollutant Exposure Zone (APEZ), as defined by the San Francisco Planning Department, Environmental Planning.

Abbreviations:
BAAQMD: Bay Area Air Quality Management District
HRA: Health Risk Assessment
µg: microgram
m^3: cubic meter

Table 6.2-6
Exposure Parameters and Cancer Risk Adjustment Factors
for the No Project Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Exposure Parameter	Units	Construction			
		Child Resident	Adult Resident	Hospital Child	Daycare Child
Daily Breathing Rate (DBR)[1]	[L/kg-day]	581	302	581	581
Exposure Time (ET)[2]	[hours/24 hours]	24	24	24	11
Exposure Frequency (EF)[3]	[days/year]	350	350	365	253
Exposure Duration (ED)[4]	[years]	1.5	1.5	1	0.67
Averaging Time (AT)	[days]	25,550	25,550	25,550	25,550
Intake Factor, Inhalation (IF_{inh})	[m^3/kg-day]	0.012	0.0060	0.0083	0.0018
Cancer Risk Adjustment Factor[5]	[-]	10	1	10	10
Modeling Adjustment Factor[6]	[-]	N/A	N/A	N/A	3.15

Notes:
1. Daily breathing rate reflects default breathing rate from BAAQMD 2010.
2. Exposure time reflects default exposure time from BAAQMD 2010.
3. Exposure frequency reflects default exposure frequency from BAAQMD 2010.
4. Assumes all construction-related emissions will be emitted within the first 1.5 years. Operation of the daycare center is not expected to take place until mid- to late-2017; since Project construction will be largely completed by that time, an exposure duration of 8 months was used as a conservative estimate.
5. Based on BAAQMD 2010.
6. Construction emissions are conservatively assumed to occur concurrently with the operation of the daycare center. As such, a modeling adjustment factor of (365/253)*(24/11) = 3.15 is applied for the daycare child receptor.

Calculation:

IF_{inh} = DBR * ET * EF * ED * CF / AT

CF = 0.001 (m^3/L)

Abbreviations:
BAAQMD: Bay Area Air Quality Management District
L: liter
kg: kilogram
m^3: cubic meter

References:

BAAQMD. 2010. BAAQMD Air Toxics NSR Program Health Risk Screening Analysis (HRSA) Guidelines. January. http://baaqmd.gov/~/media/Files/Engineering/Air%20Toxics%20Programs/hrsa_guidelines.ashx?la=en

Table 6.2-7
Screening Cancer Risk Results
for the No Project Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Scenario	Units	Dormitory Receptor		Hospital Child Receptor	Daycare Child Receptor
		Child Resident	Adult Resident		
Diesel PM Cancer Potency Factor (CPF)[1]	$[mg/kg\text{-}day]^{-1}$	1.1	1.1	1.1	1.1
Excess Cancer Risk from Uncontrolled Construction Emissions[2]	[in a million]	12	0.61	8.3	22
Excess Cancer Risk from Operational Traffic Emissions[3]	[in a million]	7.2	7.2	7.2	7.2
Excess Cancer Risk from Emergency Diesel Generators[4]	[in a million]	30	30	30	30
2014 Background Risk[5]	[in a million]	26	26	44	41
Total Excess Cancer Risk	[in a million]	74.9	63.8	89.6	99.7
Cumulative Threshold[6]	[in a million]	100	100	100	100
Total Risk Exceeds Threshold?	-	No	No	No	No

Notes:
1. From Cal/EPA 2013.
2. Represent health impacts for a residential receptor at the dormitory, hospital, or daycare.
3. The screening values reflect a 70-year cancer risk with age sensitivity factors applied (BAAQMD 2012).
4. A cancer risk of 10 in a million, the maximum allowable Project cancer risk from toxic air contaminants in the BAAQMD, is conservatively assumed.
5. 2014 background risk from the Citywide HRA database for all receptors.
6. Cumulative threshold is the threshold for creating an Air Pollutant Exposure Zone (APEZ), as defined by the San Francisco Planning Department, Environmental Planning.

Calculation:
Cancer Risk = [AnnualConc] × [CF] × $[IF_{inh}]$ × [CPF] x [CRAF] x [MAF]
CF = 0.001 (mg/µg)

Abbreviations:
BAAQMD: Bay Area Air Quality Management District
Cal/EPA: California Environmental Protection Agency
CRAF: Cancer Risk Adjustment Factor
HRA: Health Risk Assessment
IF_{inh}: Intake Factor, Inhalation
kg: kilogram
mg: milligram
PM: Particulate Matter
µg: microgram

References:

Cal/EPA. 2013. OEHHA/ARB Consolidated Table of Approved Risk Assessment Health Values. August. Available online at: http://www.arb.ca.gov/toxics/healthval/contable.pdf

Bay Area Air Quality Management District (BAAQMD). 2012. Recommended Methods for Screening and Modeling Local Risks and Hazards. May. Available online at: http://baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Risk%20Modeling%20Approach%20May%202012.ashx?la=en

Mission Bay Blocks 29-32 Alternative A

San Francisco County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	1,056.00	1000sqft	10.27	1,056,000.00	0
Regional Shopping Center	31.70	1000sqft	0.73	31,700.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	4.6	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2017
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	349	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2 intensity factor of 349 for 2017 from http://www.pge.com/includes/docs/pdfs/shared/environment/calculator/pge_ghg_emission_factor_info_sheet.pdf

Land Use - Retail acreage is Caleemod default; Office acreage was adjusted to make total acreage equal to 11 acres, per NOP site description. Square footage from Jose's comment.

Construction Phase - For consistency with project runs, construction was assumed to begin in 2015. No demolition - no buildings currently onsite.

Architectural Coating - Coating VOC contents reduced to meet limits of BAAQMD Reg 8 Rule 3: Interior coating limit of 100 g/L. Exterior limit of 150 g/L.

Vehicle Trips - Trip rates from traffic study, allocated to each land use subtype using same percent allocations from Caleemod defaults.

Energy Use - Title 24 eletricity and natural gas energy intensities have been adjusted for 2013 standards per CEC report: http://www.energy.ca.gov/2013publications/CEC-400-2013-008/CEC-400-2013-008.pdf

Table Name	Column Name	Default Value	New Value
tblEnergyUse	T24E	5.01	3.92
tblEnergyUse	T24E	2.74	2.14
tblEnergyUse	T24NG	19.28	16.04
tblEnergyUse	T24NG	4.10	3.41
tblLandUse	LotAcreage	24.24	10.27
tblProjectCharacteristics	CO2IntensityFactor	641.35	349
tblProjectCharacteristics	OperationalYear	2014	2017
tblVehicleTrips	ST_TR	2.37	1.24
tblVehicleTrips	ST_TR	49.97	26.23
tblVehicleTrips	SU_TR	0.98	1.24
tblVehicleTrips	SU_TR	25.24	26.23
tblVehicleTrips	WD_TR	11.01	4.67
tblVehicleTrips	WD_TR	42.94	18.22

2.0 Emissions Summary

2.1 Overall Construction

Uncontrolled Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2015	0.9258	6.7021	8.3537	0.0121	0.6555	0.3199	0.9755	0.2217	0.2986	0.5203	0.0000	1,058.9386	1,058.9386	0.1152	0.0000	1,061.3570
2016	6.0565	2.6176	3.6002	5.7500e-003	0.2203	0.1260	0.3463	0.0598	0.1180	0.1777	0.0000	489.9286	489.9286	0.0465	0.0000	490.9046
Total	**6.9823**	**9.3197**	**11.9539**	**0.0179**	**0.8758**	**0.4459**	**1.3217**	**0.2814**	**0.4166**	**0.6980**	**0.0000**	**1,548.8671**	**1,548.8671**	**0.1616**	**0.0000**	**1,552.2616**

Controlled Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2015	0.9258	6.7021	8.3537	0.0121	0.6555	0.3199	0.9755	0.2217	0.2986	0.5203	0.0000	1,058.9382	1,058.9382	0.1152	0.0000	1,061.3566
2016	6.0565	2.6176	3.6002	5.7500e-003	0.2203	0.1260	0.3463	0.0598	0.1180	0.1777	0.0000	489.9284	489.9284	0.0465	0.0000	490.9044
Total	**6.9823**	**9.3197**	**11.9539**	**0.0179**	**0.8758**	**0.4459**	**1.3217**	**0.2814**	**0.4166**	**0.6980**	**0.0000**	**1,548.8665**	**1,548.8665**	**0.1616**	**0.0000**	**1,552.2610**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Uncontrolled Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	4.8162	1.0000e-004	0.0102	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.0194	0.0194	5.0000e-005	0.0000	0.0206
Energy	0.0978	0.8890	0.7467	5.3300e-003		0.0676	0.0676		0.0676	0.0676	0.0000	3,161.0963	3,161.0963	0.2008	0.0555	3,182.5027
Mobile	2.6430	5.5930	25.0005	0.0571	3.9504	0.0858	4.0362	1.0713	0.0790	1.1502	0.0000	4,346.1903	4,346.1903	0.1796	0.0000	4,349.9625
Waste						0.0000	0.0000		0.0000	0.0000	206.1109	0.0000	206.1109	12.1808	0.0000	461.9079
Water						0.0000	0.0000		0.0000	0.0000	60.2893	227.3138	287.6031	6.2112	0.1501	464.5755
Total	**7.5570**	**6.4820**	**25.7574**	**0.0624**	**3.9504**	**0.1534**	**4.1038**	**1.0713**	**0.1466**	**1.2178**	**266.4003**	**7,734.6198**	**8,001.0201**	**18.7725**	**0.2056**	**8,458.9691**

2.2 Overall Operational

Controlled Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	4.8162	1.0000e-004	0.0102	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.0194	0.0194	5.0000e-005	0.0000	0.0206
Energy	0.0978	0.8890	0.7467	5.3300e-003		0.0676	0.0676		0.0676	0.0676	0.0000	3,161.0963	3,161.0963	0.2008	0.0555	3,182.5027
Mobile	2.6430	5.5930	25.0005	0.0571	3.9504	0.0858	4.0362	1.0713	0.0790	1.1502	0.0000	4,346.1903	4,346.1903	0.1796	0.0000	4,349.9625
Waste						0.0000	0.0000		0.0000	0.0000	206.1109	0.0000	206.1109	12.1808	0.0000	461.9079
Water						0.0000	0.0000		0.0000	0.0000	60.2893	227.3138	287.6031	6.2101	0.1499	464.4794
Total	**7.5570**	**6.4820**	**25.7574**	**0.0624**	**3.9504**	**0.1534**	**4.1038**	**1.0713**	**0.1466**	**1.2178**	**266.4003**	**7,734.6198**	**8,001.0201**	**18.7713**	**0.2053**	**8,458.8730**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.11**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/29/2015	2/11/2015	5	10	
2	Grading	Grading	2/12/2015	3/25/2015	5	30	
3	Building Construction	Building Construction	3/26/2015	5/18/2016	5	300	
4	Paving	Paving	5/19/2016	6/15/2016	5	20	
5	Architectural Coating	Architectural Coating	6/16/2016	7/13/2016	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 75

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 1,631,550; Non-Residential Outdoor: 543,850 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Rubber Tired Dozers	3	8.00	255	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	2	8.00	162	0.38
Grading	Graders	1	8.00	174	0.41
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Scrapers	2	8.00	361	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Building Construction	Cranes	1	7.00	226	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Pavers	2	8.00	125	0.42
Paving	Paving Equipment	2	8.00	130	0.36
Paving	Rollers	2	8.00	80	0.38
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	7	18.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	348.00	178.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	70.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2015

Uncontrolled Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0903	0.0000	0.0903	0.0497	0.0000	0.0497	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0263	0.2845	0.2132	2.0000e-004		0.0154	0.0154		0.0142	0.0142	0.0000	18.6506	18.6506	5.5700e-003	0.0000	18.7675
Total	**0.0263**	**0.2845**	**0.2132**	**2.0000e-004**	**0.0903**	**0.0154**	**0.1058**	**0.0497**	**0.0142**	**0.0639**	**0.0000**	**18.6506**	**18.6506**	**5.5700e-003**	**0.0000**	**18.7675**

Uncontrolled Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.6000e-004	4.9000e-004	4.9400e-003	1.0000e-005	8.2000e-004	1.0000e-005	8.2000e-004	2.2000e-004	1.0000e-005	2.2000e-004	0.0000	0.8427	0.8427	5.0000e-005	0.0000	0.8437
Total	**3.6000e-004**	**4.9000e-004**	**4.9400e-003**	**1.0000e-005**	**8.2000e-004**	**1.0000e-005**	**8.2000e-004**	**2.2000e-004**	**1.0000e-005**	**2.2000e-004**	**0.0000**	**0.8427**	**0.8427**	**5.0000e-005**	**0.0000**	**0.8437**

3.2 Site Preparation - 2015

Controlled Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0903	0.0000	0.0903	0.0497	0.0000	0.0497	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0263	0.2845	0.2132	2.0000e-004		0.0154	0.0154		0.0142	0.0142	0.0000	18.6505	18.6505	5.5700e-003	0.0000	18.7675
Total	**0.0263**	**0.2845**	**0.2132**	**2.0000e-004**	**0.0903**	**0.0154**	**0.1058**	**0.0497**	**0.0142**	**0.0639**	**0.0000**	**18.6505**	**18.6505**	**5.5700e-003**	**0.0000**	**18.7675**

Controlled Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.6000e-004	4.9000e-004	4.9400e-003	1.0000e-005	8.2000e-004	1.0000e-005	8.2000e-004	2.2000e-004	1.0000e-005	2.2000e-004	0.0000	0.8427	0.8427	5.0000e-005	0.0000	0.8437
Total	**3.6000e-004**	**4.9000e-004**	**4.9400e-003**	**1.0000e-005**	**8.2000e-004**	**1.0000e-005**	**8.2000e-004**	**2.2000e-004**	**1.0000e-005**	**2.2000e-004**	**0.0000**	**0.8427**	**0.8427**	**5.0000e-005**	**0.0000**	**0.8437**

3.3 Grading - 2015

Uncontrolled Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1301	0.0000	0.1301	0.0540	0.0000	0.0540	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1016	1.1857	0.7626	9.3000e-004		0.0570	0.0570		0.0525	0.0525	0.0000	88.2633	88.2633	0.0264	0.0000	88.8167
Total	**0.1016**	**1.1857**	**0.7626**	**9.3000e-004**	**0.1301**	**0.0570**	**0.1871**	**0.0540**	**0.0525**	**0.1064**	**0.0000**	**88.2633**	**88.2633**	**0.0264**	**0.0000**	**88.8167**

Uncontrolled Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1900e-003	1.6400e-003	0.0165	4.0000e-005	2.7200e-003	3.0000e-005	2.7500e-003	7.2000e-004	2.0000e-005	7.5000e-004	0.0000	2.8090	2.8090	1.6000e-004	0.0000	2.8123
Total	**1.1900e-003**	**1.6400e-003**	**0.0165**	**4.0000e-005**	**2.7200e-003**	**3.0000e-005**	**2.7500e-003**	**7.2000e-004**	**2.0000e-005**	**7.5000e-004**	**0.0000**	**2.8090**	**2.8090**	**1.6000e-004**	**0.0000**	**2.8123**

3.3 Grading - 2015

Controlled Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1301	0.0000	0.1301	0.0540	0.0000	0.0540	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1016	1.1857	0.7626	9.3000e-004		0.0570	0.0570		0.0525	0.0525	0.0000	88.2632	88.2632	0.0264	0.0000	88.8166
Total	**0.1016**	**1.1857**	**0.7626**	**9.3000e-004**	**0.1301**	**0.0570**	**0.1871**	**0.0540**	**0.0525**	**0.1064**	**0.0000**	**88.2632**	**88.2632**	**0.0264**	**0.0000**	**88.8166**

Controlled Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.1900e-003	1.6400e-003	0.0165	4.0000e-005	2.7200e-003	3.0000e-005	2.7500e-003	7.2000e-004	2.0000e-005	7.5000e-004	0.0000	2.8090	2.8090	1.6000e-004	0.0000	2.8123
Total	**1.1900e-003**	**1.6400e-003**	**0.0165**	**4.0000e-005**	**2.7200e-003**	**3.0000e-005**	**2.7500e-003**	**7.2000e-004**	**2.0000e-005**	**7.5000e-004**	**0.0000**	**2.8090**	**2.8090**	**1.6000e-004**	**0.0000**	**2.8123**

3.4 Building Construction - 2015

Uncontrolled Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3677	3.0180	1.8838	2.7000e-003		0.2127	0.2127		0.2000	0.2000	0.0000	245.2143	245.2143	0.0615	0.0000	246.5063
Total	**0.3677**	**3.0180**	**1.8838**	**2.7000e-003**		**0.2127**	**0.2127**		**0.2000**	**0.2000**	**0.0000**	**245.2143**	**245.2143**	**0.0615**	**0.0000**	**246.5063**

Uncontrolled Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.2897	2.0203	3.5544	4.1200e-003	0.1143	0.0317	0.1460	0.0327	0.0291	0.0618	0.0000	375.6842	375.6842	3.3300e-003	0.0000	375.7540
Worker	0.1389	0.1916	1.9184	4.1500e-003	0.3173	3.0400e-003	0.3203	0.0844	2.8000e-003	0.0872	0.0000	327.4745	327.4745	0.0182	0.0000	327.8565
Total	**0.4286**	**2.2119**	**5.4727**	**8.2700e-003**	**0.4315**	**0.0347**	**0.4662**	**0.1171**	**0.0319**	**0.1490**	**0.0000**	**703.1587**	**703.1587**	**0.0215**	**0.0000**	**703.6106**

3.4 Building Construction - 2015

Controlled Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3677	3.0180	1.8838	2.7000e-003		0.2127	0.2127		0.2000	0.2000	0.0000	245.2140	245.2140	0.0615	0.0000	246.5060
Total	**0.3677**	**3.0180**	**1.8838**	**2.7000e-003**		**0.2127**	**0.2127**		**0.2000**	**0.2000**	**0.0000**	**245.2140**	**245.2140**	**0.0615**	**0.0000**	**246.5060**

Controlled Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.2897	2.0203	3.5544	4.1200e-003	0.1143	0.0317	0.1460	0.0327	0.0291	0.0618	0.0000	375.6842	375.6842	3.3300e-003	0.0000	375.7540
Worker	0.1389	0.1916	1.9184	4.1500e-003	0.3173	3.0400e-003	0.3203	0.0844	2.8000e-003	0.0872	0.0000	327.4745	327.4745	0.0182	0.0000	327.8565
Total	**0.4286**	**2.2119**	**5.4727**	**8.2700e-003**	**0.4315**	**0.0347**	**0.4662**	**0.1171**	**0.0319**	**0.1490**	**0.0000**	**703.1587**	**703.1587**	**0.0215**	**0.0000**	**703.6106**

3.4 Building Construction - 2016

Uncontrolled Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1686	1.4111	0.9161	1.3300e-003		0.0974	0.0974		0.0915	0.0915	0.0000	119.8660	119.8660	0.0297	0.0000	120.4903
Total	**0.1686**	**1.4111**	**0.9161**	**1.3300e-003**		**0.0974**	**0.0974**		**0.0915**	**0.0915**	**0.0000**	**119.8660**	**119.8660**	**0.0297**	**0.0000**	**120.4903**

Uncontrolled Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1265	0.8695	1.6206	2.0300e-003	0.0563	0.0125	0.0688	0.0161	0.0115	0.0277	0.0000	183.0763	183.0763	1.4500e-003	0.0000	183.1067
Worker	0.0621	0.0852	0.8543	2.0400e-003	0.1563	1.4300e-003	0.1577	0.0416	1.3200e-003	0.0429	0.0000	155.7346	155.7346	8.2500e-003	0.0000	155.9079
Total	**0.1886**	**0.9547**	**2.4749**	**4.0700e-003**	**0.2126**	**0.0140**	**0.2265**	**0.0577**	**0.0128**	**0.0705**	**0.0000**	**338.8109**	**338.8109**	**9.7000e-003**	**0.0000**	**339.0147**

3.4 Building Construction - 2016

Controlled Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1686	1.4111	0.9161	1.3300e-003		0.0974	0.0974		0.0915	0.0915	0.0000	119.8659	119.8659	0.0297	0.0000	120.4902
Total	**0.1686**	**1.4111**	**0.9161**	**1.3300e-003**		**0.0974**	**0.0974**		**0.0915**	**0.0915**	**0.0000**	**119.8659**	**119.8659**	**0.0297**	**0.0000**	**120.4902**

Controlled Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1265	0.8695	1.6206	2.0300e-003	0.0563	0.0125	0.0688	0.0161	0.0115	0.0277	0.0000	183.0763	183.0763	1.4500e-003	0.0000	183.1067
Worker	0.0621	0.0852	0.8543	2.0400e-003	0.1563	1.4300e-003	0.1577	0.0416	1.3200e-003	0.0429	0.0000	155.7346	155.7346	8.2500e-003	0.0000	155.9079
Total	**0.1886**	**0.9547**	**2.4749**	**4.0700e-003**	**0.2126**	**0.0140**	**0.2265**	**0.0577**	**0.0128**	**0.0705**	**0.0000**	**338.8109**	**338.8109**	**9.7000e-003**	**0.0000**	**339.0147**

3.5 Paving - 2016

Uncontrolled Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0209	0.2239	0.1482	2.2000e-004		0.0126	0.0126		0.0116	0.0116	0.0000	21.0138	21.0138	6.3400e-003	0.0000	21.1469
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0209**	**0.2239**	**0.1482**	**2.2000e-004**		**0.0126**	**0.0126**		**0.0116**	**0.0116**	**0.0000**	**21.0138**	**21.0138**	**6.3400e-003**	**0.0000**	**21.1469**

Uncontrolled Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.4000e-004	7.4000e-004	7.4400e-003	2.0000e-005	1.3600e-003	1.0000e-005	1.3700e-003	3.6000e-004	1.0000e-005	3.7000e-004	0.0000	1.3561	1.3561	7.0000e-005	0.0000	1.3576
Total	**5.4000e-004**	**7.4000e-004**	**7.4400e-003**	**2.0000e-005**	**1.3600e-003**	**1.0000e-005**	**1.3700e-003**	**3.6000e-004**	**1.0000e-005**	**3.7000e-004**	**0.0000**	**1.3561**	**1.3561**	**7.0000e-005**	**0.0000**	**1.3576**

3.5 Paving - 2016

Controlled Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0209	0.2239	0.1482	2.2000e-004		0.0126	0.0126		0.0116	0.0116	0.0000	21.0138	21.0138	6.3400e-003	0.0000	21.1469
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0209**	**0.2239**	**0.1482**	**2.2000e-004**		**0.0126**	**0.0126**		**0.0116**	**0.0116**	**0.0000**	**21.0138**	**21.0138**	**6.3400e-003**	**0.0000**	**21.1469**

Controlled Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.4000e-004	7.4000e-004	7.4400e-003	2.0000e-005	1.3600e-003	1.0000e-005	1.3700e-003	3.6000e-004	1.0000e-005	3.7000e-004	0.0000	1.3561	1.3561	7.0000e-005	0.0000	1.3576
Total	**5.4000e-004**	**7.4000e-004**	**7.4400e-003**	**2.0000e-005**	**1.3600e-003**	**1.0000e-005**	**1.3700e-003**	**3.6000e-004**	**1.0000e-005**	**3.7000e-004**	**0.0000**	**1.3561**	**1.3561**	**7.0000e-005**	**0.0000**	**1.3576**

3.6 Architectural Coating - 2016

Uncontrolled Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Archit. Coating	5.6717					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.6800e-003	0.0237	0.0188	3.0000e-005		1.9700e-003	1.9700e-003		1.9700e-003	1.9700e-003	0.0000	2.5533	2.5533	3.0000e-004	0.0000	2.5596
Total	**5.6754**	**0.0237**	**0.0188**	**3.0000e-005**		**1.9700e-003**	**1.9700e-003**		**1.9700e-003**	**1.9700e-003**	**0.0000**	**2.5533**	**2.5533**	**3.0000e-004**	**0.0000**	**2.5596**

Uncontrolled Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.5200e-003	3.4600e-003	0.0347	8.0000e-005	6.3500e-003	6.0000e-005	6.4100e-003	1.6900e-003	5.0000e-005	1.7400e-003	0.0000	6.3285	6.3285	3.4000e-004	0.0000	6.3355
Total	**2.5200e-003**	**3.4600e-003**	**0.0347**	**8.0000e-005**	**6.3500e-003**	**6.0000e-005**	**6.4100e-003**	**1.6900e-003**	**5.0000e-005**	**1.7400e-003**	**0.0000**	**6.3285**	**6.3285**	**3.4000e-004**	**0.0000**	**6.3355**

3.6 Architectural Coating - 2016

Controlled Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	5.6717					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	3.6800e-003	0.0237	0.0188	3.0000e-005		1.9700e-003	1.9700e-003		1.9700e-003	1.9700e-003	0.0000	2.5533	2.5533	3.0000e-004	0.0000	2.5596
Total	**5.6754**	**0.0237**	**0.0188**	**3.0000e-005**		**1.9700e-003**	**1.9700e-003**		**1.9700e-003**	**1.9700e-003**	**0.0000**	**2.5533**	**2.5533**	**3.0000e-004**	**0.0000**	**2.5596**

Controlled Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.5200e-003	3.4600e-003	0.0347	8.0000e-005	6.3500e-003	6.0000e-005	6.4100e-003	1.6900e-003	5.0000e-005	1.7400e-003	0.0000	6.3285	6.3285	3.4000e-004	0.0000	6.3355
Total	**2.5200e-003**	**3.4600e-003**	**0.0347**	**8.0000e-005**	**6.3500e-003**	**6.0000e-005**	**6.4100e-003**	**1.6900e-003**	**5.0000e-005**	**1.7400e-003**	**0.0000**	**6.3285**	**6.3285**	**3.4000e-004**	**0.0000**	**6.3355**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Controlled	2.6430	5.5930	25.0005	0.0571	3.9504	0.0858	4.0362	1.0713	0.0790	1.1502	0.0000	4,346.1903	4,346.1903	0.1796	0.0000	4,349.9625
Uncontrolled	2.6430	5.5930	25.0005	0.0571	3.9504	0.0858	4.0362	1.0713	0.0790	1.1502	0.0000	4,346.1903	4,346.1903	0.1796	0.0000	4,349.9625

4.2 Trip Summary Information

	Average Daily Trip Rate			Uncontrolled	Controlled
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	4,931.52	1,309.44	1309.44	9,312,006	9,312,006
Regional Shopping Center	577.57	831.49	831.49	1,139,862	1,139,862
Total	5,509.09	2,140.93	2,140.93	10,451,868	10,451,868

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4
Regional Shopping Center	9.50	7.30	7.30	16.30	64.70	19.00	54	35	11

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.627987	0.058543	0.149166	0.078755	0.026467	0.003331	0.026417	0.003903	0.003129	0.011009	0.010235	0.000550	0.000507

4.4 Fleet Mix

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Controlled						0.0000	0.0000		0.0000	0.0000	0.0000	2,193.339 0	2,193.339 0	0.1823	0.0377	2,208.855 7
Electricity Uncontrolled						0.0000	0.0000		0.0000	0.0000	0.0000	2,193.339 0	2,193.339 0	0.1823	0.0377	2,208.855 7
NaturalGas Controlled	0.0978	0.8890	0.7467	5.3300e-003		0.0676	0.0676		0.0676	0.0676	0.0000	967.7573	967.7573	0.0186	0.0177	973.6469
NaturalGas Uncontrolled	0.0978	0.8890	0.7467	5.3300e-003		0.0676	0.0676		0.0676	0.0676	0.0000	967.7573	967.7573	0.0186	0.0177	973.6469

5.2 Energy by Land Use - NaturalGas

Uncontrolled

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Office Building	1.80048e+007	0.0971	0.8826	0.7414	5.3000e-003		0.0671	0.0671		0.0671	0.0671	0.0000	960.8047	960.8047	0.0184	0.0176	966.6520
Regional Shopping Center	130287	7.0000e-004	6.3900e-003	5.3600e-003	4.0000e-005		4.9000e-004	4.9000e-004		4.9000e-004	4.9000e-004	0.0000	6.9526	6.9526	1.3000e-004	1.3000e-004	6.9949
Total		**0.0978**	**0.8890**	**0.7467**	**5.3400e-003**		**0.0676**	**0.0676**		**0.0676**	**0.0676**	**0.0000**	**967.7573**	**967.7573**	**0.0186**	**0.0177**	**973.6469**

Controlled

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Office Building	1.80048e+007	0.0971	0.8826	0.7414	5.3000e-003		0.0671	0.0671		0.0671	0.0671	0.0000	960.8047	960.8047	0.0184	0.0176	966.6520
Regional Shopping Center	130287	7.0000e-004	6.3900e-003	5.3600e-003	4.0000e-005		4.9000e-004	4.9000e-004		4.9000e-004	4.9000e-004	0.0000	6.9526	6.9526	1.3000e-004	1.3000e-004	6.9949
Total		**0.0978**	**0.8890**	**0.7467**	**5.3400e-003**		**0.0676**	**0.0676**		**0.0676**	**0.0676**	**0.0000**	**967.7573**	**967.7573**	**0.0186**	**0.0177**	**973.6469**

5.3 Energy by Land Use - Electricity

Uncontrolled

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Office Building	1.35062e +007	2,138.088 3	0.1777	0.0368	2,153.214 2
Regional Shopping Center	349017	55.2507	4.5900e-003	9.5000e-004	55.6416
Total		**2,193.339 0**	**0.1823**	**0.0377**	**2,208.855 7**

Controlled

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Office Building	1.35062e +007	2,138.088 3	0.1777	0.0368	2,153.214 2
Regional Shopping Center	349017	55.2507	4.5900e-003	9.5000e-004	55.6416
Total		**2,193.339 0**	**0.1823**	**0.0377**	**2,208.855 7**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Controlled	4.8162	1.0000e-004	0.0102	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.0194	0.0194	5.0000e-005	0.0000	0.0206
Uncontrolled	4.8162	1.0000e-004	0.0102	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.0194	0.0194	5.0000e-005	0.0000	0.0206

6.2 Area by SubCategory

Uncontrolled

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.5672					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	4.2480					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	9.8000e-004	1.0000e-004	0.0102	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.0194	0.0194	5.0000e-005	0.0000	0.0206
Total	**4.8162**	**1.0000e-004**	**0.0102**	**0.0000**		**4.0000e-005**	**4.0000e-005**		**4.0000e-005**	**4.0000e-005**	**0.0000**	**0.0194**	**0.0194**	**5.0000e-005**	**0.0000**	**0.0206**

6.2 Area by SubCategory

Controlled

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.5672					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	4.2480					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	9.8000e-004	1.0000e-004	0.0102	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.0194	0.0194	5.0000e-005	0.0000	0.0206
Total	**4.8162**	**1.0000e-004**	**0.0102**	**0.0000**		**4.0000e-005**	**4.0000e-005**		**4.0000e-005**	**4.0000e-005**	**0.0000**	**0.0194**	**0.0194**	**5.0000e-005**	**0.0000**	**0.0206**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Controlled	287.6031	6.2101	0.1499	464.4794
Uncontrolled	287.6031	6.2112	0.1501	464.5755

7.2 Water by Land Use

Uncontrolled

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Office Building	187.687 / 115.034	284.0495	6.1344	0.1483	458.8352
Regional Shopping Center	2.3481 / 1.43916	3.5537	0.0768	1.8500e-003	5.7404
Total		**287.6031**	**6.2112**	**0.1501**	**464.5755**

Controlled

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Office Building	187.687 / 115.034	284.0495	6.1333	0.1480	458.7402
Regional Shopping Center	2.3481 / 1.43916	3.5537	0.0767	1.8500e-003	5.7392
Total		**287.6031**	**6.2101**	**0.1499**	**464.4794**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Controlled	206.1109	12.1808	0.0000	461.9079
Uncontrolled	206.1109	12.1808	0.0000	461.9079

8.2 Waste by Land Use

Uncontrolled

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Office Building	982.08	199.3534	11.7815	0.0000	446.7637
Regional Shopping Center	33.29	6.7576	0.3994	0.0000	15.1442
Total		**206.1109**	**12.1808**	**0.0000**	**461.9079**

8.2 Waste by Land Use

Controlled

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Office Building	982.08	199.3534	11.7815	0.0000	446.7637
Regional Shopping Center	33.29	6.7576	0.3994	0.0000	15.1442
Total		**206.1109**	**12.1808**	**0.0000**	**461.9079**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Area Source Emissions Adjustment

Default Consumer Product Emission Factor[1]	2.1E-05	lb/ROG/sqft/day
Updated Consumer Product Emission Factor[2]	1.5E-05	lb/ROG/sqft/day
Default Consumer Products Emissions	4.2	tons/year
Updated Consumer Product Emissions	3.0	tons/year
Reduction in Consumer Product Emissions	1.2	tons/year
Default Area Source Emissions	4.8	tons/year
Updated Area Source Emissions	3.6	tons/year

Notes:

1. Default value from the California Emissions Estimator Model (CalEEMod®).

2. San Francisco-specific area source emission factor developed by San Francisco Environmental Planning (SFEP) for ROG from consumer products.

Reduced Density Alternative Tables

Reduced Intensity Alternative

Average Daily Construction-related Emissions

	Average Daily Construction Emissions (pounds/day)			
	ROG	NOx	PM_{10}	$PM_{2.5}$
Off-road Equipment Emissions	11	154	6.2	6.2
Truck and Vehicle emissions	7	48	0.8	0.7
Architectural Coating Emissions	31	0	0	0
Total	**49**	**203**	**7.0**	**7.0**
BAAQMD Threshold	54	54	82	54
Above Threshold?	No	**Yes**	No	No

Reduced Intensity Alternative

Controlled Average Daily Construction-related Emissions

	Average Daily Construction Emissions (pounds/day)			
	ROG	NOx	PM10	PM2.5
With Tier 4 Off-road Equipment				
Off-road Equipment Emissions	2.2	21	0.33	0.33
Truck and Vehicle emissions	7	48	0.8	0.7
Architectural Coating Emissions	31	0	0	0
Total	**40**	**69**	**1.1**	**1.1**
BAAQMD Threshold	54	54	82	54
Above Threshold?	No	**Yes**	No	No
With Tier 2 + ARB NOx VDECS Off-road Equipment				
Off-road Equipment Emissions	0.46	82	0.51	0.51
Truck and Vehicle emissions	7	48	0.8	0.7
Architectural Coating Emissions	31	0	0	0
Total	**38.6**	**130**	**1.3**	**1.2**
BAAQMD Threshold	54	54	82	54
Above Threshold?	No	**Yes**	No	No

Reduced Intensity Alternative

Average Daily and Maximum Annual Operational Emissions

	Average Daily Emissions (pounds/day)			
	ROG	**NOx**	**PM10**	**PM2.5**
Emission Source				
Mobile	34	90	64	18
Standby Diesel Generators	0.30	0.97	0.04	0.04
Boilers	2.1	14	2.9	2.9
Area Sources	28	<0.01	<0.01	<0.01
Total	64	105	67	21
Threshold	54	54	82	54
Above Threshold?	**Yes**	**Yes**	No	No

	Maximum Annual Emissions (short tons/year)			
	ROG	**NOx**	**PM10**	**PM2.5**
Emission Source				
Mobile	6.2	16	12	3.3
Standby Diesel generators	0.055	0.18	0.0072	0.0072
Boilers	0.38	2.6	0.52	0.52
Area Sources	5.2	<0.01	<0.01	<0.01
Total	11.8	19	12.3	3.8
Threshold	10	10	15	10
Above Threshold?	**Yes**	**Yes**	No	No

Annual Average $PM_{2.5}$ Concentrations at Off-site Receptors

For the Reduced Intensity Alternative

	$PM_{2.5}$ Concentration ($\mu g/m^3$, Annual Average)		
Source	**UCSF Hearst Tower Receptor**	**UCSF Hospital Receptor**	**Uber/ARE Daycare Receptor**
Construction			
Background at the maximally impacted receptor	8.5	8.6	8.4
Uncontrolled Construction Contribution	0.27	0.27	1.1
Controlled (Tier 2 + NOx VDECS) Construction Contribution	0.049	0.048	0.19
Cumulative Total (Uncontrolled/with Mitigation)	8.8/8.5	8.9/8.7	9.4/8.6
Significance Threshold	10	10	10
Significant?	No	No	No
Operation			
Background at the maximally impacted receptor	8.5	8.6	8.4
Project Operations – Generators	0.055	0.055	0.055
Project Operations – Mobile	0.32	0.32	0.32
Cumulative Total (Uncontrolled)	8.9	9.0	8.7
Significance Threshold	10	10	10
Significant?	No	No	No

NOTE: The cumulative total concentrations may not sum precisely due to rounding of subtotals.

Lifetime Excess Cancer Risk at Off-site Receptors
For the Reduced Intensity Alternative

Source	Excess Cancer Risk (in one million)			
	UCSF Hearst Tower Receptor		**UCSF Hospital Receptor**	**Uber/ARE Daycare Receptor**
	Child Resident	Adult Resident	Child Resident	Child Daycare
Background at the maximally impacted receptor	26	26	44	20
Uncontrolled Construction Contribution	48	2.5	25	65
Controlled (Tier 2 + NOx VDECS) Construction Contribution	8.5	0.44	4.4	11
Project Operations – Generators	30	30	30	30
Project Operations – Mobile	7.2	7.2	7.2	7.2
Cumulative Total (Uncontrolled/with Mitigation)	111/72	66/64	106/86	122/69
Significance Threshold	100	100	100	100
Significant (Uncontrolled/with Mitigation)?	**Yes/No**	**No/No**	**Yes/No**	**Yes/No**

NOTE: The cumulative total risks may not sum precisely due to rounding of subtotals.

Table 6.3-1
Toxicity-Weighted Construction Emissions
for the Reduced Intensity Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Chemical	Unit Risk Factor[1] $(ug/m^3)^{-1}$	Uncontrolled Project Emissions[3] (lb/project)	Weighted (lb/project)-$(m^3/\mu g)$	Percent Contribution to Risk
Diesel PM[4]	3.0E-04	3,626	1.1	99.8%
TACs from Speciated Gasoline TOG due to Tailpipe Emissions[2]	1.81E-06	1,263	0.0023	0.21%
TACs from Speciated Gasoline TOG due to Evaporative Losses[2]	1.07E-07	1,861	0.0002	0.02%

Chemical	Unit Risk Factor[1] $(ug/m^3)^{-1}$	Controlled Tier 4 Project Emissions[3] (lb/project)	Weighted (lb/project)-$(m^3/\mu g)$	Percent Contribution to Risk
Diesel PM[4]	3.0E-04	548	0.16	98.5%
TACs from Speciated Gasoline TOG due to Tailpipe Emissions[2]	1.81E-06	1,263	0.0023	1.4%
TACs from Speciated Gasoline TOG Evaporative Losses[2]	1.07E-07	1,861	0.0002	0.1%

Notes:

1. From Cal/EPA 2013.
2. From BAAQMD 2012.
3. Emissions estimates are subject to change before publication of draft Environmental Impact Report.
4. Includes DPM emissions from off-road equiment and on-road sources. Emissions in the controlled scenario reflect the use of Tier 4 off-road equipment.

Abbreviations:

PM: particulate matter
lb: pound
g: gram
s: second
TOG: Total Organic Gas
µg: microgram

References:

Bay Area Air Quality Management District (BAAQMD). 2012. Recommended Methods for Screening and Modeling Local Risks and Hazards. May. http://baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Risk%20Modeling%20Approach%20May%202012.ashx?la=en

Cal/EPA. 2013. OEHHA/ARB Consolidated Table of Approved Risk Assessment Health Values. August. http://www.arb.ca.gov/toxics/healthval/contable.pdf

Table 6.3-2
Construction Particulate Matter Emissions
for the Reduced Intensity Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Emissions	Units	Uncontrolled Scenario	Controlled Tier 4 Scenario	Controlled Tier 2 + ARB NOx VDECS Scenario
Project construction $PM_{2.5}$ emissions[1]	[lb/project]	3,629	551	648
Project construction DPM emissions[1]	[lb/project]	3,626	548	645
Construction duration	[years]	2	2	2
Average $PM_{2.5}$ emissions[2]	[g/s]	0.026	0.004	0.005
Average DPM emissions[2]	[g/s]	0.026	0.004	0.005

Notes:

1. Includes emissions from off-road equiment and on-road sources. Emissions in the controlled scenario reflect the use of Tier 4 or Tier 2 + ARB NOx VDECS off-road equipment.

2. Annual emissions are calculated by dividing the project construction emissions by the construction duration. Average DPM and $PM_{2.5}$ emissions are calculated by converting pounds per year to grams per second using standard conversions.

Abbreviations:

DPM: Diesel particulate matter
lb: pound
g: gram
s: second

Table 6.3-3
Annual Average Daily Traffic from Project Operation
for the Reduced Intensity Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Trip Type	Scenario	Days Per Year	Daily One-way Vehicle Trips[1]
Mission Bay, Weekday Trips	Basketball Event Days	30	11,692
	Concert and Family Show Event Days[2]	45	11,692
	Convention Event and Other Event Days[3]	61	7,024
	No Event Days	125	4,258
Mission Bay, Weekend Trips	Basketball Event Days	30	10,893
	Concert and Family Show Event Days[2]	55	10,893
	No Event Days	19	3,556
		Annual One-way Vehicle Trips:	2,831,083
		Annual Average Daily Traffic (AADT):[4]	**7,756**

Notes:
1. Based on traffic data from Adavant Consulting.
2. Trips associated with concert and family show event days are conservatively assumed to be equal to basketball event days as presented in the traffic study.
3. Trips associated with convention and other event days are conservatively assumed to be equal to convention event days as presented in the traffic study.

Abbreviations:
AADT: Annual average daily traffic

Table 6.3-4
Screening $PM_{2.5}$ Concentrations and Cancer Risks from Operational Traffic
for the Reduced Intensity Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Impact[1]	North-South Roadway Impact	East-West Roadway Impact	Total Impact from 4 Adjacent Roadways
$PM_{2.5}$ Concentration (ug/m^3)	0.080	0.078	0.32
Lifetime Cancer Risk (in a million)	2.2	1.4	7.2

Notes:

1. Based on BAAQMD County Surface Street Screening Tables for San Francisco County. A distance of 10 feet from the roadway and an annual average daily traffic (AADT) volume of 10,000 vehicles per day (vpd) was conservatively assumed since the AADT shown in Table 2 is less than 10,000 vpd.

References:

Bay Area Air Quality Management District (BAAQMD). 2011. Roadway Screening Analysis Tables. December. Available online at :
http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/County%20Surface%20Street%20Screening%20Tables%20Dec%202011.ashx?la=en

Table 6.3-5
AERMOD Construction Screening Inputs and Outputs
for the Reduced Intensity Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Parameter	**Inputs and Outputs**		
Source	Construction		
Source Type	Area		
Emission Rate (g/s-m^2)	2.2E-05		
Release Height (m)	5		
Area (m^2)	45482		
Receptor Height (m)	1.8		
Urban/Rural (U/R)	U		
Meteorological Station	Mission Bay 2008		
Dispersion Factor (µg/m^3 per g/s)			
Annual Average Dispersion Factor at Dormitory Receptor	**10.4**		
Annual Average Dispersion Factor at Hospital Receptoı	**10.4**		
Annual Average Dispersion Factor at Daycare Child Receptoı	**41**		
Concentration	**Uncontrolled**	**Tier 4 Controlled**	**Tier 2 + ARB NOx VDECS Controlled**
$PM_{2.5}$ Emission Rate (g/s)	0.026	0.0040	0.0047
Annual Maximum $PM_{2.5}$ Conc at Dormitory Receptor (µg/m^3)	**0.27**	**0.041**	**0.049**
Annual Maximum $PM_{2.5}$ Conc at Hospital Receptor (µg/m^3)	**0.27**	**0.041**	**0.048**
Annual Maximum $PM_{2.5}$ Conc at Daycare Child Receptor (µg/m^3)	**1.1**	**0.16**	**0.19**
Diesel PM Emission Rate (g/s)	0.026	0.0039	0.0046
Annual Maximum DPM Conc at Dormitory Receptor (µg/m^3)	**0.27**	**0.041**	**0.048**
Annual Maximum DPM Conc at Hospital Receptor (µg/m^3)	**0.27**	**0.041**	**0.048**
Annual Maximum DPM Conc at Hospital Receptor (µg/m^3)	**1.06**	**0.16**	**0.19**

Abbreviations:
g: gram
m: meter
m^2: square meter
m^3: cubic meter
PM: particulate matter
s: second
µg: microgram

Table 6.3-6
Screening $PM_{2.5}$ Concentration Results
for the Reduced Intensity Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Scenario	Concentration [µg/m³]		
	Dormitory Receptor	Hospital Receptor	Daycare Receptor
Construction			
$PM_{2.5}$ Concentration from Uncontrolled Construction Emissions	0.27	0.27	1.1
$PM_{2.5}$ Concentration from Tier 4 Controlled Construction Emissions	0.041	0.041	0.16
$PM_{2.5}$ Concentration from Tier 2 + ARB NOx VDECS Controlled Construction Emissions	0.049	0.048	0.19
2014 Background $PM_{2.5}$ Concentration[1]	8.5	8.6	8.4
Total $PM_{2.5}$ Concentration (Construction, Uncontrolled scenario)	8.8	8.9	9.4
Total $PM_{2.5}$ Concentration (Construction, Tier 4 Controlled scenario)	8.5	8.7	8.5
Total $PM_{2.5}$ Concentration (Construction, Tier 2 + ARB NOx VDECS Controlled scenario)	8.5	8.7	8.6
Cumulative Threshold[2]	10	10	10
Total $PM_{2.5}$ Concentration Exceeds Threshold? (Uncontrolled scenario)	No	No	No
Total $PM_{2.5}$ Concentration Exceeds Threshold? (Tier 4 Controlled scenario)	No	No	No
Total $PM_{2.5}$ Concentration Exceeds Threshold? (Tier 2 + ARB NOx VDECS Controlled scenario)	No	No	No
Operational			
$PM_{2.5}$ Concentration from Operational Traffic	0.32	0.32	0.32
$PM_{2.5}$ Concentration from Emergency Diesel Generators[2]	0.055	0.055	0.055
2014 Background $PM_{2.5}$ Concentration[1]	8.5	8.6	8.4
Total $PM_{2.5}$ Concentration (Operational)	8.9	9.0	8.7
Cumulative Threshold[2]	10	10	10
Total $PM_{2.5}$ Concentration Exceeds Threshold? (Operational)	No	No	No

Notes:
1. 2014 background risk from the Citywide HRA database for all receptors.
2. Cumulative threshold is the threshold for creating an Air Pollutant Exposure Zone (APEZ), as defined by the San Francisco Planning Department, Environmental Planning.
3. Back-calculated assuming a cancer risk of 10 in a million for each of the three generators (total of 30 in a million). The cancer risk of 10 in a million is the maximum allowable Project cancer risk from toxic air contaminants in the BAAQMD, and exposure assumptions for a 70-year resident.

Abbreviations:
BAAQMD: Bay Area Air Quality Management District
HRA: Health Risk Assessment
µg: microgram
m^3: cubic meter

Table 6.3-7
Exposure Parameters and Cancer Risk Adjustment Factors
for the Reduced Intensity Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Exposure Parameter	Units	Construction			
		Child Resident	Adult Resident	Hospital Child	Daycare Child
Daily Breathing Rate (DBR)[1]	[L/kg-day]	581	302	581	581
Exposure Time (ET)[2]	[hours/24 hours]	24	24	24	11
Exposure Frequency (EF)[3]	[days/year]	350	350	365	253
Exposure Duration (ED)[4]	[years]	2	2	1	0.67
Averaging Time (AT)	[days]	25,550	25,550	25,550	25,550
Intake Factor, Inhalation (IF_{inh})	[m^3/kg-day]	0.016	0.0083	0.0083	0.0018
Cancer Risk Adjustment Factor[5]	[-]	10	1	10	10
Modeling Adjustment Factor[6]	[-]	N/A	N/A	N/A	3.15

Notes:

1. Daily breathing rate reflects default breathing rate from BAAQMD 2010.
2. Exposure time reflects default exposure time from BAAQMD 2010.
3. Exposure frequency reflects default exposure frequency from BAAQMD 2010.
4. Assumes all construction-related emissions will be emitted within the first two years. Operation of the daycare center is not expected to take place until mid- to late-2017; since Project construction will be largely completed by that time, an exposure duration of 8 months was used as a conservative estimate.
5. Based on BAAQMD 2010.
6. Construction emissions are conservatively assumed to occur concurrently with the operation of the daycare center. As such, a modeling adjustment factor of (365/253)*(24/11) = 3.15 is applied for the daycare child receptor.

Calculation:

IF_{inh} = DBR * ET * EF * ED * CF / AT

CF = 0.001 (m^3/L)

Abbreviations:

BAAQMD: Bay Area Air Quality Management District
L: liter
kg: kilogram
m^3: cubic meter

References:

BAAQMD. 2010. BAAQMD Air Toxics NSR Program Health Risk Screening Analysis (HRSA) Guidelines. January.
http://baaqmd.gov/~/media/Files/Engineering/Air%20Toxics%20Programs/hrsa_guidelines.ashx?la=en

Table 6.3-8
Screening Cancer Risk Results
for the Reduced Intensity Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Scenario	Units	Dormitory Receptor		Hospital Child Receptor	Daycare Child Receptor
		Child Resident	Adult Resident		
Diesel PM Cancer Potency Factor (CPF)[1]	$[mg/kg\text{-}day]^{-1}$	1.1	1.1	1.1	1.1
Excess Cancer Risk from Uncontrolled Construction Emissions[2]	[in a million]	48	2.5	25	65
Excess Cancer Risk from Tier 4 Controlled Construction Emissions[2]	[in a million]	7.2	0.37	3.7	10
Excess Cancer Risk from Tier 2 + ARB NOx VDECS Controlled Construction Emissions[2]	[in a million]	8.5	0.44	4.4	11
Excess Cancer Risk from Operational Traffic Emissions[3]	[in a million]	7.2	7.2	7.2	7.2
Excess Cancer Risk from Emergency Diesel Generators[4]	[in a million]	30	30	30	30
2014 Background Risk[5]	[in a million]	26	26	44	20
Total Excess Cancer Risk (Uncontrolled Scenario)	[in a million]	111	66	106	122
Total Excess Cancer Risk (Tier 4 Controlled Scenario)	[in a million]	70	64	85	67
Total Excess Cancer Risk (Tier 2 + ARB NOx VDECS) Controlled Scenario)	[in a million]	72	64	86	69
Cumulative Threshold	[in a million]	100	100	100	100
Total Risk Exceeds Threshold? (Uncontrolled Scenario)	-	Yes	No	Yes	Yes
Total Risk Exceeds Threshold? (Tier 4 Controlled Scenario)	-	No	No	No	No
Total Risk Exceeds Threshold? (Tier 2 + ARB NOx VDECS Controlled Scenario)	-	No	No	No	No

Notes:
1. From Cal/EPA 2013.
2. Represent health impacts for a residential receptor at the dormitory, hospital, or daycare.
3. The screening values reflect a 70-year cancer risk with age sensitivity factors applied (BAAQMD 2012).
4. A cancer risk of 10 in a million, the maximum allowable Project cancer risk from toxic air contaminants in the BAAQMD, is conservatively assumed.
5. 2014 background risk from the Citywide HRA database for all receptors.
6. Cumulative threshold is the threshold for creating an Air Pollutant Exposure Zone (APEZ), as defined by the San Francisco Planning Department, Environmental Planning.

Calculation:
Cancer Risk = [AnnualConc] × [CF] × [IF_{inh}] × [CPF] x [CRAF]
CF = 0.001 (mg/µg)

Abbreviations:
BAAQMD: Bay Area Air Quality Management District
Cal/EPA: California Environmental Protection Agency
CRAF: Cancer Risk Adjustment Factor
HRA: Health Risk Assessment
IF_{inh}: Intake Factor, Inhalation
kg: kilogram
mg: milligram
PM: Particulate Matter
µg: microgram

References:

Cal/EPA. 2013. OEHHA/ARB Consolidated Table of Approved Risk Assessment Health Values. August. Available online at: http://www.arb.ca.gov/toxics/healthval/contable.pdf

Bay Area Air Quality Management District (BAAQMD). 2012. Recommended Methods for Screening and Modeling Local Risks and Hazards. May. Available online at: http://baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Risk%20Modeling%20Approach%20May%202012.ashx?la=en

Project Construction Trip Estimates

Phase	Duration [months]	Average Number of Daily Construction Trucks[1]	Average Number of Daily Construction Workers[1]	Number of Work Days	Total One-Way Trips		
					Hauling Trips	Vendor Trips	Worker Trips
Entire Site							
Demolition (Entire Site)	1	8	10	22	352	-	440
Excavation and Shoring (Entire Site)	3	300	25	66	39,600	-	3,300
Arena							
Foundation & Below Grade Construction (Piles & Concrete)	6	20	100	131	-	5,240	26,200
Base Building	16	25	200	348	-	17,400	139,200
Exterior Finishing	10	25	50	218	-	10,900	21,800
Interior Finishing	18.5	30	150	402	-	24,120	120,600
Garage/Podium							
Foundation & Below Grade Construction (Piles & Concrete)	6	20	50	131	-	5,240	13,100
Base Building	9	20	50	196	-	7,840	19,600
NW Tower[2]							
Base Building	8	15	40	174	-	3,132	8,352
Exterior Finishing	5	2	10	109	-	262	1,308
Interior Finishing	12	10	100	261	-	3,132	31,320
SW Tower[2]							
Base Building	8	15	40	174	-	3,132	8,352
Exterior Finishing	5	2	10	109	-	262	1,308
Interior Finishing	12	10	100	261	-	3,132	31,320
Entire Site							
Street Improvements	5	10	40	109	-	2,180	8,720
				Total Construction Trips	39,952	85,971	434,920

Notes:

1. Proposed number of construction trucks and workers provided by Project Sponsor in a table titled "Summary of Construction Phases and Duration, and Daily Construction Trucks and Workers by Phase," dated 11/25/2014.

2. The number of trips associated with NW Tower and SW Tower were reduced by 40% to reflect the 40% reduction in square footage for non-arena land uses in the Reduced Intensity Alternative.

Onroad Equipment Activities, Emission Factors and Emissions

Site	Year	Trip Type[1]	Vehicle Type[1]	Fuel	% of Fleet[1]	Total One-way Trips	One-way Trip Length	Running Exhaust and Running Losses Emission Factor (g/mile)				
								ROG Exhaust	*ROG Running Loss*	*NOx Exhaust*	*PM_{10} Exhaust*	*$PM_{2.5}$ Exhaust*
Mission Bay	2015	Worker	LDA	GAS	50%	434,920	12.4	0.039	0.067	0.12	0.0023	0.0021
	2015	Worker	LDT1	GAS	25%	434,920	12.4	0.079	0.22	0.27	0.0043	0.0040
	2015	Worker	LDT2	GAS	25%	434,920	12.4	0.041	0.10	0.21	0.0022	0.0020
	2015	Vendor	T6	DSL	50%	85,971	7.3	0.22	0	4.6	0.12	0.11
	2015	Vendor	T7	DSL	50%	85,971	7.3	0.29	0	7.4	0.12	0.11
	2015	Hauling	T7	DSL	100%	39,952	20	0.29	0	7.4	0.12	0.11

Notes:

1. CalEEMod default vehicle mix of light-duty auto (LDA), light-duty truck type 1 (LDT1), and light-duty truck type 2 (LDT2) for worker trips, mix of medium heavy-duty vehicles (MHDT) and heavy heavy-duty trucks (HHDT) for vendor trips, and all HHDT for hauling trips.

Onroad Equipment Activities, Emission Factors and Emissions

								Running Exhaust and Running Losses Emissions (lb)				
Site	**Year**	**Trip Type[1]**	**Vehicle Type[1]**	**Fuel**	**% of Fleet[1]**	**Total One-way Trips**	**One-way Trip Length**	*ROG Exhaust*	*ROG Running Loss*	*NOx Exhaust*	*PM_{10} Exhaust*	*$PM_{2.5}$ Exhaust*
Mission Bay	2015	Worker	LDA	GAS	50%	434,920	12.4	233	396	708	14	12.47
	2015	Worker	LDT1	GAS	25%	434,920	12.4	234	658	789	13	11.88
	2015	Worker	LDT2	GAS	25%	434,920	12.4	122	311	615	6.6	6.07
	2015	Vendor	T6	DSL	50%	85,971	7.3	154	0	3,201	84	77.56
	2015	Vendor	T7	DSL	50%	85,971	7.3	201	0	5,093	81	74.33
	2015	Hauling	T7	DSL	100%	39,952	20	512	0	12,969	206	189.28

Notes:

1. CalEEMod default vehicle mix of light-duty auto (LDA), light-duty truck type 1 (LDT1), and light-duty truck type 2 (LDT2) for worker trips, mix of medium heavy-duty vehicles (MHDT) and heavy heavy-duty trucks (HHDT) for vendor trips, and all HHDT for hauling trips.

Onroad Equipment Activities, Emission Factors and Emissions

								Idling Emission Factor (g/hr-vehicle)				Idling Exhaust Emissions (lb) [5 min per one-way trip for mass emissions]			
Site	Year	Trip Type[1]	Vehicle Type[1]	Fuel	% of Fleet[1]	Total One-way Trips	One-way Trip Length	*ROG*	*NOx*	*PM_{10}*	*$PM_{2.5}$*	*ROG*	*NOx*	*PM_{10}*	*$PM_{2.5}$*
Mission Bay	2015	Worker	LDA	GAS	50%	434,920	12.4	0	0	0	0	0	0	0	0.00
	2015	Worker	LDT1	GAS	25%	434,920	12.4	0	0	0	0	0	0	0	0.00
	2015	Worker	LDT2	GAS	25%	434,920	12.4	0	0	0	0	0	0	0	0.00
	2015	Vendor	T6	DSL	50%	85,971	7.3	2.0	80	0.36	0.33	16	630	2.8	2.59
	2015	Vendor	T7	DSL	50%	85,971	7.3	6.4	66	0.31	0.28	50	523	2.4	2.22
	2015	Hauling	T7	DSL	100%	39,952	20	6.4	66	0.31	0.28	47	486	2.2	2.06

Notes:

1. CalEEMod default vehicle mix of light-duty auto (LDA), light-duty truck type 1 (LDT1), and light-duty truck type 2 (LDT2) for worker trips, mix of medium heavy-duty vehicles (MHDT) and heavy heavy-duty trucks (HHDT) for vendor trips, and all HHDT for hauling trips.

Onroad Equipment Activities, Emission Factors and Emissions

								Starting Exhaust Emission Factor (g/one-way trip)				Starting Exhaust Emissions (lb) [Once per one-way trip for mass emissions]			
Site	**Year**	**Trip Type[1]**	**Vehicle Type[1]**	**Fuel**	**% of Fleet[1]**	**Total One-way Trips**	**One-way Trip Length**	*ROG*	*NOx*	*PM_{10}*	*$PM_{2.5}$*	*ROG*	*NOx*	*PM_{10}*	*$PM_{2.5}$*
Mission Bay	2015	Worker	LDA	GAS	50%	434,920	12.4	0.22	0.18	0.0030	0.0027	105	85	1.4	1.30
	2015	Worker	LDT1	GAS	25%	434,920	12.4	0.43	0.31	0.0046	0.0042	102	73	1.1	1.01
	2015	Worker	LDT2	GAS	25%	434,920	12.4	0.28	0.34	0.0027	0.0025	66	82	0.65	0.60
	2015	Vendor	T6	DSL	50%	85,971	7.3	0	0	0	0	0	0	0	0.00
	2015	Vendor	T7	DSL	50%	85,971	7.3	0	0	0	0	0	0	0	0.00
	2015	Hauling	T7	DSL	100%	39,952	20	0	0	0	0	0	0	0	0.00

Notes:

1. CalEEMod default vehicle mix of light-duty auto (LDA), light-duty truck type 1 (LDT1), and light-duty truck type 2 (LDT2) for worker trips, mix of medium heavy-duty vehicles (MHDT) and heavy heavy-duty trucks (HHDT) for vendor trips, and all HHDT for hauling trips.

Onroad Equipment Activities, Emission Factors and Emissions

								Evaporative ROG Emission Factor (g/one-way trip)			Evaporative ROG Emissions (lb)		
Site	**Year**	**Trip Type[1]**	**Vehicle Type[1]**	**Fuel**	**% of Fleet[1]**	**Total One-way Trips**	**One-way Trip Length**	*Diurnal*	*Hot-Soak*	*Resting Loss*	*Diurnal*	*Hot-Soak*	*Resting Loss*
Mission Bay	2015	Worker	LDA	GAS	50%	434,920	12.4	0.046	0.15	0.041	22	73	20
	2015	Worker	LDT1	GAS	25%	434,920	12.4	0.10	0.28	0.083	25	68	20
	2015	Worker	LDT2	GAS	25%	434,920	12.4	0.050	0.16	0.047	12	39	11
	2015	Vendor	T6	DSL	50%	85,971	7.3	0	0	0	0	0	0
	2015	Vendor	T7	DSL	50%	85,971	7.3	0	0	0	0	0	0
	2015	Hauling	T7	DSL	100%	39,952	20	0	0	0	0	0	0

Notes:

1. CalEEMod default vehicle mix of light-duty auto (LDA), light-duty truck type 1 (LDT1), and light-duty truck type 2 (LDT2) for worker trips, mix of medium heavy-duty vehicles (MHDT) and heavy heavy-duty trucks (HHDT) for vendor trips, and all HHDT for hauling trips.

Reduction in Offroad Construction Equipment Emissions

	Emissions (pounds)			
	ROG	NOx	PM_{10}	$PM_{2.5}$
Uncontrolled				
Offroad Equipment Building Construction Emissions	4,617	60,008	2,567	2,567
Offroad Equipment Building Construction Emissions Reduction[1]	843	10,958	469	469
With Tier 4 Off-road Equipment				
Offroad Equipment Building Construction Emissions	871	4,616	113	113
Offroad Equipment Building Construction Emissions Reduction[1]	159	843	21	21
With Tier 2 + ARB NOx VDECS Off-road Equipment				
Offroad Equipment Building Construction Emissions	186	33,002	210	210
Offroad Equipment Building Construction Emissions Reduction[1]	34	6,026	38	38

Notes:

1. This represents the reduction in offroad equipment emissions in the Building Construction phase due to lower square footage associated with non-arena land uses. A scaling factor of 0.18, which represents the reduction in total square footage of the Project, was applied to determine the emission reduction. The construction emission summary table reflects this reduction in construction equipment emissions.

Construction Area Emissions Estimates (Reduced Intensity Alternative)

Venue	Floor Area[1]	Building Surface Area[2]	Architectural Coatings: Reapplication Rate	Architectural Coatings: Indoor Paint VOC EF[3]	Architectural Coatings: Outdoor Paint VOC EF[3]	Architectural Coatings: Architectural Coating VOC emissions[4]
	[ft^2]	[ft^2]		[g/L]	[g/L]	[lb/yr]
Event Center	750,000	1,500,000	100%	100	150	7,823
GSW Office Space	25,000	50,000				261
Office Space	348,000	696,000				3,630
Retail Space	75,000	150,000				782
Parking and Loading	375,000	750,000				3,911

Notes:

1. Square footage for office and retail space reflects a 40% reduction. Parking and loading square footage was scaled by the number of anticipated parking spots in the Reduced Intensity Alternative (750).

2. Consistent with CalEEMod, residential building surface area is assumed to be 2.7 times the floor area, and non-residential 2 times the floor area.

3. Based on BAAQMD paint VOC regulations, 100 g/L for flat paints, generally used indoors, and 150 g/L for all other architectural coatings. Building area is assumed to be 75% indoors and 25% outdoors, consistent with CalEEMod.

4. Uses CalEEMod assumptions of 1 gallon of paint covers 180 square feet.

Area Sources	Total Emissions [ton/yr]				
	ROG	CO	NO_x	PM_{10}	$PM_{2.5}$
Architectural Coatings	8.20	--	--	--	--
Total Project Emissions:	8.20	0.00	0.00	0.00	0.00

Mobile Source CAP Emissions Estimates (Reduced Intensity Alternative)

Project CAPs Emission Factors

Emission Factor[1]	Units	Pollutant				
		ROG	CO	NO_x	PM_{10}	$PM_{2.5}$
Running Exhaust	[g/mile]	0.068	1.5	0.45	0.0066	0.0060
Idling Exhaust	[g/trip]	0.013	0.1	0.09	0.0003	0.0003
Starting Exhaust	[g/trip]	0.279	3.5	0.33	0.0030	0.0028
PM Brake Wear	[g/mile]	-	-	-	0.0420	0.0180
PM Tire Wear	[g/mile]	-	-	-	0.0088	0.0022
ROG Running Loss	[g/mile]	0.079	-	-	-	-
ROG Diurnal	[g/trip]	0.052	-	-	-	-
ROG Hot-Soak	[g/trip]	0.148	-	-	-	-
ROG Resting Loss	[g/trip]	0.044	-	-	-	-

Notes:

1. From EMFAC2011, calendar year 2017, San Francisco Bay Area. Emission factors are weighted by VMT for all vehicle categories.

Mobile Source CAP Emissions Estimates (Reduced Intensity Alternative)

Project CAPs Emission Calculations

Trip Type	Scenario[1]	Daily One-way Vehicle Trips[2]			Days Per Year[3]	Weighted Trip Length [mile][4]	Emissions				
		Arena	Retail	Office			ROG	CO	NO_x	PM_{10}	$PM_{2.5}$
							[ton/yr]				
Mission Bay, Weekend Trips	Basketball Event Days	8,715	1,864	314	30	21.7	1.3	13	3.7	0.45	0.21
	Concert and Family Show Event Days	8,715	1,864	314	55	21.7	2.5	24	6.8	0.82	0.38
	No Event Days	55	3,187	314	19	7.9	0.13	1.2	0.30	0.034	0.016
Mission Bay, Weekday Trips	Basketball Event Days	8,589	1,536	1,567	30	20.6	1.4	14	3.8	0.46	0.21
	Concert and Family Show Event Days	8,589	1,536	1,567	45	20.6	2.1	20	5.7	0.69	0.32
	Other Event Days	3,921	1,536	1,567	61	17.5	1.5	14	4.0	0.48	0.22
	No Event Days	55	2,636	1,567	125	8.0	1.0	9	2.4	0.27	0.12
						Total Emissions:	**9.8**	**97**	**26.6**	**3.20**	**1.47**

Notes:
1. "Other event days" refer to convention events. Scenario naming is consistent with Project Traffic Study.
2. Daily vehicle trips provided by Adavant Consulting. Office use includes GSW offices.
3. The maximum number of home games (60) in a season was conservatively assumed. Furthermore, it is assumed that half of the games will take place on weekends. Vehicle generation associated with all concert and family show events is approximated by concert trips, while the other 61 events are assumed to be convention events on weekdays.
4. Trip length for each scenario is weighted by the number of trips in each land use category. Arena vehicle trips are assumed to have a trip length of 25.05 miles/trip based on season ticket holder addresses. Season ticket holders account for approximately 60% seating at Warrior games. Vehicle trips from retail and office space are assumed to have a trip length of 11.98 miles/trip, based on 2006 average commute trip length in the Bay Area (MTC 2008).

Mobile Source CAP Emissions Estimates (Reduced Intensity Alternative)

Road Dust Calculations

Total Annual VMT

Trip Type	Scenario	VMT [mile/yr]
Mission Bay, Weekend Trips	Basketball Event Days	7,088,632
	Concert and Family Show Event Days	12,995,825
	No Event Days	533,873
Mission Bay, Weekday Trips	Basketball Event Days	7,220,378
	Concert and Family Show Event Days	10,830,567
	Other Event Days	7,505,786
	No Event Days	4,246,568
	Total VMT	**50,421,631**

Pollutants	Emissions Factor [lb/VMT]	Emissions [ton/yr]
Fugitive PM_{10}	0.00063	15.94
Fugitive $PM_{2.5}$	0.00016	3.91

Road Dust Equation[1]

E = k*(sL)^0.91 * (W)^1.02 * (1-P/4N)

where:

E = annual average emission factor in the same units as k	
k = particle size multiplier for particle size range and units of interest	
PM_{10} (lb/VMT)	0.0022
$PM_{2.5}$ (lb/VMT)	0.00054
sL = road surface silt loading (grams per square meter) (g/m^2)	0.1
W = average weight (tons) of all the vehicles traveling the road	2.4
P = number of "wet" days with at least 0.01 in of precipitation during averaging period	64
N number of days in the averaging period	365

Notes:

1. Road dust equation and parameters are based on CalEEMod defaults for the San Francisco Bay Area Air Basin.

References

California Air Resources Board (ARB). 2011. EMission FACtor Model (EMFAC2011).
Available online at www.arb.ca.gov/msei/modeling.htm

Metropolitan Transportation Commission (MTC). 2008. Travel Forecasts Data Summary: Transportation 2035 Plan for the
Available online at http://www.mtc.ca.gov/planning/2035_plan/Supplementary/T2035-Travel_Forecast_Data_Summary.pdf

Area Source Emissions Adjustment

Default Consumer Product Emission Factor[1]	2.1E-05	lb/ROG/sqft/day
Updated Consumer Product Emission Factor[2]	1.5E-05	lb/ROG/sqft/day
Default Consumer Products Emissions	6.1	tons/year
Updated Consumer Product Emissions	4.3	tons/year
Reduction in Consumer Product Emissions	1.8	tons/year
Default Area Source Emissions	7.0	tons/year
Updated Area Source Emissions	5.2	tons/year

Notes:

1. Default value from the California Emissions Estimator Model (CalEEMod®).

2. San Francisco-specific area source emission factor developed by San Francisco Environmental Planning (SFEP) for ROG from consumer products.

Off-Site Alternative Tables

Piers 30-32 + Seawall Lot 330 Project Alternative

Average Daily Construction-related Emissions

	Average Daily Construction Emissions (pounds/day)			
	ROG	**NOx**	**PM10**	**PM2.5**
Offroad Equipment Emissions	14	204	7.6	7.6
Construction Trip Emissions	5.1	30	0.51	0.47
Marine Vessel Emissions	6.9	60	3.4	3.4
Architectural Coating Emissions	29	0	0	0
Total	**55**	**295**	**12**	**11**

Controlled Average Daily Construction-related Emissions

	Average Daily Construction Emissions (pounds/day)			
	ROG	**NOx**	**PM10**	**PM2.5**
With Tier 3 + Diesel Particulate Filter Off-road Equipment				
Offroad Equipment Emissions	0.88	157	1.1	1.1
Construction Trip Emissions	5.1	30	0.51	0.47
Marine Vessel Emissions	2.1	11	0.25	0.25
Architectural Coating Emissions	29	0	0	0
Total	**37**	**199**	**1.9**	**1.8**

Piers 30-32 and Seawall Lot 330 Project Alternative

Averge Daily and Maximum Annual Operational Emissions

	Average Daily Emissions (pounds/day)			
	ROG	**NOx**	**PM10**	**PM2.5**
Emission Source				
Mobile (Alternative - GSW trips)	12	17	4.9	2.2
Marine	1.1	7.4	0.28	0.28
Generators	0.26	0.81	0.033	0.033
Boilers	3.3	23	4.6	4.6
Area Source	29	0.10	0.042	0.042
Total	46	48	10	7.1

	Maximum Annual Emissions (short tons/year)			
	ROG	**NOx**	**PM10**	**PM2.5**
Emission Source				
Mobile (Alternative - GSW trips)	2.2	3.2	0.89	0.40
Marine	0.20	1.3	0.051	0.051
Generators	0.047	0.15	0.0060	0.0060
Boilers	0.60	4.1	0.83	0.83
Area Source	5.3	0.018	0.0076	0.0076
Total	8.3	8.8	1.8	1.3

Annual Average PM2.5 Concentrations at off-site Receptors

for the Off-site Alternative

	$PM_{2.5}$ Concentration ($\mu g/m^3$, Annual Average)	
Source	**Residential Receptor with Highest Project Impact**	**Residential Receptor with Highest Background Impact**
Construction		
Background at the maximally impacted receptor	9.1	10
Uncontrolled Construction Contribution	1.8	0.13
Controlled (Tier 3 + VDECS) Construction Contribution	0.29	0.021
Total Cumulative PM2.5 Concentration (Uncontrolled/Controlled)	11/9.4	10/10
Project Total (Uncontrolled/Controlled)	1.8/0.29	0.13/0.021
Project Contribution Significance Threshold	0.2	0.2
Significant? (Uncontrolled/Controlled)	Yes/Yes	No/No
Operation		
Background at the maximally impacted receptor	9.1	10
Project Operations – Generators	0.055	0.055
Project Operations – Mobile	0.32	0.32
Project Operations - Water Taxis	0.081	0.042
Total Cumulative PM2.5 Concentration	9.6	10
Project Total	0.45	0.41
Significance Threshold	0.2	0.2
Significant?	Yes	Yes

NOTE: The cumulative total concentrations may not sum precisely due to rounding of subtotals.

Lifetime Excess Cancer Risk at Off-site Receptors

for the Off-site Alternative

	Excess Cancer Risk (in one million)	
Source	**Residential Receptor with Highest Project Impact**	**Residential Receptor with Highest Background Impact**
Background at the maximally impacted receptor	113	560
Uncontrolled Construction Contribution	285	17
Controlled (Tier 3 + VDECS) Construction Contribution	44	2.7
Project Operations – Generators	30	30
Project Operations – Mobile	7.2	7.2
Project Operations - Water Taxis	44	23
Cumulative Cancer Risk (Uncontrolled/with Mitigation)	479/238	637/622
Project Total (Uncontrolled/with Mitigation)	366/125	77/62
Significance Threshold	7	7
Significant (Uncontrolled/with Mitigation)?	**Yes/Yes**	**Yes/Yes**

NOTE: The cumulative total risks may not sum precisely due to rounding of subtotals.

Table 6.4-1
Toxicity-Weighted Construction Emissions
for the Piers 30-32 + Seawall Lot 330 Project Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Chemical	Unit Risk Factor[1] $(ug/m^3)^{-1}$	Uncontrolled Project Emissions (lb/project)	Weighted (lb/project)-(m^3/µg)	Percent Contribution to Risk
Diesel PM[2]	3.0E-04	4,916	1.5	99.9%
TACs from Speciated Gasoline TOG due to Tailpipe Emissions	1.81E-06	1,001	0.0018	0.12%
TACs from Speciated Gasoline TOG due to Evaporative Losses	1.07E-07	1,610	0.0002	0.01%

Chemical	Unit Risk Factor[1] $(ug/m^3)^{-1}$	Controlled Project Emissions (lb/project)	Weighted (lb/project)-(m^3/µg)	Percent Contribution to Risk
Diesel PM[3]	3.0E-04	951	0.29	99.3%
TACs from Speciated Gasoline TOG due to Tailpipe Emissions[2]	1.81E-06	1,001	0.0018	0.6%
TACs from Speciated Gasoline TOG Evaporative Losses[2]	1.07E-07	1,610	0.0002	0.1%

Notes:

1. From Cal/EPA 2013 and BAAQMD 2012
2. Includes DPM emissions from off-road equiment and on-road sources. Emissions in the controlled scenario reflect the use of Tier 3 off-road equipment with diesel particulate filters.

Abbreviations:

PM: particulate matter
lb: pound
g: gram
s: second
TOG: Total Organic Gas
μg: microgram

References:

Bay Area Air Quality Management District (BAAQMD). 2012. Recommended Methods for Screening and Modeling Local Risks and Hazards. May. http://baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Risk%20Modeling%20Approach%20May%202012.ashx?la=en

Cal/EPA. 2013. OEHHA/ARB Consolidated Table of Approved Risk Assessment Health Values. August. http://www.arb.ca.gov/toxics/healthval/contable.pdf

Table 6.4-2
Construction Particulate Matter Emissions
for the Piers 30-32 + Seawall Lot 330 Project Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Year	Phase ID	Phase	Project Equipment	Source Group[1]	DPM Emission Rate (g/s) - Uncontrolled	DPM Emission Rate (g/s) - Controlled[2]	$PM_{2.5}$ Emission Rate (g/s) - Uncontrolled	$PM_{2.5}$ Emission Rate (g/s) - Controlled[2]
1	0	Indicator Pile Program	APE 600 Tandem Vibratory Hammer	CONPIERS	6.1E-04	1.3E-04	6.1E-04	1.3E-04
1	0	Indicator Pile Program	Crawler Cranes (24 & 48 pile set and hammer)	CONPIERS	3.4E-04	5.0E-05	3.4E-04	5.0E-05
1	0	Indicator Pile Program	Large Forklifts	CONPIERS	1.5E-04	1.2E-05	1.5E-04	1.2E-05
1	0	Indicator Pile Program	Mobile Cranes	CONPIERS	3.4E-04	5.0E-05	3.4E-04	5.0E-05
1	0	Marine	Marine Emissions	MARINE	0.030	0.0022	0.030	0.0022
1	0	Road	Piers 30-32 Haul Roads	ROAD	2.5E-04	2.5E-04	3.4E-04	3.4E-04
1	0	Road	SWL330 Haul Roads	ROAD	4.1E-05	4.1E-05	5.9E-05	5.9E-05
1	1	Pile Installation & Deck Reconstruction	APE 600 Tandem Vibratory Hammer	CONPIERS	0.0075	0.0016	0.0075	0.0016
1	1	Pile Installation & Deck Reconstruction	Concrete Boom Pumps	CONPIERS	0.0032	4.8E-04	0.0032	4.8E-04
1	1	Pile Installation & Deck Reconstruction	Crawler Cranes (24 & 48 pile set and hammer)	CONPIERS	0.0055	8.1E-04	0.0055	8.1E-04
1	1	Pile Installation & Deck Reconstruction	Cutting and chopping saws	CONPIERS	0	0	0	0
1	1	Pile Installation & Deck Reconstruction	Large Forklifts	CONPIERS	0.0011	9.9E-05	0.0011	9.9E-05
1	1	Pile Installation & Deck Reconstruction	Mobile Cranes	CONPIERS	0.0027	4.0E-04	0.0027	4.0E-04
1	1	Pile Installation & Deck Reconstruction	Saw cutters	CONPIERS	0	0	0	0
1	1	Pile Installation & Deck Reconstruction	Street Sweeper	CONPIERS	8.7E-04	7.4E-05	8.7E-04	7.4E-05
1	2	Building Construction (including arena)	Concrete Boom Pumps	CONPIERS	9.3E-04	1.4E-04	9.3E-04	1.4E-04
1	2	Building Construction (including arena)	Crawler Cranes	CONPIERS	0.0016	2.3E-04	0.0016	2.3E-04
1	2	Building Construction (including arena)	Cutting/chopping saws	CONPIERS	0	0	0	0
1	2	Building Construction (including arena)	Drywall stud impact guns	CONPIERS	0	0	0	0
1	2	Building Construction (including arena)	Grandall-type Forklifts	CONPIERS	0.0034	2.9E-04	0.0034	2.9E-04
1	2	Building Construction (including arena)	Mobile Cranes	CONPIERS	0.0022	3.2E-04	0.0022	3.2E-04
1	2	Building Construction (including arena)	Street Sweeper	CONPIERS	5.7E-04	4.8E-05	5.7E-04	4.8E-05
1	2	Building Construction (including arena)	Tile cutting saws	CONPIERS	0	0	0	0
1	3	Demolition	CAT 300 series excavator	CONSWL	6.9E-05	1.9E-05	6.9E-05	1.9E-05
1	3	Demolition	Street Sweeper	CONSWL	1.9E-04	1.6E-05	1.9E-04	1.6E-05
1	4	Shoring (Pile-driving)	APE 600 Tandem Vibratory Hammer	CONSWL	0.0025	5.2E-04	0.0025	5.2E-04
1	4	Shoring (Pile-driving)	Concrete Boom Pumps	CONSWL	0.0011	1.7E-04	0.0011	1.7E-04
1	4	Shoring (Pile-driving)	Crawler Cranes (24 & 48 pile set and hammer)	CONSWL	0.0017	2.7E-04	0.0017	2.7E-04
1	4	Shoring (Pile-driving)	Cutting and chopping saws	CONSWL	0	0	0	0
1	4	Shoring	Drill Rig	CONSWL	0.0011	2.3E-04	0.0011	2.3E-04
1	4	Shoring	Grout-mixing plant	CONSWL	8.6E-05	1.4E-05	8.6E-05	1.4E-05
1	4	Shoring (Pile-driving)	Large Forklifts	CONSWL	3.5E-04	3.2E-05	3.5E-04	3.2E-05
1	4	Shoring (Pile-driving)	Mobile Cranes	CONSWL	8.7E-04	1.3E-04	8.7E-04	1.3E-04
1	4	Shoring (Pile-driving)	Saw cutters	CONSWL	0	0	0	0
1	4	Shoring	Small Excavator	CONSWL	2.1E-04	5.7E-05	2.1E-04	5.7E-05
1	4	Shoring (Pile-driving)	Street Sweeper	CONSWL	2.9E-04	2.4E-05	2.9E-04	2.4E-05
1	4	Shoring	Support Crane	CONSWL	3.7E-04	5.7E-05	3.7E-04	5.7E-05
1	5	Mass Excavation	CAT 600 Excavator	CONSWL	2.1E-04	5.7E-05	2.1E-04	5.7E-05
1	5	Mass Excavation	D6 or equivalent dozer	CONSWL	5.8E-04	3.5E-05	5.8E-04	3.5E-05
1	6	Building Construction	Concrete Boom Pumps	CONSWL	6.1E-04	9.9E-05	6.1E-04	9.9E-05
1	6	Building Construction	Gradall-type Forklifts	CONSWL	2.2E-04	2.0E-05	2.2E-04	2.0E-05
1	6	Building Construction	Manlifts	CONSWL	1.9E-04	1.8E-05	1.9E-04	1.8E-05
1	6	Building Construction	Tower cranes	CONSWL	5.0E-04	7.6E-05	5.0E-04	7.6E-05

Year	Phase ID	Phase	Project Equipment	Source Group[1]	DPM Emission Rate (g/s) - Uncontrolled	DPM Emission Rate (g/s) - Controlled[2]	$PM_{2.5}$ Emission Rate (g/s) - Uncontrolled	$PM_{2.5}$ Emission Rate (g/s) - Controlled[2]
2	0	Road	Piers 30-32 Haul Roads	ROAD	3.0E-04	3.0E-04	4.2E-04	4.2E-04
2	0	Road	SWL330 Haul Roads	ROAD	8.0E-05	8.0E-05	1.2E-04	1.2E-04
2	2	Building Construction (including arena)	Concrete Boom Pumps	CONPIERS	0.0014	2.1E-04	0.0014	2.1E-04
2	2	Building Construction (including arena)	Crawler Cranes	CONPIERS	0.0014	2.0E-04	0.0014	2.0E-04
2	2	Building Construction (including arena)	Cutting/chopping saws	CONPIERS	0	0	0	0
2	2	Building Construction (including arena)	Drywall stud impact guns	CONPIERS	0	0	0	0
2	2	Building Construction (including arena)	Grandall-type Forklifts	CONPIERS	0.0045	3.9E-04	0.0045	3.9E-04
2	2	Building Construction (including arena)	Mobile Cranes	CONPIERS	0.0032	4.8E-04	0.0032	4.8E-04
2	2	Building Construction (including arena)	Street Sweeper	CONPIERS	8.5E-04	7.2E-05	8.5E-04	7.2E-05
2	2	Building Construction (including arena)	Tile cutting saws	CONPIERS	0	0	0	0
2	6	Building Construction	Concrete Boom Pumps	CONSWL	0.0036	5.9E-04	0.0036	5.9E-04
2	6	Building Construction	Gradall-type Forklifts	CONSWL	0.0013	1.2E-04	0.0013	1.2E-04
2	6	Building Construction	Manlifts	CONSWL	0.0011	1.1E-04	0.0011	1.1E-04
2	6	Building Construction	Tower cranes	CONSWL	0.0030	4.5E-04	0.0030	4.5E-04
3	0	Road	Piers 30-32 Haul Roads	ROAD	5.1E-05	5.1E-05	6.9E-05	6.9E-05
3	0	Road	SWL330 Haul Roads	ROAD	3.3E-05	3.3E-05	4.8E-05	4.8E-05
3	2	Building Construction (including arena)	Concrete Boom Pumps	CONPIERS	2.3E-04	3.5E-05	2.3E-04	3.5E-05
3	2	Building Construction (including arena)	Grandall-type Forklifts	CONPIERS	7.5E-04	6.5E-05	7.5E-04	6.5E-05
3	2	Building Construction (including arena)	Mobile Cranes	CONPIERS	5.4E-04	8.0E-05	5.4E-04	8.0E-05
3	2	Building Construction (including arena)	Street Sweeper	CONPIERS	1.4E-04	1.2E-05	1.4E-04	1.2E-05
3	6	Building Construction	Concrete Boom Pumps	CONSWL	9.1E-04	1.5E-04	9.1E-04	1.5E-04
3	6	Building Construction	Gradall-type Forklifts	CONSWL	3.4E-04	3.0E-05	3.4E-04	3.0E-05
3	6	Building Construction	Manlifts	CONSWL	2.8E-04	2.7E-05	2.8E-04	2.7E-05
3	6	Building Construction	Tower cranes	CONSWL	7.4E-04	1.1E-04	7.4E-04	1.1E-04
3	7	Paving	Other Material Handling Equipment	CONSWL	9.0E-06	1.8E-06	9.0E-06	1.8E-06
3	7	Paving	Pavers	CONSWL	5.2E-05	9.4E-06	5.2E-05	9.4E-06
3	7	Paving	Paving Equipment	CONSWL	4.0E-05	8.4E-06	4.0E-05	8.4E-06
3	7	Paving	Rollers	CONSWL	1.1E-04	1.5E-05	1.1E-04	1.5E-05
3	7	Paving	Tractors/Loaders/Backhoes	CONSWL	5.8E-05	8.9E-06	5.8E-05	8.9E-06
3	8	Architectural Coating	Other Construction Equipment	CONSWL	5.6E-05	6.0E-06	5.6E-05	6.0E-06

Notes:
1. The four source groups are:
   - CONPIERS: Offroad construction equipmient at Piers 30-32
   - CONSWL: Offroad construction equipmient at Seawall Lot 330
   - ROAD: Onroad construction trips
   - MARINE: Construction marine vessels
2. The controlled scenario reflects the use of Tier 3 offroad construction equipment with diesel particulate filters.

Abbreviations:
DPM: diesel particulate matter
g: gram
s: second

Table 6.4-3
Annual Average Daily Traffic from Project Operation
for the Piers 30-32 + Seawall Lot 330 Project Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Trip Type	Scenario	Days Per Year	Daily One-way Vehicle Trips[1]
Weekday Trips	Basketball Event Days	30	7,215
	Concert Event Days[2]	45	6,533
	Convention Event Days	61	4,400
	No Event Days	125	2,705
Weekend Trips	Basketball Event Days	30	7,838
	Concert Event Days[2]	55	6,533
	No Event Days	19	2,998
		Annual One-way Vehicle Trips:	1,768,377
		Annual Average Daily Traffic (AADT):	**4,845**

Notes:
1. Based on traffic data from Adavant Consulting.
2. Trips conservatively assumed to be equal to basketball event days.

Table 6.4-4
Screening $PM_{2.5}$ Concentrations and Cancer Risks from Operational Traffic
for the Piers 30-32 + Seawall Lot 330 Project Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Impact[1]	North-South Roadway Impact	East-West Roadway Impact	Total Impact from 4 Adjacent Roadways
$PM_{2.5}$ Concentration ($\mu g/m^3$)	0.080	0.078	0.32
Lifetime Cancer Risk (in a million)	2.2	1.4	7.2

Notes:
1. Based on BAAQMD County Surface Street Screening Tables for San Francisco County. A distance of 10 feet from the roadway and an annual average daily traffic (AADT) volume of 10,000 vehicles per day (vpd) was conservatively assumed since the AADT shown in Table 7.2-2 is less than 10,000 vpd.

References:

Bay Area Air Quality Management District (BAAQMD). 2011. Roadway Screening Analysis Tables. December. Available online at :
http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/County%20Surface%20Street%20Screening%20Tables%20Dec%202011.ashx?la=en

Table 6.4-5
SCREEN3 Construction Screening Inputs and Outputs
for the Piers 30-32 + Seawall Lot 330 Project Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Parameter	Inputs and Outputs
Source	Water Taxis
Source Type	Area
Emission Rate (g/s-m^2)	0.00167
Release Height (m)	6
Length of larger side (m)	40
Length of smaller side (m)	15
Area (m^2)	600
Receptor Height (m)	1.8
Urban/Rural (U/R)	U
Met Choice	1 - Full Met
Distance from receptor with highest Project impact (m)	160
Distance from receptor with highest background impact (m)	240
Dispersion Factor (µg/m^3 per g/s)	
1-hour dispersion factor at receptor with highest Project impact	1,374
Annual Average Dispersion Factor at receptor with highest Project impact[1]	**137**
1-hour dispersion factor at receptor with highest background impact	708
Annual Average Dispersion Factor at receptor with highest background impact[1]	**71**
Concentration (µg/m^3)	**Uncontrolled**
DPM/$PM_{2.5}$ Emission Rate[2] (g/s)	5.9E-04
Annual Maximum DPM/$PM_{2.5}$ Conc at receptor with highest Project impact	**0.08**
Annual Maximum DPM/$PM_{2.5}$ Conc at receptor with highest background impact	**0.04**

Notes:

1. A scaling ratio of 0.1 is applied to convert the 1-hour dispersion factor to annual dispersion factor per BAAQMD Permit Modeling Guidance.

2. 40% of the mass emissions were conservatively assumed to be emitted at the dock.

Abbreviations:
DPM: diesel particulate matter
g: gram
m: meter
m^2: square meter
m^3: cubic meter
s: second
µg: microgram

References:
Bay Area Air Quality Management District (BAAQMD). 2007. Permit Modeling Guidance. June.
http://baaqmd.gov/~/media/Files/Engineering/Air%20Toxics%20Programs/pmt_modeling_guidance.ashx?la=en
SCREEN3. http://www.epa.gov/ttn/scram/dispersion_screening.htm#screen3

Table 6.4-6
AERMOD Construction Modeling Results
for the Piers 30-32 + Seawall Lot 330 Project Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Receptor	UTMx (m)	UTMy (m)	Cancer Risk Increase (in one million)		Maximum Annual $PM_{2.5}$ Concentration ($\mu g/m^3$)	
			Uncontrolled	Controlled	Uncontrolled	Controlled
Residential receptor with highest Project impacts	553,820	4,182,280	285	44	1.8	0.29
Residential receptor with highest background impacts	553,720	4,182,500	17	2.7	0.13	0.021

Abbreviations:
m: meter
m^3: cubic meter
PM: particulate matter
UTM: Universal Transverse Mercator
µg: microgram

Table 6.4-7
Screening $PM_{2.5}$ Concentration Results
for the Piers 30-32 + Seawall Lot 330 Project Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Scenario	Concentration [µg/m^3] Residential Receptor with Highest Project Impact	Concentration [µg/m^3] Residential Receptor with Highest Background Impact
Construction		
2014 Background $PM_{2.5}$ Concentration[1]	9.1	10.1
$PM_{2.5}$ Concentration from Uncontrolled Construction Emissions	1.8	0.13
$PM_{2.5}$ Concentration from Controlled Construction Emissions	0.29	0.021
Significance Threshold[2]	0.2	0.2
Project $PM_{2.5}$ Concentration Exceeds Threshold? (Uncontrolled scenario)	Yes	No
Project $PM_{2.5}$ Concentration Exceeds Threshold? (Controlled scenario)	Yes	No
Operational		
2014 Background $PM_{2.5}$ Concentration[1]	9.1	10.1
$PM_{2.5}$ Concentration from Operational Traffic	0.32	0.32
$PM_{2.5}$ Concentration from Emergency Diesel Generators[3]	0.055	0.055
$PM_{2.5}$ Concentration from Water Taxis	0.081	0.042
Total Project $PM_{2.5}$ Concentration (Operational)	0.45	0.41
Significance Threshold[2]	0.2	0.2
Total Project $PM_{2.5}$ Concentration Exceeds Threshold? (Operational)	Yes	Yes

Notes:
1. From the Citywide HRA database.
2. Significance threshold of 0.2 µg/m^3 is applicable since the alternative is in an Air Pollutant Exposure Zone.
3. Back-calculated assuming a cancer risk of 10 in a million for each of the three generators (total of 30 in a million). The cancer risk of 10 in a million is the maximum allowable Project cancer risk from toxic air contaminants in the BAAQMD, and exposure assumptions for a 70-year resident.

Abbreviations:
BAAQMD: Bay Area Air Quality Management District
HRA: Health Risk Assessment
µg: microgram
m^3: cubic meter

Table 6.4-8
Exposure Parameters and Cancer Risk Adjustment Factors
for the Piers 30-32 + Seawall Lot 330 Project Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Exposure Parameter	Units	Adult Resident			
		Construction Year Year 1	Construction Year Year 2	Construction Year Year 3	Water Taxis Operation
Daily Breathing Rate (DBR)[1]	[L/kg-day]	581	581	581	302
Exposure Time (ET)[2]	[hours/24 hours]	24	24	24	24
Exposure Frequency (EF)[3]	[days/year]	350	350	350	350
Exposure Duration (ED)[4]	[years]	1	1	1	70
Averaging Time (AT)	[days]	25,550	25,550	25,550	25,550
Intake Factor, Inhalation (IF_{inh})	[m^3/kg-day]	0.0080	0.0080	0.0080	0.29
Cancer Risk Adjustment Factor[5]	[-]	10	10	4.75	1.7

Notes:
1. Daily breathing rate reflects default breathing rate from BAAQMD 2010.
2. Exposure time reflects default exposure time from BAAQMD 2010.
3. Exposure frequency reflects default exposure frequency from BAAQMD 2010.
4. Construction-related emissions will be emitted over 3 years. For operation, the exposure duration is 70 years for a resident.
5. Based on BAAQMD 2010.

Calculation:

IF_{inh} = DBR * ET * EF * ED * CF / AT

CF = 0.001 (m^3/L)

Abbreviations:

BAAQMD: Bay Area Air Quality Management District
L: liter
kg: kilogram
m^3: cubic meter

References:

BAAQMD. 2010. BAAQMD Air Toxics NSR Program Health Risk Screening Analysis (HRSA) Guidelines. January.
http://baaqmd.gov/~/media/Files/Engineering/Air%20Toxics%20Programs/hrsa_guidelines.ashx?la=en

Table 6.4-9
Screening Cancer Risk Results
for the Piers 30-32 + Seawall Lot 330 Project Alternative
GSW Mission Bay Multi-Purpose Event Center & Ancillary Development
San Francisco, California

Scenario	Units	Residential Receptor with Highest Project Impact	Residential Receptor with Highest Background Impact
Diesel PM Cancer Potency Factor (CPF)[1]	$[mg/kg\text{-}day]^{-1}$	1.1	1.1
2014 Background Risk[2]	[in a million]	113	560
Excess Cancer Risk from Uncontrolled Construction Emissions[3]	[in a million]	285	17
Excess Cancer Risk from Controlled Construction Emissions[3]	[in a million]	44	2.7
Excess Cancer Risk from Operational Traffic Emissions[4]	[in a million]	7.2	7.2
Excess Cancer Risk from Emergency Diesel Generators[5]	[in a million]	30	30
Excess Cancer Risk from Water Taxis[6]	[in a million]	44	23
Total Project Excess Cancer Risk (Uncontrolled Scenario)	[in a million]	366	77
Total Project Excess Cancer Risk (Controlled Scenario)	[in a million]	125	62
Significance Threshold[7]	[in a million]	7	7
Total Risk Exceeds Threshold? (Uncontrolled Scenario)	-	Yes	Yes
Total Risk Exceeds Threshold? (Controlled Scenario)	-	Yes	Yes

Notes:
1. From Cal/EPA 2013.
2. From the Citywide HRA database for the residential receptor.
3. Represent health impacts at the residential receptor with highest Project impacts and highest background impacts.
4. The screening values reflect a 70-year cancer risk with age sensitivity factors applied (BAAQMD 2012).
5. A cancer risk of 10 in a million, the maximum allowable Project cancer risk from toxic air contaminants in the BAAQMD, is conservatively assumed.
6. The cancer risk from water taxis operation is based on screening values and exposure parameters associated with a 70-year resident.
7. Significance threshold of 7 in a million is applicable since the alternative is in an Air Pollutant Exposure Zone.

Calculation:
Cancer Risk = [AnnualConc] × [CF] × [IF_{inh}] × [CPF] x [CRAF]
CF = 0.001 (mg/µg)

Abbreviations:
BAAQMD: Bay Area Air Quality Management District
Cal/EPA: California Environmental Protection Agency
CRAF: Cancer Risk Adjustment Factor
HRA: Health Risk Assessment
IF_{inh}: Intake Factor, Inhalation
kg: kilogram
mg: milligram
PM: Particulate Matter
µg: microgram

References:

Cal/EPA. 2013. OEHHA/ARB Consolidated Table of Approved Risk Assessment Health Values. August. Available online at: http://www.arb.ca.gov/toxics/healthval/contable.pdf

Bay Area Air Quality Management District (BAAQMD). 2012. Recommended Methods for Screening and Modeling Local Risks and Hazards. May. Available online at: http://baaqmd.gov/~/media/Files/Planning%20and%20Research/CEQA/Risk%20Modeling%20Approach%20May%202012.ashx?la=en

Piers 30-32 amd SWL 330 Construction Equipment List

Phase ID	Phase	Project Equipment	OFFROAD Equipment	HP	OFFROAD HP Bin	Tier HP Bin	LF	Quantity	Total Hours	Calendar Year	Construction Year	Fuel
0	Indicator Pile Program	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	530	750	600	0.2881	1	456	2015	1	Diesel
0	Indicator Pile Program	Mobile Cranes	Cranes	530	750	600	0.2881	1	456	2015	1	Diesel
0	Indicator Pile Program	Large Forklifts	Forklifts	93	120	100	0.201	1	456	2015	1	Diesel
0	Indicator Pile Program	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	1200	9999	9999	0.5025	1	304	2015	1	Diesel
1	Pile Installation & Deck Reconstruction	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	530	750	600	0.2881	4	7300	2016	1	Diesel
1	Pile Installation & Deck Reconstruction	Mobile Cranes	Cranes	530	750	600	0.2881	2	3650	2016	1	Diesel
1	Pile Installation & Deck Reconstruction	Concrete Boom Pumps	Other Construction Equipment	480	500	600	0.4154	2	3346	2016	1	Diesel
1	Pile Installation & Deck Reconstruction	Large Forklifts	Forklifts	93	120	100	0.201	2	3650	2016	1	Diesel
1	Pile Installation & Deck Reconstruction	Saw cutters	Other Construction Equipment	0	50	11	0.4154	2	3650	2016	1	Electric
1	Pile Installation & Deck Reconstruction	Cutting and chopping saws	Other Construction Equipment	0	50	11	0.4154	2	3650	2016	1	Electric
1	Pile Installation & Deck Reconstruction	Street Sweeper	Sweepers/Scrubbers	285	500	300	0.4556	1	782	2016	1	Diesel
2	Building Construction (including arena)	Street Sweeper	Sweepers/Scrubbers	285	500	300	0.4556	1	521	2016	1	Diesel
2	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	480	500	600	0.4154	2	973	2016	1	Diesel
2	Building Construction (including arena)	Crawler Cranes	Cranes	530	750	600	0.2881	2	2129	2016	1	Diesel
2	Building Construction (including arena)	Mobile Cranes	Cranes	530	750	600	0.2881	4	2920	2016	1	Diesel
2	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	93	120	100	0.201	8	10950	2016	1	Diesel
2	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	0	50	11	0.4154	15	11406	2016	1	Electric
2	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	0	50	11	0.4154	10	4563	2016	1	Electric
2	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	0	50	11	0.4154	25	19010	2016	1	Electric
2	Building Construction (including arena)	Street Sweeper	Sweepers/Scrubbers	285	500	300	0.4556	1	782	2016	2	Diesel
2	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	480	500	600	0.4154	2	1460	2016	2	Diesel
2	Building Construction (including arena)	Crawler Cranes	Cranes	530	750	600	0.2881	2	1825	2016	2	Diesel
2	Building Construction (including arena)	Mobile Cranes	Cranes	530	750	600	0.2881	4	4380	2016	2	Diesel
2	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	93	120	100	0.201	8	14600	2016	2	Diesel
2	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	0	50	11	0.4154	15	20531	2016	2	Electric
2	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	0	50	11	0.4154	10	13688	2016	2	Electric
2	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	0	50	11	0.4154	25	30417	2016	2	Electric
2	Building Construction (including arena)	Street Sweeper	Sweepers/Scrubbers	285	500	300	0.4556	1	130	2016	3	Diesel
2	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	480	500	600	0.4154	2	243	2016	3	Diesel
2	Building Construction (including arena)	Mobile Cranes	Cranes	530	750	600	0.2881	4	730	2016	3	Diesel
2	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	93	120	100	0.201	8	2433	2016	3	Diesel
3	Demolition	CAT 300 series excavator	Excavators	404	500	600	0.3819	1	173.81	2017	1	Diesel
3	Demolition	Street Sweeper	Sweepers/Scrubbers	285	500	300	0.4556	1	173.81	2017	1	Diesel
4	Shoring	Drill Rig	Bore/Drill Rigs	1205	9999	9999	0.5025	1	521.429	2017	1	Diesel
4	Shoring	Support Crane	Cranes	530	750	600	0.2881	1	521.429	2017	1	Diesel
4	Shoring	Grout-mixing plant	Other Material Handling Equipment	24	50	25	0.3953	1	521.429	2017	1	Diesel
4	Shoring	Small Excavator	Excavators	404	500	600	0.3819	1	521.429	2017	1	Diesel

Piers 30-32 amd SWL 330 Construction Equipment List

Phase ID	Phase	Project Equipment	OFFROAD Equipment	HP	OFFROAD HP Bin	Tier HP Bin	LF	Quantity	Total Hours	Calendar Year	Construction Year	Fuel
5	Mass Excavation	CAT 600 Excavator	Excavators	404	500	600	0.3819	1	521.429	2017	1	Diesel
5	Mass Excavation	D6 or equivalent dozer	Rubber Tired Dozers	235	250	300	0.3953	1	521.429	2017	1	Diesel
6	Building Construction	Tower cranes	Cranes	530	750	600	0.2881	2	695.238	2017	1	Diesel
6	Building Construction	Gradall-type Forklifts	Forklifts	230	250	300	0.201	2	608.333	2017	1	Diesel
6	Building Construction	Manlifts	Forklifts	51	120	75	0.201	4	1216.67	2017	1	Diesel
6	Building Construction	Concrete Boom Pumps	Other Construction Equipment	480	500	600	0.4154	2	695.238	2017	1	Diesel
6	Building Construction	Tower cranes	Cranes	530	750	600	0.2881	2	4171	2017	2	Diesel
6	Building Construction	Gradall-type Forklifts	Forklifts	230	250	300	0.201	2	3650	2017	2	Diesel
6	Building Construction	Manlifts	Forklifts	51	120	75	0.201	4	7300	2017	2	Diesel
6	Building Construction	Concrete Boom Pumps	Other Construction Equipment	480	500	600	0.4154	2	4171.43	2017	2	Diesel
6	Building Construction	Tower cranes	Cranes	530	750	600	0.2881	2	1043	2017	3	Diesel
6	Building Construction	Gradall-type Forklifts	Forklifts	230	250	300	0.201	2	912.5	2017	3	Diesel
6	Building Construction	Manlifts	Forklifts	51	120	75	0.201	4	1825	2017	3	Diesel
6	Building Construction	Concrete Boom Pumps	Other Construction Equipment	480	500	600	0.4154	2	1042.86	2017	3	Diesel
7	Paving	Other Material Handling Equipment	Other Material Handling Equipment	9	50	11	0.3953	1	174	2018	3	Diesel
7	Paving	Pavers	Pavers	125	175	175	0.4154	1	174	2018	3	Diesel
7	Paving	Paving Equipment	Paving Equipment	130	175	175	0.3551	1	174	2018	3	Diesel
7	Paving	Rollers	Rollers	80	120	100	0.3752	2	348	2018	3	Diesel
7	Paving	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	97	120	100	0.3685	1	174	2018	3	Diesel
8	Architectural Coating	Other Construction Equipment	Other Construction Equipment	78	120	100	0.4154	1	130.357	2018	3	Diesel
1	Pile Installation & Deck Reconstruction	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	1200	9999	9999	0.5025	2	3650	2016	1	Diesel
1	Pile Installation & Deck Reconstruction	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	530	750	600	0.2881	4	112	2016	1	Diesel
1	Pile Installation & Deck Reconstruction	Mobile Cranes	Cranes	530	750	600	0.2881	2	56	2016	1	Diesel
1	Pile Installation & Deck Reconstruction	Concrete Boom Pumps	Other Construction Equipment	480	500	600	0.4154	2	51	2016	1	Diesel
1	Pile Installation & Deck Reconstruction	Large Forklifts	Forklifts	93	120	100	0.201	2	56	2016	1	Diesel
1	Pile Installation & Deck Reconstruction	Saw cutters	Other Construction Equipment	0	50	11	0.4154	2	56	2016	1	Electric
1	Pile Installation & Deck Reconstruction	Cutting and chopping saws	Other Construction Equipment	0	50	11	0.4154	2	56	2016	1	Electric
1	Pile Installation & Deck Reconstruction	Street Sweeper	Sweepers/Scrubbers	285	500	300	0.4556	1	12	2016	1	Diesel
1	Pile Installation & Deck Reconstruction	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	1200	9999	9999	0.5025	2	56	2016	1	Diesel
4	Shoring (Pile-driving)	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	530	750	600	0.2881	4	2433	2017	1	Diesel
4	Shoring (Pile-driving)	Mobile Cranes	Cranes	530	750	600	0.2881	2	1217	2017	1	Diesel
4	Shoring (Pile-driving)	Concrete Boom Pumps	Other Construction Equipment	480	500	600	0.4154	2	1217	2017	1	Diesel
4	Shoring (Pile-driving)	Large Forklifts	Forklifts	93	120	100	0.201	2	1217	2017	1	Diesel
4	Shoring (Pile-driving)	Saw cutters	Other Construction Equipment	0	50	11	0.4154	2	1217	2017	1	Electric
4	Shoring (Pile-driving)	Cutting and chopping saws	Other Construction Equipment	0	50	11	0.4154	2	1217	2017	1	Electric
4	Shoring (Pile-driving)	Street Sweeper	Sweepers/Scrubbers	285	500	300	0.4556	1	261	2017	1	Diesel
4	Shoring (Pile-driving)	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	1200	9999	9999	0.5025	2	1217	2017	1	Diesel

Piers 30-32 and SWL 330 Uncontrolled Offroad Equipment Activities and Emissions

Construction Year	Phase ID	Phase	Project Equipment	OFFROAD Equipment	Total Hours	HP	OFFROAD HP Bin	Tier HP Bin	Fuel	Emissions	Units	Pollutant	Engine Tier Uncontrolled	DPF Uncontrolled
1	0	Indicator Pile Program	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	304	1200	9999	9999	Diesel	1,724	lb	Nox	OFFROAD	0
1	0	Indicator Pile Program	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	304	1200	9999	9999	Diesel	42	lb	PM	OFFROAD	0
1	0	Indicator Pile Program	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	304	1200	9999	9999	Diesel	72	lb	ROG	OFFROAD	0
1	0	Indicator Pile Program	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	456	530	750	600	Diesel	662	lb	Nox	OFFROAD	0
1	0	Indicator Pile Program	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	456	530	750	600	Diesel	23	lb	PM	OFFROAD	0
1	0	Indicator Pile Program	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	456	530	750	600	Diesel	44	lb	ROG	OFFROAD	0
1	0	Indicator Pile Program	Large Forklifts	Forklifts	456	93	120	100	Diesel	124	lb	Nox	OFFROAD	0
1	0	Indicator Pile Program	Large Forklifts	Forklifts	456	93	120	100	Diesel	10	lb	PM	OFFROAD	0
1	0	Indicator Pile Program	Large Forklifts	Forklifts	456	93	120	100	Diesel	14	lb	ROG	OFFROAD	0
1	0	Indicator Pile Program	Mobile Cranes	Cranes	456	530	750	600	Diesel	662	lb	Nox	OFFROAD	0
1	0	Indicator Pile Program	Mobile Cranes	Cranes	456	530	750	600	Diesel	23	lb	PM	OFFROAD	0
1	0	Indicator Pile Program	Mobile Cranes	Cranes	456	530	750	600	Diesel	44	lb	ROG	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	56	1200	9999	9999	Diesel	319	lb	Nox	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	56	1200	9999	9999	Diesel	7.9	lb	PM	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	56	1200	9999	9999	Diesel	14	lb	ROG	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	3,650	1200	9999	9999	Diesel	20,761	lb	Nox	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	3,650	1200	9999	9999	Diesel	513	lb	PM	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	3,650	1200	9999	9999	Diesel	891	lb	ROG	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Concrete Boom Pumps	Other Construction Equipment	51	480	500	600	Diesel	92	lb	Nox	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Concrete Boom Pumps	Other Construction Equipment	51	480	500	600	Diesel	3.4	lb	PM	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Concrete Boom Pumps	Other Construction Equipment	51	480	500	600	Diesel	6.9	lb	ROG	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Concrete Boom Pumps	Other Construction Equipment	3,346	480	500	600	Diesel	6,015	lb	Nox	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Concrete Boom Pumps	Other Construction Equipment	3,346	480	500	600	Diesel	222	lb	PM	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Concrete Boom Pumps	Other Construction Equipment	3,346	480	500	600	Diesel	452	lb	ROG	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	112	530	750	600	Diesel	163	lb	Nox	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	112	530	750	600	Diesel	5.8	lb	PM	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	112	530	750	600	Diesel	11	lb	ROG	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	7,300	530	750	600	Diesel	10,601	lb	Nox	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	7,300	530	750	600	Diesel	376	lb	PM	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	7,300	530	750	600	Diesel	718	lb	ROG	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Cutting and chopping saws	Other Construction Equipment	56	0	50	11	Electric	0	lb	Nox	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Cutting and chopping saws	Other Construction Equipment	56	0	50	11	Electric	0	lb	PM	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Cutting and chopping saws	Other Construction Equipment	56	0	50	11	Electric	0	lb	ROG	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Cutting and chopping saws	Other Construction Equipment	3,650	0	50	11	Electric	0	lb	Nox	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Cutting and chopping saws	Other Construction Equipment	3,650	0	50	11	Electric	0	lb	PM	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Cutting and chopping saws	Other Construction Equipment	3,650	0	50	11	Electric	0	lb	ROG	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Large Forklifts	Forklifts	56	93	120	100	Diesel	14	lb	Nox	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Large Forklifts	Forklifts	56	93	120	100	Diesel	1.2	lb	PM	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Large Forklifts	Forklifts	56	93	120	100	Diesel	1.7	lb	ROG	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Large Forklifts	Forklifts	3,650	93	120	100	Diesel	936	lb	Nox	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Large Forklifts	Forklifts	3,650	93	120	100	Diesel	78	lb	PM	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Large Forklifts	Forklifts	3,650	93	120	100	Diesel	109	lb	ROG	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Mobile Cranes	Cranes	56	530	750	600	Diesel	81	lb	Nox	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Mobile Cranes	Cranes	56	530	750	600	Diesel	2.9	lb	PM	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Mobile Cranes	Cranes	56	530	750	600	Diesel	5.5	lb	ROG	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Mobile Cranes	Cranes	3,650	530	750	600	Diesel	5,300	lb	Nox	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Mobile Cranes	Cranes	3,650	530	750	600	Diesel	188	lb	PM	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Mobile Cranes	Cranes	3,650	530	750	600	Diesel	359	lb	ROG	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Saw cutters	Other Construction Equipment	56	0	50	11	Electric	0	lb	Nox	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Saw cutters	Other Construction Equipment	56	0	50	11	Electric	0	lb	PM	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Saw cutters	Other Construction Equipment	56	0	50	11	Electric	0	lb	ROG	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Saw cutters	Other Construction Equipment	3,650	0	50	11	Electric	0	lb	Nox	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Saw cutters	Other Construction Equipment	3,650	0	50	11	Electric	0	lb	PM	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Saw cutters	Other Construction Equipment	3,650	0	50	11	Electric	0	lb	ROG	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Street Sweeper	Sweepers/Scrubbers	12	285	500	300	Diesel	21	lb	Nox	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Street Sweeper	Sweepers/Scrubbers	12	285	500	300	Diesel	0.91	lb	PM	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Street Sweeper	Sweepers/Scrubbers	12	285	500	300	Diesel	1.6	lb	ROG	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Street Sweeper	Sweepers/Scrubbers	782	285	500	300	Diesel	1,360	lb	Nox	OFFROAD	0
1	1	Pile Installation & Deck Reconstruction	Street Sweeper	Sweepers/Scrubbers	782	285	500	300	Diesel	59	lb	PM	OFFROAD	0

Piers 30-32 and SWL 330 Uncontrolled Offroad Equipment Activities and Emissions

Construction Year	Phase ID	Phase	Project Equipment	OFFROAD Equipment	Total Hours	HP	OFFROAD HP Bin	Tier HP Bin	Fuel	Emissions	Units	Pollutant	Engine Tier Uncontrolled	DPF Uncontrolled
1	1	Pile Installation & Deck Reconstruction	Street Sweeper	Sweepers/Scrubbers	782	285	500	300	Diesel	106	lb	ROG	OFFROAD	0
1	2	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	973	480	500	600	Diesel	1,750	lb	Nox	OFFROAD	0
1	2	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	973	480	500	600	Diesel	64	lb	PM	OFFROAD	0
1	2	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	973	480	500	600	Diesel	132	lb	ROG	OFFROAD	0
1	2	Building Construction (including arena)	Crawler Cranes	Cranes	2,129	530	750	600	Diesel	3,092	lb	Nox	OFFROAD	0
1	2	Building Construction (including arena)	Crawler Cranes	Cranes	2,129	530	750	600	Diesel	110	lb	PM	OFFROAD	0
1	2	Building Construction (including arena)	Crawler Cranes	Cranes	2,129	530	750	600	Diesel	209	lb	ROG	OFFROAD	0
1	2	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	11,406	0	50	11	Electric	0	lb	Nox	OFFROAD	0
1	2	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	11,406	0	50	11	Electric	0	lb	PM	OFFROAD	0
1	2	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	11,406	0	50	11	Electric	0	lb	ROG	OFFROAD	0
1	2	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	19,010	0	50	11	Electric	0	lb	Nox	OFFROAD	0
1	2	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	19,010	0	50	11	Electric	0	lb	PM	OFFROAD	0
1	2	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	19,010	0	50	11	Electric	0	lb	ROG	OFFROAD	0
1	2	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	10,950	93	120	100	Diesel	2,808	lb	Nox	OFFROAD	0
1	2	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	10,950	93	120	100	Diesel	235	lb	PM	OFFROAD	0
1	2	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	10,950	93	120	100	Diesel	326	lb	ROG	OFFROAD	0
1	2	Building Construction (including arena)	Mobile Cranes	Cranes	2,920	530	750	600	Diesel	4,240	lb	Nox	OFFROAD	0
1	2	Building Construction (including arena)	Mobile Cranes	Cranes	2,920	530	750	600	Diesel	150	lb	PM	OFFROAD	0
1	2	Building Construction (including arena)	Mobile Cranes	Cranes	2,920	530	750	600	Diesel	287	lb	ROG	OFFROAD	0
1	2	Building Construction (including arena)	Street Sweeper	Sweepers/Scrubbers	521	285	500	300	Diesel	906	lb	Nox	OFFROAD	0
1	2	Building Construction (including arena)	Street Sweeper	Sweepers/Scrubbers	521	285	500	300	Diesel	40	lb	PM	OFFROAD	0
1	2	Building Construction (including arena)	Street Sweeper	Sweepers/Scrubbers	521	285	500	300	Diesel	71	lb	ROG	OFFROAD	0
1	2	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	4,563	0	50	11	Electric	0	lb	Nox	OFFROAD	0
1	2	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	4,563	0	50	11	Electric	0	lb	PM	OFFROAD	0
1	2	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	4,563	0	50	11	Electric	0	lb	ROG	OFFROAD	0
1	3	Demolition	CAT 300 series excavator	Excavators	174	404	500	600	Diesel	148	lb	Nox	OFFROAD	0
1	3	Demolition	CAT 300 series excavator	Excavators	174	404	500	600	Diesel	4.8	lb	PM	OFFROAD	0
1	3	Demolition	CAT 300 series excavator	Excavators	174	404	500	600	Diesel	12	lb	ROG	OFFROAD	0
1	3	Demolition	Street Sweeper	Sweepers/Scrubbers	174	285	500	300	Diesel	303	lb	Nox	OFFROAD	0
1	3	Demolition	Street Sweeper	Sweepers/Scrubbers	174	285	500	300	Diesel	13	lb	PM	OFFROAD	0
1	3	Demolition	Street Sweeper	Sweepers/Scrubbers	174	285	500	300	Diesel	24	lb	ROG	OFFROAD	0
1	4	Shoring	Drill Rig	Bore/Drill Rigs	521	1205	9999	9999	Diesel	2,986	lb	Nox	OFFROAD	0
1	4	Shoring	Drill Rig	Bore/Drill Rigs	521	1205	9999	9999	Diesel	74	lb	PM	OFFROAD	0
1	4	Shoring	Drill Rig	Bore/Drill Rigs	521	1205	9999	9999	Diesel	131	lb	ROG	OFFROAD	0
1	4	Shoring	Grout-mixing plant	Other Material Handling Equipment	521	24	50	25	Diesel	61	lb	Nox	OFFROAD	0
1	4	Shoring	Grout-mixing plant	Other Material Handling Equipment	521	24	50	25	Diesel	6.0	lb	PM	OFFROAD	0
1	4	Shoring	Grout-mixing plant	Other Material Handling Equipment	521	24	50	25	Diesel	18	lb	ROG	OFFROAD	0
1	4	Shoring	Small Excavator	Excavators	521	404	500	600	Diesel	445	lb	Nox	OFFROAD	0
1	4	Shoring	Small Excavator	Excavators	521	404	500	600	Diesel	14	lb	PM	OFFROAD	0
1	4	Shoring	Small Excavator	Excavators	521	404	500	600	Diesel	35	lb	ROG	OFFROAD	0
1	4	Shoring	Support Crane	Cranes	521	530	750	600	Diesel	730	lb	Nox	OFFROAD	0
1	4	Shoring	Support Crane	Cranes	521	530	750	600	Diesel	26	lb	PM	OFFROAD	0
1	4	Shoring	Support Crane	Cranes	521	530	750	600	Diesel	50	lb	ROG	OFFROAD	0
1	4	Shoring (Pile-driving)	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	1,217	1200	9999	9999	Diesel	6,939	lb	Nox	OFFROAD	0
1	4	Shoring (Pile-driving)	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	1,217	1200	9999	9999	Diesel	173	lb	PM	OFFROAD	0
1	4	Shoring (Pile-driving)	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	1,217	1200	9999	9999	Diesel	304	lb	ROG	OFFROAD	0
1	4	Shoring (Pile-driving)	Concrete Boom Pumps	Other Construction Equipment	1,217	480	500	600	Diesel	2,020	lb	Nox	OFFROAD	0
1	4	Shoring (Pile-driving)	Concrete Boom Pumps	Other Construction Equipment	1,217	480	500	600	Diesel	74	lb	PM	OFFROAD	0
1	4	Shoring (Pile-driving)	Concrete Boom Pumps	Other Construction Equipment	1,217	480	500	600	Diesel	155	lb	ROG	OFFROAD	0
1	4	Shoring (Pile-driving)	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	2,433	530	750	600	Diesel	3,406	lb	Nox	OFFROAD	0
1	4	Shoring (Pile-driving)	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	2,433	530	750	600	Diesel	120	lb	PM	OFFROAD	0
1	4	Shoring (Pile-driving)	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	2,433	530	750	600	Diesel	235	lb	ROG	OFFROAD	0
1	4	Shoring (Pile-driving)	Cutting and chopping saws	Other Construction Equipment	1,217	0	50	11	Electric	0	lb	Nox	OFFROAD	0
1	4	Shoring (Pile-driving)	Cutting and chopping saws	Other Construction Equipment	1,217	0	50	11	Electric	0	lb	PM	OFFROAD	0
1	4	Shoring (Pile-driving)	Cutting and chopping saws	Other Construction Equipment	1,217	0	50	11	Electric	0	lb	ROG	OFFROAD	0
1	4	Shoring (Pile-driving)	Large Forklifts	Forklifts	1,217	93	120	100	Diesel	292	lb	Nox	OFFROAD	0
1	4	Shoring (Pile-driving)	Large Forklifts	Forklifts	1,217	93	120	100	Diesel	24	lb	PM	OFFROAD	0
1	4	Shoring (Pile-driving)	Large Forklifts	Forklifts	1,217	93	120	100	Diesel	34	lb	ROG	OFFROAD	0
1	4	Shoring (Pile-driving)	Mobile Cranes	Cranes	1,217	530	750	600	Diesel	1,703	lb	Nox	OFFROAD	0

Piers 30-32 and SWL 330 Uncontrolled Offroad Equipment Activities and Emissions

Construction Year	Phase ID	Phase	Project Equipment	OFFROAD Equipment	Total Hours	HP	OFFROAD HP Bin	Tier HP Bin	Fuel	Emissions	Units	Pollutant	Engine Tier Uncontrolled	DPF Uncontrolled
1	4	Shoring (Pile-driving)	Mobile Cranes	Cranes	1,217	530	750	600	Diesel	60	lb	PM	OFFROAD	0
1	4	Shoring (Pile-driving)	Mobile Cranes	Cranes	1,217	530	750	600	Diesel	117	lb	ROG	OFFROAD	0
1	4	Shoring (Pile-driving)	Saw cutters	Other Construction Equipment	1,217	0	50	11	Electric	0	lb	Nox	OFFROAD	0
1	4	Shoring (Pile-driving)	Saw cutters	Other Construction Equipment	1,217	0	50	11	Electric	0	lb	PM	OFFROAD	0
1	4	Shoring (Pile-driving)	Saw cutters	Other Construction Equipment	1,217	0	50	11	Electric	0	lb	ROG	OFFROAD	0
1	4	Shoring (Pile-driving)	Street Sweeper	Sweepers/Scrubbers	261	285	500	300	Diesel	454	lb	Nox	OFFROAD	0
1	4	Shoring (Pile-driving)	Street Sweeper	Sweepers/Scrubbers	261	285	500	300	Diesel	20	lb	PM	OFFROAD	0
1	4	Shoring (Pile-driving)	Street Sweeper	Sweepers/Scrubbers	261	285	500	300	Diesel	36	lb	ROG	OFFROAD	0
1	5	Mass Excavation	CAT 600 Excavator	Excavators	521	404	500	600	Diesel	445	lb	Nox	OFFROAD	0
1	5	Mass Excavation	CAT 600 Excavator	Excavators	521	404	500	600	Diesel	14	lb	PM	OFFROAD	0
1	5	Mass Excavation	CAT 600 Excavator	Excavators	521	404	500	600	Diesel	35	lb	ROG	OFFROAD	0
1	5	Mass Excavation	D6 or equivalent dozer	Rubber Tired Dozers	521	235	250	300	Diesel	819	lb	Nox	OFFROAD	0
1	5	Mass Excavation	D6 or equivalent dozer	Rubber Tired Dozers	521	235	250	300	Diesel	40	lb	PM	OFFROAD	0
1	5	Mass Excavation	D6 or equivalent dozer	Rubber Tired Dozers	521	235	250	300	Diesel	75	lb	ROG	OFFROAD	0
1	6	Building Construction	Concrete Boom Pumps	Other Construction Equipment	695	480	500	600	Diesel	1,154	lb	Nox	OFFROAD	0
1	6	Building Construction	Concrete Boom Pumps	Other Construction Equipment	695	480	500	600	Diesel	42	lb	PM	OFFROAD	0
1	6	Building Construction	Concrete Boom Pumps	Other Construction Equipment	695	480	500	600	Diesel	89	lb	ROG	OFFROAD	0
1	6	Building Construction	Gradall-type Forklifts	Forklifts	608	230	250	300	Diesel	357	lb	Nox	OFFROAD	0
1	6	Building Construction	Gradall-type Forklifts	Forklifts	608	230	250	300	Diesel	16	lb	PM	OFFROAD	0
1	6	Building Construction	Gradall-type Forklifts	Forklifts	608	230	250	300	Diesel	31	lb	ROG	OFFROAD	0
1	6	Building Construction	Manlifts	Forklifts	1,217	51	120	75	Diesel	160	lb	Nox	OFFROAD	0
1	6	Building Construction	Manlifts	Forklifts	1,217	51	120	75	Diesel	13	lb	PM	OFFROAD	0
1	6	Building Construction	Manlifts	Forklifts	1,217	51	120	75	Diesel	18	lb	ROG	OFFROAD	0
1	6	Building Construction	Tower cranes	Cranes	695	530	750	600	Diesel	973	lb	Nox	OFFROAD	0
1	6	Building Construction	Tower cranes	Cranes	695	530	750	600	Diesel	34	lb	PM	OFFROAD	0
1	6	Building Construction	Tower cranes	Cranes	695	530	750	600	Diesel	67	lb	ROG	OFFROAD	0
2	2	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	1,460	480	500	600	Diesel	2,625	lb	Nox	OFFROAD	0
2	2	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	1,460	480	500	600	Diesel	97	lb	PM	OFFROAD	0
2	2	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	1,460	480	500	600	Diesel	197	lb	ROG	OFFROAD	0
2	2	Building Construction (including arena)	Crawler Cranes	Cranes	1,825	530	750	600	Diesel	2,650	lb	Nox	OFFROAD	0
2	2	Building Construction (including arena)	Crawler Cranes	Cranes	1,825	530	750	600	Diesel	94	lb	PM	OFFROAD	0
2	2	Building Construction (including arena)	Crawler Cranes	Cranes	1,825	530	750	600	Diesel	180	lb	ROG	OFFROAD	0
2	2	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	20,531	0	50	11	Electric	0	lb	Nox	OFFROAD	0
2	2	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	20,531	0	50	11	Electric	0	lb	PM	OFFROAD	0
2	2	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	20,531	0	50	11	Electric	0	lb	ROG	OFFROAD	0
2	2	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	30,417	0	50	11	Electric	0	lb	Nox	OFFROAD	0
2	2	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	30,417	0	50	11	Electric	0	lb	PM	OFFROAD	0
2	2	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	30,417	0	50	11	Electric	0	lb	ROG	OFFROAD	0
2	2	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	14,600	93	120	100	Diesel	3,744	lb	Nox	OFFROAD	0
2	2	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	14,600	93	120	100	Diesel	313	lb	PM	OFFROAD	0
2	2	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	14,600	93	120	100	Diesel	435	lb	ROG	OFFROAD	0
2	2	Building Construction (including arena)	Mobile Cranes	Cranes	4,380	530	750	600	Diesel	6,361	lb	Nox	OFFROAD	0
2	2	Building Construction (including arena)	Mobile Cranes	Cranes	4,380	530	750	600	Diesel	225	lb	PM	OFFROAD	0
2	2	Building Construction (including arena)	Mobile Cranes	Cranes	4,380	530	750	600	Diesel	431	lb	ROG	OFFROAD	0
2	2	Building Construction (including arena)	Street Sweeper	Sweepers/Scrubbers	782	285	500	300	Diesel	1,360	lb	Nox	OFFROAD	0
2	2	Building Construction (including arena)	Street Sweeper	Sweepers/Scrubbers	782	285	500	300	Diesel	59	lb	PM	OFFROAD	0
2	2	Building Construction (including arena)	Street Sweeper	Sweepers/Scrubbers	782	285	500	300	Diesel	106	lb	ROG	OFFROAD	0
2	2	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	13,688	0	50	11	Electric	0	lb	Nox	OFFROAD	0
2	2	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	13,688	0	50	11	Electric	0	lb	PM	OFFROAD	0
2	2	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	13,688	0	50	11	Electric	0	lb	ROG	OFFROAD	0
2	6	Building Construction	Concrete Boom Pumps	Other Construction Equipment	4,171	480	500	600	Diesel	6,926	lb	Nox	OFFROAD	0
2	6	Building Construction	Concrete Boom Pumps	Other Construction Equipment	4,171	480	500	600	Diesel	253	lb	PM	OFFROAD	0
2	6	Building Construction	Concrete Boom Pumps	Other Construction Equipment	4,171	480	500	600	Diesel	531	lb	ROG	OFFROAD	0
2	6	Building Construction	Gradall-type Forklifts	Forklifts	3,650	230	250	300	Diesel	2,139	lb	Nox	OFFROAD	0
2	6	Building Construction	Gradall-type Forklifts	Forklifts	3,650	230	250	300	Diesel	94	lb	PM	OFFROAD	0
2	6	Building Construction	Gradall-type Forklifts	Forklifts	3,650	230	250	300	Diesel	184	lb	ROG	OFFROAD	0
2	6	Building Construction	Manlifts	Forklifts	7,300	51	120	75	Diesel	960	lb	Nox	OFFROAD	0
2	6	Building Construction	Manlifts	Forklifts	7,300	51	120	75	Diesel	79	lb	PM	OFFROAD	0
2	6	Building Construction	Manlifts	Forklifts	7,300	51	120	75	Diesel	111	lb	ROG	OFFROAD	0

Piers 30-32 and SWL 330 Uncontrolled Offroad Equipment Activities and Emissions

Construction Year	Phase ID	Phase	Project Equipment	OFFROAD Equipment	Total Hours	HP	OFFROAD HP Bin	Tier HP Bin	Fuel	Emissions	Units	Pollutant	Engine Tier Uncontrolled	DPF Uncontrolled
2	6	Building Construction	Tower cranes	Cranes	4,171	530	750	600	Diesel	5,839	lb	Nox	OFFROAD	0
2	6	Building Construction	Tower cranes	Cranes	4,171	530	750	600	Diesel	207	lb	PM	OFFROAD	0
2	6	Building Construction	Tower cranes	Cranes	4,171	530	750	600	Diesel	403	lb	ROG	OFFROAD	0
3	2	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	243	480	500	600	Diesel	437	lb	Nox	OFFROAD	0
3	2	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	243	480	500	600	Diesel	16	lb	PM	OFFROAD	0
3	2	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	243	480	500	600	Diesel	33	lb	ROG	OFFROAD	0
3	2	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	2,433	93	120	100	Diesel	624	lb	Nox	OFFROAD	0
3	2	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	2,433	93	120	100	Diesel	52	lb	PM	OFFROAD	0
3	2	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	2,433	93	120	100	Diesel	72	lb	ROG	OFFROAD	0
3	2	Building Construction (including arena)	Mobile Cranes	Cranes	730	530	750	600	Diesel	1,060	lb	Nox	OFFROAD	0
3	2	Building Construction (including arena)	Mobile Cranes	Cranes	730	530	750	600	Diesel	38	lb	PM	OFFROAD	0
3	2	Building Construction (including arena)	Mobile Cranes	Cranes	730	530	750	600	Diesel	72	lb	ROG	OFFROAD	0
3	2	Building Construction (including arena)	Street Sweeper	Sweepers/Scrubbers	130	285	500	300	Diesel	227	lb	Nox	OFFROAD	0
3	2	Building Construction (including arena)	Street Sweeper	Sweepers/Scrubbers	130	285	500	300	Diesel	10	lb	PM	OFFROAD	0
3	2	Building Construction (including arena)	Street Sweeper	Sweepers/Scrubbers	130	285	500	300	Diesel	18	lb	ROG	OFFROAD	0
3	6	Building Construction	Concrete Boom Pumps	Other Construction Equipment	1,043	480	500	600	Diesel	1,731	lb	Nox	OFFROAD	0
3	6	Building Construction	Concrete Boom Pumps	Other Construction Equipment	1,043	480	500	600	Diesel	63	lb	PM	OFFROAD	0
3	6	Building Construction	Concrete Boom Pumps	Other Construction Equipment	1,043	480	500	600	Diesel	133	lb	ROG	OFFROAD	0
3	6	Building Construction	Gradall-type Forklifts	Forklifts	913	230	250	300	Diesel	535	lb	Nox	OFFROAD	0
3	6	Building Construction	Gradall-type Forklifts	Forklifts	913	230	250	300	Diesel	23	lb	PM	OFFROAD	0
3	6	Building Construction	Gradall-type Forklifts	Forklifts	913	230	250	300	Diesel	46	lb	ROG	OFFROAD	0
3	6	Building Construction	Manlifts	Forklifts	1,825	51	120	75	Diesel	240	lb	Nox	OFFROAD	0
3	6	Building Construction	Manlifts	Forklifts	1,825	51	120	75	Diesel	20	lb	PM	OFFROAD	0
3	6	Building Construction	Manlifts	Forklifts	1,825	51	120	75	Diesel	28	lb	ROG	OFFROAD	0
3	6	Building Construction	Tower cranes	Cranes	1,043	530	750	600	Diesel	1,460	lb	Nox	OFFROAD	0
3	6	Building Construction	Tower cranes	Cranes	1,043	530	750	600	Diesel	52	lb	PM	OFFROAD	0
3	6	Building Construction	Tower cranes	Cranes	1,043	530	750	600	Diesel	101	lb	ROG	OFFROAD	0
3	7	Paving	Other Material Handling Equipment	Other Material Handling Equipment	174	9	50	11	Diesel	7.1	lb	Nox	OFFROAD	0
3	7	Paving	Other Material Handling Equipment	Other Material Handling Equipment	174	9	50	11	Diesel	0.62	lb	PM	OFFROAD	0
3	7	Paving	Other Material Handling Equipment	Other Material Handling Equipment	174	9	50	11	Diesel	1.8	lb	ROG	OFFROAD	0
3	7	Paving	Pavers	Pavers	174	125	175	175	Diesel	75	lb	Nox	OFFROAD	0
3	7	Paving	Pavers	Pavers	174	125	175	175	Diesel	3.6	lb	PM	OFFROAD	0
3	7	Paving	Pavers	Pavers	174	125	175	175	Diesel	6.7	lb	ROG	OFFROAD	0
3	7	Paving	Paving Equipment	Paving Equipment	174	130	175	175	Diesel	56	lb	Nox	OFFROAD	0
3	7	Paving	Paving Equipment	Paving Equipment	174	130	175	175	Diesel	2.7	lb	PM	OFFROAD	0
3	7	Paving	Paving Equipment	Paving Equipment	174	130	175	175	Diesel	5.0	lb	ROG	OFFROAD	0
3	7	Paving	Rollers	Rollers	348	80	120	100	Diesel	107	lb	Nox	OFFROAD	0
3	7	Paving	Rollers	Rollers	348	80	120	100	Diesel	7.4	lb	PM	OFFROAD	0
3	7	Paving	Rollers	Rollers	348	80	120	100	Diesel	11	lb	ROG	OFFROAD	0
3	7	Paving	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	174	97	120	100	Diesel	57	lb	Nox	OFFROAD	0
3	7	Paving	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	174	97	120	100	Diesel	4.0	lb	PM	OFFROAD	0
3	7	Paving	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	174	97	120	100	Diesel	5.8	lb	ROG	OFFROAD	0
3	8	Architectural Coating	Other Construction Equipment	Other Construction Equipment	130	78	120	100	Diesel	51	lb	Nox	OFFROAD	0
3	8	Architectural Coating	Other Construction Equipment	Other Construction Equipment	130	78	120	100	Diesel	3.9	lb	PM	OFFROAD	0
3	8	Architectural Coating	Other Construction Equipment	Other Construction Equipment	130	78	120	100	Diesel	5.6	lb	ROG	OFFROAD	0

Piers 30-32 and SWL 330 Controlled Offroad Equipment Activities and Emissions (Tier 3 + DPF)

Construction Year	Phase ID	Phase	Project Equipment	OFFROAD Equipment	Total Hours	HP	OFFROAD HP Bin	Tier HP Bin	Fuel	Emissions	Units	Pollutant	Engine Tier Controlled	DPF Controlled
1	1	Pile Installation & Deck Reconstruction	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	7,300	530	750	600	Diesel	37	lb	HC	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	7,300	530	750	600	Diesel	7,004	lb	Nox	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	7,300	530	750	600	Diesel	55	lb	PM	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Cutting and chopping saws	Other Construction Equipment	56	0	50	11	Electric	0	lb	HC	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Cutting and chopping saws	Other Construction Equipment	56	0	50	11	Electric	0	lb	Nox	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Cutting and chopping saws	Other Construction Equipment	56	0	50	11	Electric	0	lb	PM	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Cutting and chopping saws	Other Construction Equipment	3,650	0	50	11	Electric	0	lb	HC	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Cutting and chopping saws	Other Construction Equipment	3,650	0	50	11	Electric	0	lb	Nox	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Cutting and chopping saws	Other Construction Equipment	3,650	0	50	11	Electric	0	lb	PM	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Large Forklifts	Forklifts	56	93	120	100	Diesel	0.041	lb	HC	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Large Forklifts	Forklifts	56	93	120	100	Diesel	7.7	lb	Nox	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Large Forklifts	Forklifts	56	93	120	100	Diesel	0.10	lb	PM	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Large Forklifts	Forklifts	3,650	93	120	100	Diesel	2.7	lb	HC	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Large Forklifts	Forklifts	3,650	93	120	100	Diesel	500	lb	Nox	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Large Forklifts	Forklifts	3,650	93	120	100	Diesel	6.8	lb	PM	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Mobile Cranes	Cranes	56	530	750	600	Diesel	0.29	lb	HC	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Mobile Cranes	Cranes	56	530	750	600	Diesel	54	lb	Nox	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Mobile Cranes	Cranes	56	530	750	600	Diesel	0.42	lb	PM	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Mobile Cranes	Cranes	3,650	530	750	600	Diesel	19	lb	HC	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Mobile Cranes	Cranes	3,650	530	750	600	Diesel	3,502	lb	Nox	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Mobile Cranes	Cranes	3,650	530	750	600	Diesel	28	lb	PM	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Saw cutters	Other Construction Equipment	56	0	50	11	Electric	0	lb	HC	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Saw cutters	Other Construction Equipment	56	0	50	11	Electric	0	lb	Nox	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Saw cutters	Other Construction Equipment	56	0	50	11	Electric	0	lb	PM	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Saw cutters	Other Construction Equipment	3,650	0	50	11	Electric	0	lb	HC	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Saw cutters	Other Construction Equipment	3,650	0	50	11	Electric	0	lb	Nox	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Saw cutters	Other Construction Equipment	3,650	0	50	11	Electric	0	lb	PM	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Street Sweeper	Sweepers/Scrubbers	12	285	500	300	Diesel	0.052	lb	HC	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Street Sweeper	Sweepers/Scrubbers	12	285	500	300	Diesel	10	lb	Nox	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Street Sweeper	Sweepers/Scrubbers	12	285	500	300	Diesel	0.077	lb	PM	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Street Sweeper	Sweepers/Scrubbers	782	285	500	300	Diesel	3.4	lb	HC	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Street Sweeper	Sweepers/Scrubbers	782	285	500	300	Diesel	638	lb	Nox	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Street Sweeper	Sweepers/Scrubbers	782	285	500	300	Diesel	5.0	lb	PM	Tier 3	1
1	2	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	973	480	500	600	Diesel	6.5	lb	HC	Tier 3	1
1	2	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	973	480	500	600	Diesel	1,219	lb	Nox	Tier 3	1
1	2	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	973	480	500	600	Diesel	10	lb	PM	Tier 3	1
1	2	Building Construction (including arena)	Crawler Cranes	Cranes	2,129	530	750	600	Diesel	11	lb	HC	Tier 3	1
1	2	Building Construction (including arena)	Crawler Cranes	Cranes	2,129	530	750	600	Diesel	2,043	lb	Nox	Tier 3	1
1	2	Building Construction (including arena)	Crawler Cranes	Cranes	2,129	530	750	600	Diesel	16	lb	PM	Tier 3	1
1	2	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	11,406	0	50	11	Electric	0	lb	HC	Tier 3	1
1	2	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	11,406	0	50	11	Electric	0	lb	Nox	Tier 3	1
1	2	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	11,406	0	50	11	Electric	0	lb	PM	Tier 3	1
1	2	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	19,010	0	50	11	Electric	0	lb	HC	Tier 3	1
1	2	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	19,010	0	50	11	Electric	0	lb	Nox	Tier 3	1
1	2	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	19,010	0	50	11	Electric	0	lb	PM	Tier 3	1
1	2	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	10,950	93	120	100	Diesel	8.0	lb	HC	Tier 3	1
1	2	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	10,950	93	120	100	Diesel	1,500	lb	Nox	Tier 3	1
1	2	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	10,950	93	120	100	Diesel	20	lb	PM	Tier 3	1
1	2	Building Construction (including arena)	Mobile Cranes	Cranes	2,920	530	750	600	Diesel	15	lb	HC	Tier 3	1
1	2	Building Construction (including arena)	Mobile Cranes	Cranes	2,920	530	750	600	Diesel	2,801	lb	Nox	Tier 3	1
1	2	Building Construction (including arena)	Mobile Cranes	Cranes	2,920	530	750	600	Diesel	22	lb	PM	Tier 3	1
1	2	Building Construction (including arena)	Street Sweeper	Sweepers/Scrubbers	521	285	500	300	Diesel	2.3	lb	HC	Tier 3	1
1	2	Building Construction (including arena)	Street Sweeper	Sweepers/Scrubbers	521	285	500	300	Diesel	425	lb	Nox	Tier 3	1
1	2	Building Construction (including arena)	Street Sweeper	Sweepers/Scrubbers	521	285	500	300	Diesel	3.4	lb	PM	Tier 3	1
1	2	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	4,563	0	50	11	Electric	0	lb	HC	Tier 3	1
1	2	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	4,563	0	50	11	Electric	0	lb	Nox	Tier 3	1
1	2	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	4,563	0	50	11	Electric	0	lb	PM	Tier 3	1
1	3	Demolition	CAT 300 series excavator	Excavators	174	404	500	600	Diesel	0.90	lb	HC	Tier 3	1
1	3	Demolition	CAT 300 series excavator	Excavators	174	404	500	600	Diesel	168	lb	Nox	Tier 3	1
1	3	Demolition	CAT 300 series excavator	Excavators	174	404	500	600	Diesel	1.3	lb	PM	Tier 3	1

Piers 30-32 and SWL 330 Controlled Offroad Equipment Activities and Emissions (Tier 3 + DPF)

Construction Year	Phase ID	Phase	Project Equipment	OFFROAD Equipment	Total Hours	HP	OFFROAD HP Bin	Tier HP Bin	Fuel	Emissions	Units	Pollutant	Engine Tier Controlled	DPF Controlled
1	3	Demolition	Street Sweeper	Sweepers/Scrubbers	174	285	500	300	Diesel	0.76	lb	HC	Tier 3	1
1	3	Demolition	Street Sweeper	Sweepers/Scrubbers	174	285	500	300	Diesel	142	lb	Nox	Tier 3	1
1	3	Demolition	Street Sweeper	Sweepers/Scrubbers	174	285	500	300	Diesel	1.1	lb	PM	Tier 3	1
1	4	Shoring	Drill Rig	Bore/Drill Rigs	521	1205	9999	9999	Diesel	17	lb	HC	Tier 3	1
1	4	Shoring	Drill Rig	Bore/Drill Rigs	521	1205	9999	9999	Diesel	3,174	lb	Nox	Tier 3	1
1	4	Shoring	Drill Rig	Bore/Drill Rigs	521	1205	9999	9999	Diesel	16	lb	PM	Tier 3	1
1	4	Shoring	Grout-mixing plant	Other Material Handling Equipment	521	24	50	25	Diesel	0.31	lb	HC	Tier 3	1
1	4	Shoring	Grout-mixing plant	Other Material Handling Equipment	521	24	50	25	Diesel	58	lb	Nox	Tier 3	1
1	4	Shoring	Grout-mixing plant	Other Material Handling Equipment	521	24	50	25	Diesel	1.0	lb	PM	Tier 3	1
1	4	Shoring	Small Excavator	Excavators	521	404	500	600	Diesel	2.7	lb	HC	Tier 3	1
1	4	Shoring	Small Excavator	Excavators	521	404	500	600	Diesel	505	lb	Nox	Tier 3	1
1	4	Shoring	Small Excavator	Excavators	521	404	500	600	Diesel	4.0	lb	PM	Tier 3	1
1	4	Shoring	Support Crane	Cranes	521	530	750	600	Diesel	2.7	lb	HC	Tier 3	1
1	4	Shoring	Support Crane	Cranes	521	530	750	600	Diesel	500	lb	Nox	Tier 3	1
1	4	Shoring	Support Crane	Cranes	521	530	750	600	Diesel	3.9	lb	PM	Tier 3	1
1	4	Shoring (Pile-driving)	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	1,217	1200	9999	9999	Diesel	39	lb	HC	Tier 3	1
1	4	Shoring (Pile-driving)	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	1,217	1200	9999	9999	Diesel	7,375	lb	Nox	Tier 3	1
1	4	Shoring (Pile-driving)	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	1,217	1200	9999	9999	Diesel	36	lb	PM	Tier 3	1
1	4	Shoring (Pile-driving)	Concrete Boom Pumps	Other Construction Equipment	1,217	480	500	600	Diesel	8.2	lb	HC	Tier 3	1
1	4	Shoring (Pile-driving)	Concrete Boom Pumps	Other Construction Equipment	1,217	480	500	600	Diesel	1,524	lb	Nox	Tier 3	1
1	4	Shoring (Pile-driving)	Concrete Boom Pumps	Other Construction Equipment	1,217	480	500	600	Diesel	12	lb	PM	Tier 3	1
1	4	Shoring (Pile-driving)	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	2,433	530	750	600	Diesel	12	lb	HC	Tier 3	1
1	4	Shoring (Pile-driving)	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	2,433	530	750	600	Diesel	2,335	lb	Nox	Tier 3	1
1	4	Shoring (Pile-driving)	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	2,433	530	750	600	Diesel	18	lb	PM	Tier 3	1
1	4	Shoring (Pile-driving)	Cutting and chopping saws	Other Construction Equipment	1,217	0	50	11	Electric	0	lb	HC	Tier 3	1
1	4	Shoring (Pile-driving)	Cutting and chopping saws	Other Construction Equipment	1,217	0	50	11	Electric	0	lb	Nox	Tier 3	1
1	4	Shoring (Pile-driving)	Cutting and chopping saws	Other Construction Equipment	1,217	0	50	11	Electric	0	lb	PM	Tier 3	1
1	4	Shoring (Pile-driving)	Large Forklifts	Forklifts	1,217	93	120	100	Diesel	0.89	lb	HC	Tier 3	1
1	4	Shoring (Pile-driving)	Large Forklifts	Forklifts	1,217	93	120	100	Diesel	167	lb	Nox	Tier 3	1
1	4	Shoring (Pile-driving)	Large Forklifts	Forklifts	1,217	93	120	100	Diesel	2.3	lb	PM	Tier 3	1
1	4	Shoring (Pile-driving)	Mobile Cranes	Cranes	1,217	530	750	600	Diesel	6.2	lb	HC	Tier 3	1
1	4	Shoring (Pile-driving)	Mobile Cranes	Cranes	1,217	530	750	600	Diesel	1,167	lb	Nox	Tier 3	1
1	4	Shoring (Pile-driving)	Mobile Cranes	Cranes	1,217	530	750	600	Diesel	9.2	lb	PM	Tier 3	1
1	4	Shoring (Pile-driving)	Saw cutters	Other Construction Equipment	1,217	0	50	11	Electric	0	lb	HC	Tier 3	1
1	4	Shoring (Pile-driving)	Saw cutters	Other Construction Equipment	1,217	0	50	11	Electric	0	lb	Nox	Tier 3	1
1	4	Shoring (Pile-driving)	Saw cutters	Other Construction Equipment	1,217	0	50	11	Electric	0	lb	PM	Tier 3	1
1	4	Shoring (Pile-driving)	Street Sweeper	Sweepers/Scrubbers	261	285	500	300	Diesel	1.1	lb	HC	Tier 3	1
1	4	Shoring (Pile-driving)	Street Sweeper	Sweepers/Scrubbers	261	285	500	300	Diesel	213	lb	Nox	Tier 3	1
1	4	Shoring (Pile-driving)	Street Sweeper	Sweepers/Scrubbers	261	285	500	300	Diesel	1.7	lb	PM	Tier 3	1
1	5	Mass Excavation	CAT 600 Excavator	Excavators	521	404	500	600	Diesel	2.7	lb	HC	Tier 3	1
1	5	Mass Excavation	CAT 600 Excavator	Excavators	521	404	500	600	Diesel	505	lb	Nox	Tier 3	1
1	5	Mass Excavation	CAT 600 Excavator	Excavators	521	404	500	600	Diesel	4.0	lb	PM	Tier 3	1
1	0	Indicator Pile Program	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	304	1200	9999	9999	Diesel	10	lb	HC	Tier 3	1
1	0	Indicator Pile Program	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	304	1200	9999	9999	Diesel	1,844	lb	Nox	Tier 3	1
1	0	Indicator Pile Program	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	304	1200	9999	9999	Diesel	9.1	lb	PM	Tier 3	1
1	0	Indicator Pile Program	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	456	530	750	600	Diesel	2.3	lb	HC	Tier 3	1
1	0	Indicator Pile Program	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	456	530	750	600	Diesel	438	lb	Nox	Tier 3	1
1	0	Indicator Pile Program	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	456	530	750	600	Diesel	3.5	lb	PM	Tier 3	1
1	0	Indicator Pile Program	Large Forklifts	Forklifts	456	93	120	100	Diesel	0.33	lb	HC	Tier 3	1
1	0	Indicator Pile Program	Large Forklifts	Forklifts	456	93	120	100	Diesel	63	lb	Nox	Tier 3	1
1	0	Indicator Pile Program	Large Forklifts	Forklifts	456	93	120	100	Diesel	0.85	lb	PM	Tier 3	1
1	0	Indicator Pile Program	Mobile Cranes	Cranes	456	530	750	600	Diesel	2.3	lb	HC	Tier 3	1
1	0	Indicator Pile Program	Mobile Cranes	Cranes	456	530	750	600	Diesel	438	lb	Nox	Tier 3	1
1	0	Indicator Pile Program	Mobile Cranes	Cranes	456	530	750	600	Diesel	3.5	lb	PM	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	56	1200	9999	9999	Diesel	1.8	lb	HC	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	56	1200	9999	9999	Diesel	340	lb	Nox	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	56	1200	9999	9999	Diesel	1.7	lb	PM	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	3,650	1200	9999	9999	Diesel	118	lb	HC	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	3,650	1200	9999	9999	Diesel	22,126	lb	Nox	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	APE 600 Tandem Vibratory Hammer	Bore/Drill Rigs	3,650	1200	9999	9999	Diesel	109	lb	PM	Tier 3	1

Piers 30-32 and SWL 330 Controlled Offroad Equipment Activities and Emissions (Tier 3 + DPF)

Construction Year	Phase ID	Phase	Project Equipment	OFFROAD Equipment	Total Hours	HP	OFFROAD HP Bin	Tier HP Bin	Fuel	Emissions	Units	Pollutant	Engine Tier Controlled	DPF Controlled
1	1	Pile Installation & Deck Reconstruction	Concrete Boom Pumps	Other Construction Equipment	51	480	500	600	Diesel	0.34	lb	HC	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Concrete Boom Pumps	Other Construction Equipment	51	480	500	600	Diesel	64	lb	Nox	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Concrete Boom Pumps	Other Construction Equipment	51	480	500	600	Diesel	0.51	lb	PM	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Concrete Boom Pumps	Other Construction Equipment	3,346	480	500	600	Diesel	22	lb	HC	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Concrete Boom Pumps	Other Construction Equipment	3,346	480	500	600	Diesel	4,192	lb	Nox	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Concrete Boom Pumps	Other Construction Equipment	3,346	480	500	600	Diesel	33	lb	PM	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	112	530	750	600	Diesel	0.58	lb	HC	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	112	530	750	600	Diesel	108	lb	Nox	Tier 3	1
1	1	Pile Installation & Deck Reconstruction	Crawler Cranes (24 & 48 pile set and hammer)	Cranes	112	530	750	600	Diesel	0.85	lb	PM	Tier 3	1
1	5	Mass Excavation	D6 or equivalent dozer	Rubber Tired Dozers	521	235	250	300	Diesel	1.6	lb	HC	Tier 3	1
1	5	Mass Excavation	D6 or equivalent dozer	Rubber Tired Dozers	521	235	250	300	Diesel	304	lb	Nox	Tier 3	1
1	5	Mass Excavation	D6 or equivalent dozer	Rubber Tired Dozers	521	235	250	300	Diesel	2.4	lb	PM	Tier 3	1
1	6	Building Construction	Concrete Boom Pumps	Other Construction Equipment	695	480	500	600	Diesel	4.7	lb	HC	Tier 3	1
1	6	Building Construction	Concrete Boom Pumps	Other Construction Equipment	695	480	500	600	Diesel	871	lb	Nox	Tier 3	1
1	6	Building Construction	Concrete Boom Pumps	Other Construction Equipment	695	480	500	600	Diesel	6.9	lb	PM	Tier 3	1
1	6	Building Construction	Gradall-type Forklifts	Forklifts	608	230	250	300	Diesel	0.95	lb	HC	Tier 3	1
1	6	Building Construction	Gradall-type Forklifts	Forklifts	608	230	250	300	Diesel	177	lb	Nox	Tier 3	1
1	6	Building Construction	Gradall-type Forklifts	Forklifts	608	230	250	300	Diesel	1.4	lb	PM	Tier 3	1
1	6	Building Construction	Manlifts	Forklifts	1,217	51	120	75	Diesel	0.78	lb	HC	Tier 3	1
1	6	Building Construction	Manlifts	Forklifts	1,217	51	120	75	Diesel	146	lb	Nox	Tier 3	1
1	6	Building Construction	Manlifts	Forklifts	1,217	51	120	75	Diesel	1.2	lb	PM	Tier 3	1
1	6	Building Construction	Tower cranes	Cranes	695	530	750	600	Diesel	3.6	lb	HC	Tier 3	1
1	6	Building Construction	Tower cranes	Cranes	695	530	750	600	Diesel	667	lb	Nox	Tier 3	1
1	6	Building Construction	Tower cranes	Cranes	695	530	750	600	Diesel	5.3	lb	PM	Tier 3	1
2	2	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	1,460	480	500	600	Diesel	10	lb	HC	Tier 3	1
2	2	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	1,460	480	500	600	Diesel	1,829	lb	Nox	Tier 3	1
2	2	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	1,460	480	500	600	Diesel	14	lb	PM	Tier 3	1
2	2	Building Construction (including arena)	Crawler Cranes	Cranes	1,825	530	750	600	Diesel	9.4	lb	HC	Tier 3	1
2	2	Building Construction (including arena)	Crawler Cranes	Cranes	1,825	530	750	600	Diesel	1,751	lb	Nox	Tier 3	1
2	2	Building Construction (including arena)	Crawler Cranes	Cranes	1,825	530	750	600	Diesel	14	lb	PM	Tier 3	1
2	2	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	20,531	0	50	11	Electric	0	lb	HC	Tier 3	1
2	2	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	20,531	0	50	11	Electric	0	lb	Nox	Tier 3	1
2	2	Building Construction (including arena)	Cutting/chopping saws	Other Construction Equipment	20,531	0	50	11	Electric	0	lb	PM	Tier 3	1
2	2	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	30,417	0	50	11	Electric	0	lb	HC	Tier 3	1
2	2	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	30,417	0	50	11	Electric	0	lb	Nox	Tier 3	1
2	2	Building Construction (including arena)	Drywall stud impact guns	Other Construction Equipment	30,417	0	50	11	Electric	0	lb	PM	Tier 3	1
2	2	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	14,600	93	120	100	Diesel	11	lb	HC	Tier 3	1
2	2	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	14,600	93	120	100	Diesel	2,001	lb	Nox	Tier 3	1
2	2	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	14,600	93	120	100	Diesel	27	lb	PM	Tier 3	1
2	2	Building Construction (including arena)	Mobile Cranes	Cranes	4,380	530	750	600	Diesel	22	lb	HC	Tier 3	1
2	2	Building Construction (including arena)	Mobile Cranes	Cranes	4,380	530	750	600	Diesel	4,202	lb	Nox	Tier 3	1
2	2	Building Construction (including arena)	Mobile Cranes	Cranes	4,380	530	750	600	Diesel	33	lb	PM	Tier 3	1
2	2	Building Construction (including arena)	Street Sweeper	Sweepers/Scrubbers	782	285	500	300	Diesel	3.4	lb	HC	Tier 3	1
2	2	Building Construction (including arena)	Street Sweeper	Sweepers/Scrubbers	782	285	500	300	Diesel	638	lb	Nox	Tier 3	1
2	2	Building Construction (including arena)	Street Sweeper	Sweepers/Scrubbers	782	285	500	300	Diesel	5.0	lb	PM	Tier 3	1
2	2	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	13,688	0	50	11	Electric	0	lb	HC	Tier 3	1
2	2	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	13,688	0	50	11	Electric	0	lb	Nox	Tier 3	1
2	2	Building Construction (including arena)	Tile cutting saws	Other Construction Equipment	13,688	0	50	11	Electric	0	lb	PM	Tier 3	1
2	6	Building Construction	Concrete Boom Pumps	Other Construction Equipment	4,171	480	500	600	Diesel	28	lb	HC	Tier 3	1
2	6	Building Construction	Concrete Boom Pumps	Other Construction Equipment	4,171	480	500	600	Diesel	5,226	lb	Nox	Tier 3	1
2	6	Building Construction	Concrete Boom Pumps	Other Construction Equipment	4,171	480	500	600	Diesel	41	lb	PM	Tier 3	1
2	6	Building Construction	Gradall-type Forklifts	Forklifts	3,650	230	250	300	Diesel	5.7	lb	HC	Tier 3	1
2	6	Building Construction	Gradall-type Forklifts	Forklifts	3,650	230	250	300	Diesel	1,060	lb	Nox	Tier 3	1
2	6	Building Construction	Gradall-type Forklifts	Forklifts	3,650	230	250	300	Diesel	8.4	lb	PM	Tier 3	1
2	6	Building Construction	Manlifts	Forklifts	7,300	51	120	75	Diesel	4.7	lb	HC	Tier 3	1
2	6	Building Construction	Manlifts	Forklifts	7,300	51	120	75	Diesel	878	lb	Nox	Tier 3	1
2	6	Building Construction	Manlifts	Forklifts	7,300	51	120	75	Diesel	7.4	lb	PM	Tier 3	1
2	6	Building Construction	Tower cranes	Cranes	4,171	530	750	600	Diesel	21	lb	HC	Tier 3	1
2	6	Building Construction	Tower cranes	Cranes	4,171	530	750	600	Diesel	4,002	lb	Nox	Tier 3	1
2	6	Building Construction	Tower cranes	Cranes	4,171	530	750	600	Diesel	32	lb	PM	Tier 3	1

Piers 30-32 and SWL 330 Controlled Offroad Equipment Activities and Emissions (Tier 3 + DPF)

Construction Year	Phase ID	Phase	Project Equipment	OFFROAD Equipment	Total Hours	HP	OFFROAD HP Bin	Tier HP Bin	Fuel	Emissions	Units	Pollutant	Engine Tier Controlled	DPF Controlled
3	2	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	243	480	500	600	Diesel	1.6	lb	HC	Tier 3	1
3	2	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	243	480	500	600	Diesel	305	lb	Nox	Tier 3	1
3	2	Building Construction (including arena)	Concrete Boom Pumps	Other Construction Equipment	243	480	500	600	Diesel	2.4	lb	PM	Tier 3	1
3	2	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	2,433	93	120	100	Diesel	1.8	lb	HC	Tier 3	1
3	2	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	2,433	93	120	100	Diesel	333	lb	Nox	Tier 3	1
3	2	Building Construction (including arena)	Grandall-type Forklifts	Forklifts	2,433	93	120	100	Diesel	4.5	lb	PM	Tier 3	1
3	2	Building Construction (including arena)	Mobile Cranes	Cranes	730	530	750	600	Diesel	3.7	lb	HC	Tier 3	1
3	2	Building Construction (including arena)	Mobile Cranes	Cranes	730	530	750	600	Diesel	700	lb	Nox	Tier 3	1
3	2	Building Construction (including arena)	Mobile Cranes	Cranes	730	530	750	600	Diesel	5.5	lb	PM	Tier 3	1
3	2	Building Construction (including arena)	Street Sweeper	Sweepers/Scrubbers	130	285	500	300	Diesel	0.57	lb	HC	Tier 3	1
3	2	Building Construction (including arena)	Street Sweeper	Sweepers/Scrubbers	130	285	500	300	Diesel	106	lb	Nox	Tier 3	1
3	2	Building Construction (including arena)	Street Sweeper	Sweepers/Scrubbers	130	285	500	300	Diesel	0.84	lb	PM	Tier 3	1
3	6	Building Construction	Concrete Boom Pumps	Other Construction Equipment	1,043	480	500	600	Diesel	7.0	lb	HC	Tier 3	1
3	6	Building Construction	Concrete Boom Pumps	Other Construction Equipment	1,043	480	500	600	Diesel	1,307	lb	Nox	Tier 3	1
3	6	Building Construction	Concrete Boom Pumps	Other Construction Equipment	1,043	480	500	600	Diesel	10	lb	PM	Tier 3	1
3	6	Building Construction	Gradall-type Forklifts	Forklifts	913	230	250	300	Diesel	1.4	lb	HC	Tier 3	1
3	6	Building Construction	Gradall-type Forklifts	Forklifts	913	230	250	300	Diesel	265	lb	Nox	Tier 3	1
3	6	Building Construction	Gradall-type Forklifts	Forklifts	913	230	250	300	Diesel	2.1	lb	PM	Tier 3	1
3	6	Building Construction	Manlifts	Forklifts	1,825	51	120	75	Diesel	1.2	lb	HC	Tier 3	1
3	6	Building Construction	Manlifts	Forklifts	1,825	51	120	75	Diesel	219	lb	Nox	Tier 3	1
3	6	Building Construction	Manlifts	Forklifts	1,825	51	120	75	Diesel	1.9	lb	PM	Tier 3	1
3	6	Building Construction	Tower cranes	Cranes	1,043	530	750	600	Diesel	5.4	lb	HC	Tier 3	1
3	6	Building Construction	Tower cranes	Cranes	1,043	530	750	600	Diesel	1,001	lb	Nox	Tier 3	1
3	6	Building Construction	Tower cranes	Cranes	1,043	530	750	600	Diesel	7.9	lb	PM	Tier 3	1
3	7	Paving	Other Material Handling Equipment	Other Material Handling Equipment	174	9	50	11	Diesel	0.039	lb	HC	Tier 3	1
3	7	Paving	Other Material Handling Equipment	Other Material Handling Equipment	174	9	50	11	Diesel	7.3	lb	Nox	Tier 3	1
3	7	Paving	Other Material Handling Equipment	Other Material Handling Equipment	174	9	50	11	Diesel	0.12	lb	PM	Tier 3	1
3	7	Paving	Pavers	Pavers	174	125	175	175	Diesel	0.30	lb	HC	Tier 3	1
3	7	Paving	Pavers	Pavers	174	125	175	175	Diesel	57	lb	Nox	Tier 3	1
3	7	Paving	Pavers	Pavers	174	125	175	175	Diesel	0.66	lb	PM	Tier 3	1
3	7	Paving	Paving Equipment	Paving Equipment	174	130	175	175	Diesel	0.27	lb	HC	Tier 3	1
3	7	Paving	Paving Equipment	Paving Equipment	174	130	175	175	Diesel	50	lb	Nox	Tier 3	1
3	7	Paving	Paving Equipment	Paving Equipment	174	130	175	175	Diesel	0.58	lb	PM	Tier 3	1
3	7	Paving	Rollers	Rollers	348	80	120	100	Diesel	0.41	lb	HC	Tier 3	1
3	7	Paving	Rollers	Rollers	348	80	120	100	Diesel	76	lb	Nox	Tier 3	1
3	7	Paving	Rollers	Rollers	348	80	120	100	Diesel	1.0	lb	PM	Tier 3	1
3	7	Paving	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	174	97	120	100	Diesel	0.24	lb	HC	Tier 3	1
3	7	Paving	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	174	97	120	100	Diesel	46	lb	Nox	Tier 3	1
3	7	Paving	Tractors/Loaders/Backhoes	Tractors/Loaders/Backhoes	174	97	120	100	Diesel	0.62	lb	PM	Tier 3	1
3	8	Architectural Coating	Other Construction Equipment	Other Construction Equipment	130	78	120	100	Diesel	0.17	lb	HC	Tier 3	1
3	8	Architectural Coating	Other Construction Equipment	Other Construction Equipment	130	78	120	100	Diesel	31	lb	Nox	Tier 3	1
3	8	Architectural Coating	Other Construction Equipment	Other Construction Equipment	130	78	120	100	Diesel	0.42	lb	PM	Tier 3	1

Piers 30-32 and SWL 330 Controlled and Uncontrolled Onroad Equipment Activities, Emission Factors and Emissions

Site	Phase	Year	Trip Type	Vehicle Type	Fuel	% of Fleet	Days	One-way Trips per day	One-way Trip Length	Running Exhaust and Running Losses Emission Factor (g/mile)					
										ROG Exhaust	*ROG Running Loss*	*TOG Exhaust*	*TOG Running Loss*	*NOx Exhaust*	*CO_2 Exhaust (Pavley I + LCFS)*
Piers 30-32	Pile Installation	2016	Worker	LDA	GAS	50%	261	160	12.4	0.033	0.061	0.048	0.061	0.107	306
	Pile Installation	2016	Worker	LDT1	GAS	25%	261	160	12.4	0.069	0.212	0.095	0.212	0.244	368
	Pile Installation	2016	Worker	LDT2	GAS	25%	261	160	12.4	0.035	0.099	0.055	0.099	0.184	444
	Pile Installation	2016	Vendor	T6	DSL	50%	261	20	7.3	0.195	0.000	0.222	0.000	3.933	1141
	Pile Installation	2016	Vendor	T7	DSL	50%	261	20	7.3	0.251	0.000	0.286	0.000	6.294	1690
	Pile Installation	2016	Hauling	T7	DSL	100%	261	0	20	0.251	0.000	0.286	0.000	6.294	1690
	Building Construction	2016	Worker	LDA	GAS	50%	500	200	12.4	0.033	0.061	0.048	0.061	0.107	306
	Building Construction	2016	Worker	LDT1	GAS	25%	500	200	12.4	0.069	0.212	0.095	0.212	0.244	368
	Building Construction	2016	Worker	LDT2	GAS	25%	500	200	12.4	0.035	0.099	0.055	0.099	0.184	444
	Building Construction	2016	Vendor	T6	DSL	50%	500	40	7.3	0.195	0.000	0.222	0.000	3.933	1141
	Building Construction	2016	Vendor	T7	DSL	50%	500	40	7.3	0.251	0.000	0.286	0.000	6.294	1690
	Building Construction	2016	Hauling	T7	DSL	100%	500	0	20	0.251	0.000	0.286	0.000	6.294	1690
	Arena Foundation/ Utilities	2016	Worker	LDA	GAS	50%	500	200	12.4	0.033	0.061	0.048	0.061	0.107	306
	Arena Foundation/ Utilities	2016	Worker	LDT1	GAS	25%	500	200	12.4	0.069	0.212	0.095	0.212	0.244	368
	Arena Foundation/ Utilities	2016	Worker	LDT2	GAS	25%	500	200	12.4	0.035	0.099	0.055	0.099	0.184	444
	Arena Foundation/ Utilities	2016	Vendor	T6	DSL	50%	500	60	7.3	0.195	0.000	0.222	0.000	3.933	1141
	Arena Foundation/ Utilities	2016	Vendor	T7	DSL	50%	500	60	7.3	0.251	0.000	0.286	0.000	6.294	1690
	Arena Foundation/ Utilities	2016	Hauling	T7	DSL	100%	500	0	20	0.251	0.000	0.286	0.000	6.294	1690
	Arena Building Construction	2016	Worker	LDA	GAS	50%	500	200	12.4	0.033	0.061	0.048	0.061	0.107	306
	Arena Building Construction	2016	Worker	LDT1	GAS	25%	500	200	12.4	0.069	0.212	0.095	0.212	0.244	368
	Arena Building Construction	2016	Worker	LDT2	GAS	25%	500	200	12.4	0.035	0.099	0.055	0.099	0.184	444
	Arena Building Construction	2016	Vendor	T6	DSL	50%	500	160	7.3	0.195	0.000	0.222	0.000	3.933	1141
	Arena Building Construction	2016	Vendor	T7	DSL	50%	500	160	7.3	0.251	0.000	0.286	0.000	6.294	1690
	Arena Building Construction	2016	Hauling	T7	DSL	100%	500	0	20	0.251	0.000	0.286	0.000	6.294	1690

Piers 30-32 and SWL 330 Controlled and Uncontrolled Onroad Equipment Activities, Emission Factors and Emissions

Site	Phase	Year	Trip Type	Vehicle Type	Fuel	% of Fleet	Days	One-way Trips per day	One-way Trip Length	Running Exhaust and Running Losses Emission Factor (g/mile)					
										ROG Exhaust	*ROG Running Loss*	*TOG Exhaust*	*TOG Running Loss*	*NOx Exhaust*	*CO_2 Exhaust (Pavley I + LCFS)*
SWL330	Demolition	2017	Worker	LDA	GAS	50%	22	5	12.4	0.027	0.055	0.041	0.055	0.096	293
	Demolition	2017	Worker	LDT1	GAS	25%	22	5	12.4	0.060	0.203	0.084	0.203	0.224	355
	Demolition	2017	Worker	LDT2	GAS	25%	22	5	12.4	0.031	0.094	0.049	0.094	0.165	429
	Demolition	2017	Vendor	T6	DSL	50%	22	40	7.3	0.176	0.000	0.201	0.000	3.409	1121
	Demolition	2017	Vendor	T7	DSL	50%	22	40	7.3	0.240	0.000	0.274	0.000	5.613	1661
	Demolition	2017	Hauling	T7	DSL	100%	22	0	20	0.240	0.000	0.274	0.000	5.613	1661
	Shoring	2017	Worker	LDA	GAS	50%	65	10	12.4	0.027	0.055	0.041	0.055	0.096	293
	Shoring	2017	Worker	LDT1	GAS	25%	65	10	12.4	0.060	0.203	0.084	0.203	0.224	355
	Shoring	2017	Worker	LDT2	GAS	25%	65	10	12.4	0.031	0.094	0.049	0.094	0.165	429
	Shoring	2017	Vendor	T6	DSL	50%	65	40	7.3	0.176	0.000	0.201	0.000	3.409	1121
	Shoring	2017	Vendor	T7	DSL	50%	65	40	7.3	0.240	0.000	0.274	0.000	5.613	1661
	Shoring	2017	Hauling	T7	DSL	100%	65	0	20	0.240	0.000	0.274	0.000	5.613	1661
	Mass Excavation	2017	Worker	LDA	GAS	50%	65	5	12.4	0.027	0.055	0.041	0.055	0.096	293
	Mass Excavation	2017	Worker	LDT1	GAS	25%	65	5	12.4	0.060	0.203	0.084	0.203	0.224	355
	Mass Excavation	2017	Worker	LDT2	GAS	25%	65	5	12.4	0.031	0.094	0.049	0.094	0.165	429
	Mass Excavation	2017	Vendor	T6	DSL	50%	65	40	7.3	0.176	0.000	0.201	0.000	3.409	1121
	Mass Excavation	2017	Vendor	T7	DSL	50%	65	40	7.3	0.240	0.000	0.274	0.000	5.613	1661
	Mass Excavation	2017	Hauling	T7	DSL	100%	65	18	20	0.240	0.000	0.274	0.000	5.613	1661
	Building Construction	2017	Worker	LDA	GAS	50%	369	300	12.4	0.027	0.055	0.041	0.055	0.096	293
	Building Construction	2017	Worker	LDT1	GAS	25%	369	300	12.4	0.060	0.203	0.084	0.203	0.224	355
	Building Construction	2017	Worker	LDT2	GAS	25%	369	300	12.4	0.031	0.094	0.049	0.094	0.165	429
	Building Construction	2017	Vendor	T6	DSL	50%	369	80	7.3	0.176	0.000	0.201	0.000	3.409	1121
	Building Construction	2017	Vendor	T7	DSL	50%	369	80	7.3	0.240	0.000	0.274	0.000	5.613	1661
	Building Construction	2017	Hauling	T7	DSL	100%	369	0	20	0.240	0.000	0.274	0.000	5.613	1661
	Paving	2018	Worker	LDA	GAS	50%	22	15	12.4	0.022	0.050	0.035	0.050	0.088	281
	Paving	2018	Worker	LDT1	GAS	25%	22	15	12.4	0.052	0.195	0.075	0.195	0.208	342
	Paving	2018	Worker	LDT2	GAS	25%	22	15	12.4	0.027	0.090	0.044	0.090	0.148	415
	Paving	2018	Vendor	T6	DSL	50%	22	80	7.3	0.163	0.000	0.186	0.000	2.983	1102
	Paving	2018	Vendor	T7	DSL	50%	22	80	7.3	0.241	0.000	0.274	0.000	5.074	1632
	Paving	2018	Hauling	T7	DSL	100%	22	0	20	0.241	0.000	0.274	0.000	5.074	1632
	Architectural Coating	2018	Worker	LDA	GAS	50%	22	60	12.4	0.022	0.050	0.035	0.050	0.088	281
	Architectural Coating	2018	Worker	LDT1	GAS	25%	22	60	12.4	0.052	0.195	0.075	0.195	0.208	342
	Architectural Coating	2018	Worker	LDT2	GAS	25%	22	60	12.4	0.027	0.090	0.044	0.090	0.148	415
	Architectural Coating	2018	Vendor	T6	DSL	50%	22	80	7.3	0.163	0.000	0.186	0.000	2.983	1102
	Architectural Coating	2018	Vendor	T7	DSL	50%	22	80	7.3	0.241	0.000	0.274	0.000	5.074	1632
	Architectural Coating	2018	Hauling	T7	DSL	100%	22	0	20	0.241	0.000	0.274	0.000	5.074	1632

Piers 30-32 and SWL 330 Controlled and Uncontrolled Onroad Equipment Activities, Emission Factors and Emissions

					Running Exhaust and Running Losses Emissions (lb)											
Site	**Phase**	**Year**	**Trip Type**	**Vehicle Type**	*ROG Exhaust*	*ROG Running Loss*	*TOG Exhaust*	*TOG Running Loss*	*NOx Exhaust*	*CO_2 Exhaust (Pavley I + LCFS)*	*PM_{10} Exhaust*	*PM_{10} Tire Wear*	*PM_{10} Brake Wear*	*$PM_{2.5}$ Exhaust*	*$PM_{2.5}$ Tire Wear*	*$PM_{2.5}$ Brake Wear*
Piers 30-32	Pile Installation	2016	Worker	LDA	19	35	27	35	61	174687	1.3	4.6	21.0	1.2	1.1	9.0
	Pile Installation	2016	Worker	LDT1	20	61	27	61	70	105025	1.2	2.3	10.5	1.1	0.6	4.5
	Pile Installation	2016	Worker	LDT2	10	28	16	28	52	126737	0.6	2.3	10.5	0.6	0.6	4.5
	Pile Installation	2016	Vendor	T6	8	0	9	0	165	47917	4.4	0.5	5.5	4.0	0.1	2.3
	Pile Installation	2016	Vendor	T7	11	0	12	0	264	71005	3.7	1.5	2.5	3.4	0.4	1.1
	Pile Installation	2016	Hauling	T7	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
	Building Construction	2016	Worker	LDA	45	83	65	83	146	418313	3.0	10.9	50.2	2.8	2.7	21.5
	Building Construction	2016	Worker	LDT1	47	145	65	145	167	251497	2.8	5.5	25.1	2.6	1.4	10.8
	Building Construction	2016	Worker	LDT2	24	68	37	68	126	303490	1.5	5.5	25.1	1.4	1.4	10.8
	Building Construction	2016	Vendor	T6	31	0	36	0	633	183589	16.8	1.9	21.0	15.4	0.5	9.0
	Building Construction	2016	Vendor	T7	40	0	46	0	1013	272049	14.2	5.7	9.7	13.1	1.4	4.2
	Building Construction	2016	Hauling	T7	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
	Arena Foundation/ Utilities	2016	Worker	LDA	45	83	65	83	146	418313	3.0	10.9	50.2	2.8	2.7	21.5
	Arena Foundation/ Utilities	2016	Worker	LDT1	47	145	65	145	167	251497	2.8	5.5	25.1	2.6	1.4	10.8
	Arena Foundation/ Utilities	2016	Worker	LDT2	24	68	37	68	126	303490	1.5	5.5	25.1	1.4	1.4	10.8
	Arena Foundation/ Utilities	2016	Vendor	T6	47	0	54	0	950	275384	25.2	2.9	31.5	23.2	0.7	13.5
	Arena Foundation/ Utilities	2016	Vendor	T7	61	0	69	0	1519	408074	21.3	8.5	14.6	19.6	2.1	6.2
	Arena Foundation/ Utilities	2016	Hauling	T7	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
	Arena Building Construction	2016	Worker	LDA	45	83	65	83	146	418313	3.0	10.9	50.2	2.8	2.7	21.5
	Arena Building Construction	2016	Worker	LDT1	47	145	65	145	167	251497	2.8	5.5	25.1	2.6	1.4	10.8
	Arena Building Construction	2016	Worker	LDT2	24	68	37	68	126	303490	1.5	5.5	25.1	1.4	1.4	10.8
	Arena Building Construction	2016	Vendor	T6	126	0	143	0	2532	734358	67.2	7.7	83.9	61.8	1.9	36.0
	Arena Building Construction	2016	Vendor	T7	162	0	184	0	4051	1088196	56.7	22.7	38.8	52.2	5.7	16.6
	Arena Building Construction	2016	Hauling	T7	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0

Piers 30-32 and SWL 330 Controlled and Uncontrolled Onroad Equipment Activities, Emission Factors and Emissions

					Running Exhaust and Running Losses Emissions (lb)											
Site	**Phase**	**Year**	**Trip Type**	**Vehicle Type**	*ROG Exhaust*	*ROG Running Loss*	*TOG Exhaust*	*TOG Running Loss*	*NOx Exhaust*	*CO_2 Exhaust (Pavley I + LCFS)*	*PM_{10} Exhaust*	*PM_{10} Tire Wear*	*PM_{10} Brake Wear*	*$PM_{2.5}$ Exhaust*	*$PM_{2.5}$ Tire Wear*	*$PM_{2.5}$ Brake Wear*
SWL330	Demolition	2017	Worker	LDA	0	0	0	0	0	441	0.0	0.0	0.1	0.0	0.0	0.0
	Demolition	2017	Worker	LDT1	0	0	0	0	0	267	0.0	0.0	0.0	0.0	0.0	0.0
	Demolition	2017	Worker	LDT2	0	0	0	0	0	322	0.0	0.0	0.0	0.0	0.0	0.0
	Demolition	2017	Vendor	T6	1	0	1	0	24	7941	0.6	0.1	0.9	0.6	0.0	0.4
	Demolition	2017	Vendor	T7	2	0	2	0	40	11763	0.6	0.2	0.4	0.5	0.1	0.2
	Demolition	2017	Hauling	T7	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
	Shoring	2017	Worker	LDA	0	0	0	0	1	2603	0.0	0.1	0.3	0.0	0.0	0.1
	Shoring	2017	Worker	LDT1	0	1	0	1	1	1576	0.0	0.0	0.2	0.0	0.0	0.1
	Shoring	2017	Worker	LDT2	0	0	0	0	1	1905	0.0	0.0	0.2	0.0	0.0	0.1
	Shoring	2017	Vendor	T6	4	0	4	0	71	23462	1.9	0.3	2.7	1.7	0.1	1.2
	Shoring	2017	Vendor	T7	5	0	6	0	117	34754	1.6	0.7	1.3	1.5	0.2	0.5
	Shoring	2017	Hauling	T7	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
	Mass Excavation	2017	Worker	LDA	0	0	0	0	0	1302	0.0	0.0	0.2	0.0	0.0	0.1
	Mass Excavation	2017	Worker	LDT1	0	0	0	0	0	788	0.0	0.0	0.1	0.0	0.0	0.0
	Mass Excavation	2017	Worker	LDT2	0	0	0	0	0	953	0.0	0.0	0.1	0.0	0.0	0.0
	Mass Excavation	2017	Vendor	T6	4	0	4	0	71	23462	1.9	0.3	2.7	1.7	0.1	1.2
	Mass Excavation	2017	Vendor	T7	5	0	6	0	117	34754	1.6	0.7	1.3	1.5	0.2	0.5
	Mass Excavation	2017	Hauling	T7	12	0	14	0	287	84816	4.0	1.8	3.1	3.7	0.4	1.3
	Building Construction	2017	Worker	LDA	41	83	61	83	146	443343	3.2	12.1	55.6	3.0	3.0	23.8
	Building Construction	2017	Worker	LDT1	45	153	64	153	170	268343	3.0	6.1	27.8	2.7	1.5	11.9
	Building Construction	2017	Worker	LDT2	24	71	37	71	125	324510	1.6	6.1	27.8	1.5	1.5	11.9
	Building Construction	2017	Vendor	T6	42	0	48	0	810	266389	21.1	2.9	31.0	19.4	0.7	13.3
	Building Construction	2017	Vendor	T7	57	0	65	0	1333	394593	18.5	8.4	14.3	17.0	2.1	6.1
	Building Construction	2017	Hauling	T7	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
	Paving	2018	Worker	LDA	0	0	0	0	0	1267	0.0	0.0	0.2	0.0	0.0	0.1
	Paving	2018	Worker	LDT1	0	0	0	0	0	772	0.0	0.0	0.1	0.0	0.0	0.0
	Paving	2018	Worker	LDT2	0	0	0	0	0	936	0.0	0.0	0.1	0.0	0.0	0.0
	Paving	2018	Vendor	T6	2	0	3	0	42	15612	1.1	0.2	1.8	1.0	0.0	0.8
	Paving	2018	Vendor	T7	3	0	4	0	72	23117	1.1	0.5	0.9	1.0	0.1	0.4
	Paving	2018	Hauling	T7	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
	Architectural Coating	2018	Worker	LDA	0	1	1	1	2	5067	0.0	0.1	0.7	0.0	0.0	0.3
	Architectural Coating	2018	Worker	LDT1	0	2	1	2	2	3089	0.0	0.1	0.3	0.0	0.0	0.1
	Architectural Coating	2018	Worker	LDT2	0	1	0	1	1	3742	0.0	0.1	0.3	0.0	0.0	0.1
	Architectural Coating	2018	Vendor	T6	2	0	3	0	42	15612	1.1	0.2	1.8	1.0	0.0	0.8
	Architectural Coating	2018	Vendor	T7	3	0	4	0	72	23117	1.1	0.5	0.9	1.0	0.1	0.4
	Architectural Coating	2018	Hauling	T7	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0

Piers 30-32 and SWL 330 Controlled and Uncontrolled Onroad Equipment Activities, Emission Factors and Emissions

Site	Phase	Year	Trip Type	Vehicle Type	Idling Emission Factor (g/hr-vehicle)						Idling Exhaust Emissions (lb) [5 min per one-way trip for mass emissions]					
					ROG	*TOG*	*NOx*	*CO_2 (Pavley I + LCFS)*	*PM_{10}*	*$PM_{2.5}$*	*ROG*	*TOG*	*NOx*	*CO_2 (Pavley I + LCFS)*	*PM_{10}*	*$PM_{2.5}$*
Piers 30-32	Pile Installation	2016	Worker	LDA	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Pile Installation	2016	Worker	LDT1	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Pile Installation	2016	Worker	LDT2	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Pile Installation	2016	Vendor	T6	1.980	2.254	74.741	7273.007	0.294	0.270	0.9	1.1	35.8	3487	0.1	0.1
	Pile Installation	2016	Vendor	T7	5.984	6.812	60.057	6800.808	0.162	0.149	2.9	3.3	28.8	3261	0.1	0.1
	Pile Installation	2016	Hauling	T7	5.984	6.812	60.057	6800.808	0.162	0.149	0.0	0.0	0.0	0	0.0	0.0
	Building Construction	2016	Worker	LDA	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Building Construction	2016	Worker	LDT1	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Building Construction	2016	Worker	LDT2	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Building Construction	2016	Vendor	T6	1.980	2.254	74.741	7273.007	0.294	0.270	3.6	4.1	137.3	13362	0.5	0.5
	Building Construction	2016	Vendor	T7	5.984	6.812	60.057	6800.808	0.162	0.149	11.0	12.5	110.3	12494	0.3	0.3
	Building Construction	2016	Hauling	T7	5.984	6.812	60.057	6800.808	0.162	0.149	0.0	0.0	0.0	0	0.0	0.0
	Arena Foundation/ Utilities	2016	Worker	LDA	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Arena Foundation/ Utilities	2016	Worker	LDT1	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Arena Foundation/ Utilities	2016	Worker	LDT2	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Arena Foundation/ Utilities	2016	Vendor	T6	1.980	2.254	74.741	7273.007	0.294	0.270	5.5	6.2	206.0	20043	0.8	0.7
	Arena Foundation/ Utilities	2016	Vendor	T7	5.984	6.812	60.057	6800.808	0.162	0.149	16.5	18.8	165.5	18742	0.4	0.4
	Arena Foundation/ Utilities	2016	Hauling	T7	5.984	6.812	60.057	6800.808	0.162	0.149	0.0	0.0	0.0	0	0.0	0.0
	Arena Building Construction	2016	Worker	LDA	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Arena Building Construction	2016	Worker	LDT1	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Arena Building Construction	2016	Worker	LDT2	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Arena Building Construction	2016	Vendor	T6	1.980	2.254	74.741	7273.007	0.294	0.270	14.5	16.6	549.3	53447	2.2	2.0
	Arena Building Construction	2016	Vendor	T7	5.984	6.812	60.057	6800.808	0.162	0.149	44.0	50.1	441.3	49977	1.2	1.1
	Arena Building Construction	2016	Hauling	T7	5.984	6.812	60.057	6800.808	0.162	0.149	0.0	0.0	0.0	0	0.0	0.0

Piers 30-32 and SWL 330 Controlled and Uncontrolled Onroad Equipment Activities, Emission Factors and Emissions

					Idling Emission Factor (g/hr-vehicle)						Idling Exhaust Emissions (lb) [5 min per one-way trip for mass emissions]					
Site	**Phase**	**Year**	**Trip Type**	**Vehicle Type**	*ROG*	*TOG*	*NOx*	*CO_2 (Pavley I + LCFS)*	*PM_{10}*	*$PM_{2.5}$*	*ROG*	*TOG*	*NOx*	*CO_2 (Pavley I + LCFS)*	*PM_{10}*	*$PM_{2.5}$*
SWL330	Demolition	2017	Worker	LDA	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Demolition	2017	Worker	LDT1	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Demolition	2017	Worker	LDT2	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Demolition	2017	Vendor	T6	1.943	2.212	70.315	7185.677	0.246	0.226	0.2	0.2	5.7	581	0.0	0.0
	Demolition	2017	Vendor	T7	6.124	6.971	56.063	6694.892	0.135	0.124	0.5	0.6	4.5	541	0.0	0.0
	Demolition	2017	Hauling	T7	6.124	6.971	56.063	6694.892	0.135	0.124	0.0	0.0	0.0	0	0.0	0.0
	Shoring	2017	Worker	LDA	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Shoring	2017	Worker	LDT1	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Shoring	2017	Worker	LDT2	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Shoring	2017	Vendor	T6	1.943	2.212	70.315	7185.677	0.246	0.226	0.5	0.5	16.8	1716	0.1	0.1
	Shoring	2017	Vendor	T7	6.124	6.971	56.063	6694.892	0.135	0.124	1.5	1.7	13.4	1599	0.0	0.0
	Shoring	2017	Hauling	T7	6.124	6.971	56.063	6694.892	0.135	0.124	0.0	0.0	0.0	0	0.0	0.0
	Mass Excavation	2017	Worker	LDA	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Mass Excavation	2017	Worker	LDT1	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Mass Excavation	2017	Worker	LDT2	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Mass Excavation	2017	Vendor	T6	1.943	2.212	70.315	7185.677	0.246	0.226	0.5	0.5	16.8	1716	0.1	0.1
	Mass Excavation	2017	Vendor	T7	6.124	6.971	56.063	6694.892	0.135	0.124	1.5	1.7	13.4	1599	0.0	0.0
	Mass Excavation	2017	Hauling	T7	6.124	6.971	56.063	6694.892	0.135	0.124	1.3	1.5	11.9	1424	0.0	0.0
	Building Construction	2017	Worker	LDA	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Building Construction	2017	Worker	LDT1	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Building Construction	2017	Worker	LDT2	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Building Construction	2017	Vendor	T6	1.943	2.212	70.315	7185.677	0.246	0.226	5.3	6.0	190.7	19485	0.7	0.6
	Building Construction	2017	Vendor	T7	6.124	6.971	56.063	6694.892	0.135	0.124	16.6	18.9	152.0	18154	0.4	0.3
	Building Construction	2017	Hauling	T7	6.124	6.971	56.063	6694.892	0.135	0.124	0.0	0.0	0.0	0	0.0	0.0
	Paving	2018	Worker	LDA	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Paving	2018	Worker	LDT1	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Paving	2018	Worker	LDT2	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Paving	2018	Vendor	T6	1.945	2.214	66.245	7088.706	0.216	0.198	0.3	0.4	10.7	1146	0.0	0.0
	Paving	2018	Vendor	T7	6.349	7.227	53.038	6587.025	0.131	0.121	1.0	1.2	8.6	1065	0.0	0.0
	Paving	2018	Hauling	T7	6.349	7.227	53.038	6587.025	0.131	0.121	0.0	0.0	0.0	0	0.0	0.0
	Architectural Coating	2018	Worker	LDA	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Architectural Coating	2018	Worker	LDT1	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Architectural Coating	2018	Worker	LDT2	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Architectural Coating	2018	Vendor	T6	1.945	2.214	66.245	7088.706	0.216	0.198	0.3	0.4	10.7	1146	0.0	0.0
	Architectural Coating	2018	Vendor	T7	6.349	7.227	53.038	6587.025	0.131	0.121	1.0	1.2	8.6	1065	0.0	0.0
	Architectural Coating	2018	Hauling	T7	6.349	7.227	53.038	6587.025	0.131	0.121	0.0	0.0	0.0	0	0.0	0.0

Piers 30-32 and SWL 330 Controlled and Uncontrolled Onroad Equipment Activities, Emission Factors and Emissions

Site	Phase	Year	Trip Type	Vehicle Type	Starting Exhaust Emission Factor (g/one-way trip)						Starting Exhuast Emissions (lb) [Once per one-way trip for mass emissions]					
					ROG	*TOG*	*NOx*	*CO_2 (Pavley I + LCFS)*	*PM_{10}*	*$PM_{2.5}$*	*ROG*	*TOG*	*NOx*	*CO_2 (Pavley I + LCFS)*	*PM_{10}*	*$PM_{2.5}$*
Piers 30-32	Pile Installation	2016	Worker	LDA	0.188	0.201	0.153	62.302	0.003	0.003	8.6	9.2	7.1	2868	0.1	0.1
	Pile Installation	2016	Worker	LDT1	0.387	0.414	0.282	73.683	0.004	0.004	8.9	9.5	6.5	1696	0.1	0.1
	Pile Installation	2016	Worker	LDT2	0.245	0.261	0.302	88.854	0.003	0.003	5.6	6.0	7.0	2045	0.1	0.1
	Pile Installation	2016	Vendor	T6	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Pile Installation	2016	Vendor	T7	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Pile Installation	2016	Hauling	T7	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Building Construction	2016	Worker	LDA	0.188	0.201	0.153	62.302	0.003	0.003	20.7	22.1	16.9	6868	0.3	0.3
	Building Construction	2016	Worker	LDT1	0.387	0.414	0.282	73.683	0.004	0.004	21.4	22.8	15.5	4061	0.2	0.2
	Building Construction	2016	Worker	LDT2	0.245	0.261	0.302	88.854	0.003	0.003	13.5	14.4	16.7	4897	0.2	0.1
	Building Construction	2016	Vendor	T6	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Building Construction	2016	Vendor	T7	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Building Construction	2016	Hauling	T7	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Arena Foundation/ Utilities	2016	Worker	LDA	0.188	0.201	0.153	62.302	0.003	0.003	20.7	22.1	16.9	6868	0.3	0.3
	Arena Foundation/ Utilities	2016	Worker	LDT1	0.387	0.414	0.282	73.683	0.004	0.004	21.4	22.8	15.5	4061	0.2	0.2
	Arena Foundation/ Utilities	2016	Worker	LDT2	0.245	0.261	0.302	88.854	0.003	0.003	13.5	14.4	16.7	4897	0.2	0.1
	Arena Foundation/ Utilities	2016	Vendor	T6	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Arena Foundation/ Utilities	2016	Vendor	T7	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Arena Foundation/ Utilities	2016	Hauling	T7	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Arena Building Construction	2016	Worker	LDA	0.188	0.201	0.153	62.302	0.003	0.003	20.7	22.1	16.9	6868	0.3	0.3
	Arena Building Construction	2016	Worker	LDT1	0.387	0.414	0.282	73.683	0.004	0.004	21.4	22.8	15.5	4061	0.2	0.2
	Arena Building Construction	2016	Worker	LDT2	0.245	0.261	0.302	88.854	0.003	0.003	13.5	14.4	16.7	4897	0.2	0.1
	Arena Building Construction	2016	Vendor	T6	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Arena Building Construction	2016	Vendor	T7	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Arena Building Construction	2016	Hauling	T7	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0

Piers 30-32 and SWL 330 Controlled and Uncontrolled Onroad Equipment Activities, Emission Factors and Emissions

					Starting Exhaust Emission Factor (g/one-way trip)						Starting Exhuast Emissions (lb) [Once per one-way trip for mass emissions]					
Site	**Phase**	**Year**	**Trip Type**	**Vehicle Type**	*ROG*	*TOG*	*NOx*	*CO_2 (Pavley I + LCFS)*	*PM_{10}*	*$PM_{2.5}$*	*ROG*	*TOG*	*NOx*	*CO_2 (Pavley I + LCFS)*	*PM_{10}*	*$PM_{2.5}$*
SWL330	Demolition	2017	Worker	LDA	0.161	0.172	0.134	59.771	0.003	0.003	0.0	0.0	0.0	7	0.0	0.0
	Demolition	2017	Worker	LDT1	0.353	0.377	0.260	71.213	0.004	0.004	0.0	0.0	0.0	4	0.0	0.0
	Demolition	2017	Worker	LDT2	0.218	0.232	0.267	86.052	0.003	0.003	0.0	0.0	0.0	5	0.0	0.0
	Demolition	2017	Vendor	T6	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Demolition	2017	Vendor	T7	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Demolition	2017	Hauling	T7	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Shoring	2017	Worker	LDA	0.161	0.172	0.134	59.771	0.003	0.003	0.1	0.1	0.1	43	0.0	0.0
	Shoring	2017	Worker	LDT1	0.353	0.377	0.260	71.213	0.004	0.004	0.1	0.1	0.1	26	0.0	0.0
	Shoring	2017	Worker	LDT2	0.218	0.232	0.267	86.052	0.003	0.003	0.1	0.1	0.1	31	0.0	0.0
	Shoring	2017	Vendor	T6	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Shoring	2017	Vendor	T7	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Shoring	2017	Hauling	T7	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Mass Excavation	2017	Worker	LDA	0.161	0.172	0.134	59.771	0.003	0.003	0.1	0.1	0.0	21	0.0	0.0
	Mass Excavation	2017	Worker	LDT1	0.353	0.377	0.260	71.213	0.004	0.004	0.1	0.1	0.0	13	0.0	0.0
	Mass Excavation	2017	Worker	LDT2	0.218	0.232	0.267	86.052	0.003	0.003	0.0	0.0	0.0	15	0.0	0.0
	Mass Excavation	2017	Vendor	T6	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Mass Excavation	2017	Vendor	T7	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Mass Excavation	2017	Hauling	T7	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Building Construction	2017	Worker	LDA	0.161	0.172	0.134	59.771	0.003	0.003	19.6	21.0	16.3	7294	0.4	0.3
	Building Construction	2017	Worker	LDT1	0.353	0.377	0.260	71.213	0.004	0.004	21.5	23.0	15.9	4345	0.3	0.2
	Building Construction	2017	Worker	LDT2	0.218	0.232	0.267	86.052	0.003	0.003	13.3	14.2	16.3	5250	0.2	0.2
	Building Construction	2017	Vendor	T6	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Building Construction	2017	Vendor	T7	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Building Construction	2017	Hauling	T7	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Paving	2018	Worker	LDA	0.139	0.149	0.117	57.344	0.003	0.003	0.1	0.1	0.0	21	0.0	0.0
	Paving	2018	Worker	LDT1	0.323	0.345	0.240	68.869	0.004	0.004	0.1	0.1	0.0	13	0.0	0.0
	Paving	2018	Worker	LDT2	0.194	0.207	0.237	83.351	0.003	0.003	0.0	0.0	0.0	15	0.0	0.0
	Paving	2018	Vendor	T6	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Paving	2018	Vendor	T7	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Paving	2018	Hauling	T7	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Architectural Coating	2018	Worker	LDA	0.139	0.149	0.117	57.344	0.003	0.003	0.2	0.2	0.2	83	0.0	0.0
	Architectural Coating	2018	Worker	LDT1	0.323	0.345	0.240	68.869	0.004	0.004	0.2	0.3	0.2	50	0.0	0.0
	Architectural Coating	2018	Worker	LDT2	0.194	0.207	0.237	83.351	0.003	0.003	0.1	0.2	0.2	61	0.0	0.0
	Architectural Coating	2018	Vendor	T6	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Architectural Coating	2018	Vendor	T7	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0
	Architectural Coating	2018	Hauling	T7	0.000	0.000	0.000	0.000	0.000	0.000	0.0	0.0	0.0	0	0.0	0.0

Piers 30-32 and SWL 330 Controlled and Uncontrolled Onroad Equipment Activities, Emission Factors and Emissions

Site	Phase	Year	Trip Type	Vehicle Type	Evaporative ROG Emission Factor (g/one-way trip)			Evaporative ROG Emissions (lb)		
					Diurnal	*Hot-Soak*	*Resting Loss*	*Diurnal*	*Hot-Soak*	*Resting Loss*
Piers 30-32	Pile Installation	2016	Worker	LDA	0.042	0.139	0.038	1.9	6.4	1.8
	Pile Installation	2016	Worker	LDT1	0.099	0.278	0.082	2.3	6.4	1.9
	Pile Installation	2016	Worker	LDT2	0.048	0.156	0.047	1.1	3.6	1.1
	Pile Installation	2016	Vendor	T6	0.000	0.000	0.000	0.0	0.0	0.0
	Pile Installation	2016	Vendor	T7	0.000	0.000	0.000	0.0	0.0	0.0
	Pile Installation	2016	Hauling	T7	0.000	0.000	0.000	0.0	0.0	0.0
	Building Construction	2016	Worker	LDA	0.042	0.139	0.038	4.6	15.3	4.2
	Building Construction	2016	Worker	LDT1	0.099	0.278	0.082	5.5	15.3	4.5
	Building Construction	2016	Worker	LDT2	0.048	0.156	0.047	2.7	8.6	2.6
	Building Construction	2016	Vendor	T6	0.000	0.000	0.000	0.0	0.0	0.0
	Building Construction	2016	Vendor	T7	0.000	0.000	0.000	0.0	0.0	0.0
	Building Construction	2016	Hauling	T7	0.000	0.000	0.000	0.0	0.0	0.0
	Arena Foundation/ Utilities	2016	Worker	LDA	0.042	0.139	0.038	4.6	15.3	4.2
	Arena Foundation/ Utilities	2016	Worker	LDT1	0.099	0.278	0.082	5.5	15.3	4.5
	Arena Foundation/ Utilities	2016	Worker	LDT2	0.048	0.156	0.047	2.7	8.6	2.6
	Arena Foundation/ Utilities	2016	Vendor	T6	0.000	0.000	0.000	0.0	0.0	0.0
	Arena Foundation/ Utilities	2016	Vendor	T7	0.000	0.000	0.000	0.0	0.0	0.0
	Arena Foundation/ Utilities	2016	Hauling	T7	0.000	0.000	0.000	0.0	0.0	0.0
	Arena Building Construction	2016	Worker	LDA	0.042	0.139	0.038	4.6	15.3	4.2
	Arena Building Construction	2016	Worker	LDT1	0.099	0.278	0.082	5.5	15.3	4.5
	Arena Building Construction	2016	Worker	LDT2	0.048	0.156	0.047	2.7	8.6	2.6
	Arena Building Construction	2016	Vendor	T6	0.000	0.000	0.000	0.0	0.0	0.0
	Arena Building Construction	2016	Vendor	T7	0.000	0.000	0.000	0.0	0.0	0.0
	Arena Building Construction	2016	Hauling	T7	0.000	0.000	0.000	0.0	0.0	0.0

Piers 30-32 and SWL 330 Controlled and Uncontrolled Onroad Equipment Activities, Emission Factors and Emissions

Site	Phase	Year	Trip Type	Vehicle Type	Evaporative ROG Emission Factor (g/one-way trip)			Evaporative ROG Emissions (lb)		
					Diurnal	*Hot-Soak*	*Resting Loss*	*Diurnal*	*Hot-Soak*	*Resting Loss*
SWL330	Demolition	2017	Worker	LDA	0.038	0.127	0.036	0.0	0.0	0.0
	Demolition	2017	Worker	LDT1	0.097	0.271	0.082	0.0	0.0	0.0
	Demolition	2017	Worker	LDT2	0.047	0.151	0.047	0.0	0.0	0.0
	Demolition	2017	Vendor	T6	0.000	0.000	0.000	0.0	0.0	0.0
	Demolition	2017	Vendor	T7	0.000	0.000	0.000	0.0	0.0	0.0
	Demolition	2017	Hauling	T7	0.000	0.000	0.000	0.0	0.0	0.0
	Shoring	2017	Worker	LDA	0.038	0.127	0.036	0.0	0.1	0.0
	Shoring	2017	Worker	LDT1	0.097	0.271	0.082	0.0	0.1	0.0
	Shoring	2017	Worker	LDT2	0.047	0.151	0.047	0.0	0.1	0.0
	Shoring	2017	Vendor	T6	0.000	0.000	0.000	0.0	0.0	0.0
	Shoring	2017	Vendor	T7	0.000	0.000	0.000	0.0	0.0	0.0
	Shoring	2017	Hauling	T7	0.000	0.000	0.000	0.0	0.0	0.0
	Mass Excavation	2017	Worker	LDA	0.038	0.127	0.036	0.0	0.0	0.0
	Mass Excavation	2017	Worker	LDT1	0.097	0.271	0.082	0.0	0.0	0.0
	Mass Excavation	2017	Worker	LDT2	0.047	0.151	0.047	0.0	0.0	0.0
	Mass Excavation	2017	Vendor	T6	0.000	0.000	0.000	0.0	0.0	0.0
	Mass Excavation	2017	Vendor	T7	0.000	0.000	0.000	0.0	0.0	0.0
	Mass Excavation	2017	Hauling	T7	0.000	0.000	0.000	0.0	0.0	0.0
	Building Construction	2017	Worker	LDA	0.038	0.127	0.036	4.6	15.5	4.3
	Building Construction	2017	Worker	LDT1	0.097	0.271	0.082	5.9	16.5	5.0
	Building Construction	2017	Worker	LDT2	0.047	0.151	0.047	2.8	9.2	2.8
	Building Construction	2017	Vendor	T6	0.000	0.000	0.000	0.0	0.0	0.0
	Building Construction	2017	Vendor	T7	0.000	0.000	0.000	0.0	0.0	0.0
	Building Construction	2017	Hauling	T7	0.000	0.000	0.000	0.0	0.0	0.0
	Paving	2018	Worker	LDA	0.034	0.116	0.033	0.0	0.0	0.0
	Paving	2018	Worker	LDT1	0.094	0.264	0.081	0.0	0.0	0.0
	Paving	2018	Worker	LDT2	0.045	0.146	0.046	0.0	0.0	0.0
	Paving	2018	Vendor	T6	0.000	0.000	0.000	0.0	0.0	0.0
	Paving	2018	Vendor	T7	0.000	0.000	0.000	0.0	0.0	0.0
	Paving	2018	Hauling	T7	0.000	0.000	0.000	0.0	0.0	0.0
	Architectural Coating	2018	Worker	LDA	0.034	0.116	0.033	0.0	0.2	0.0
	Architectural Coating	2018	Worker	LDT1	0.094	0.264	0.081	0.1	0.2	0.1
	Architectural Coating	2018	Worker	LDT2	0.045	0.146	0.046	0.0	0.1	0.0
	Architectural Coating	2018	Vendor	T6	0.000	0.000	0.000	0.0	0.0	0.0
	Architectural Coating	2018	Vendor	T7	0.000	0.000	0.000	0.0	0.0	0.0
	Architectural Coating	2018	Hauling	T7	0.000	0.000	0.000	0.0	0.0	0.0

Marine Sources Construction CAPs Emissions Estimates (Uncontrolled)

Vessel Characteristics

Vessel Type	Number of Vessels	Main Engine: Individual Engine Power[1]	Main Engine: Number of Engines[1]	Main Engine: Engine Age[2]	Main Engine: Load Factor[3]	Main Engine: Project Operating Hours Per Vessel[4]	Auxiliary Engine: Individual Engine Power[1]	Auxiliary Engine: Number of Engines[1]	Auxiliary Engine: Engine Age[2]	Auxiliary Engine: Load Factor[3]	Auxiliary Engine: Project Operating Hours Per Vessel[4]
	-	[hp]	-	-	-	[hr]	[hp]	-	-	-	[hr]
Barge Tugboat	1	2,000	2	46	0.50	120	100	2	28	0.31	120
Support Tugboat	1	400	2	46	0.50	521	100	2	28	0.31	521
Small Boats[5]	2	250	2	46	0.45	521	100	1	28	0.43	521

CAPs Emission Factors[6]

Vessel Type	Main Engine Zero Hour Emission Factors [g/hp-hr]				Main Engine Fuel Correction Factor				Main Engine Deterioration Factor			
	ROG	CO	NO_x	PM	ROG	CO	NO_x	PM	ROG	CO	NO_x	PM
Barge Tugboat	1.26	3.07	16.52	0.70	1	1	0.930	0.720	0.44	0.25	0.21	0.67
Support Tugboat	1.26	3.07	16.52	0.70	1	1	0.930	0.720	0.44	0.25	0.21	0.67
Small Boats	1.32	3.21	16.52	0.73	1	1	0.930	0.720	0.44	0.25	0.21	0.67

Vessel Type	Auxiliary Engine Zero Hour Emission Factors [g/hp-hr]				Auxiliary Engine Fuel Correction Factor				Auxiliary Engine Deterioration Factor			
	ROG	CO	NO_x	PM	ROG	CO	NO_x	PM	ROG	CO	NO_x	PM
Barge Tugboat	1.71	4.94	13.00	0.71	1	1	0.930	0.720	0.28	0.16	0.14	0.44
Support Tugboat	1.71	4.94	13.00	0.71	1	1	0.930	0.720	0.28	0.16	0.14	0.44
Small Boats	1.71	4.94	13.00	0.71	1	1	0.930	0.720	0.28	0.16	0.14	0.44

CAPs Emission Calculations

Vessel Type	Main Engine Age	Main Engine Useful Life	Main Engine Emissions [ton][7]				Auxiliary Engine Age	Auxiliary Engine Useful Life	Auxiliary Engine Emissions [ton][7]			
	[yr]	[yr]	ROG	CO	NO_x	PM	[yr]	[yr]	ROG	CO	NO_x	PM
Barge Tugboat	46	21	0.65	1.26	5.93	0.33	28	23	0.02	0.05	0.12	0.006
Support Tugboat	46	21	0.57	1.09	5.16	0.29	28	23	0.08	0.21	0.50	0.028
Small Boats	46	21	0.67	1.29	5.80	0.34	28	23	0.11	0.29	0.70	0.039

Vessel Type	Total Engine Emissions [ton]				
	ROG	CO	NO_x	PM_{10}[8]	$PM_{2.5}$[8]
Barge Tugboat	0.67	1.30	6.05	0.34	0.34
Support Tugboat	0.65	1.30	5.66	0.31	0.31
Small Boats	0.78	1.58	6.50	0.37	0.37
Total Emissions:	2.11	4.18	18.21	1.03	1.03

Piers 30-32 and SWL 330 Uncontrolled Marine Equipment Activities, Emission Factors and Emissions

Notes:

1. Main engine numbers and horsepower of the barge tugboat and support tugboat are estimated values based on correspondence with Kurt Ricci, construction project director at Webcor. Other parameters are typical values based on Initial Statement of Reasons (ISOR) for Proposed Regulation for Commercial Harbor Craft (ARB 2007).
2. The oldest engine model year in the Commercial Harbor Craft database was selected to represent the uncontrolled scenario (ARB 2012).
3. Engine load factors based on average values in Emissions Estimation Methodology for Commercial Harbor Craft (ARB 2012).
4. Operating hours of tugboat engines based on correspondence with Kurt Ricci, construction project director at Webcor. Small boats are assumed to operate two hours per construction day.
5. Small boats required for pile repair and strengthening operations under the pier are assumed to be work boats with average vessel characteristics.
6. CAP emission factors, fuel correction factors, and engine deterioration factors based on Emissions Estimation Methodology for Commercial Harbor Craft (ARB 2012).
7. Marine vessel CAP emissions are calculated according to the following equation:

$$\text{Emissions} = EF_0 \times F \times (1 + D \times A/UL) \times HP \times LF \times Hr$$

where
EF_0 is the model year, horsepower and engine use (propulsion or auxiliary) specific zero hour emission factor (when engine is new);
F is the fuel correction factor which accounts for emission reduction benefits from burning cleaner fuel;
D is the horsepower and pollutant specific engine deterioration factor, which is the percentage increase of emission factors at the end of the useful life of the engine;
A is the age of the engine when the emissions are estimated;
UL is the vessel type and engine use specific engine useful life;
HP is rated horsepower of the engine;
LF is the vessel type and engine use specific engine load factor; and
Hr is the number of annual operating hours of the engine.

8. It was conservatively assumed that all PM is PM_{10} and $PM_{2.5}$.

References

California Air Resources Board (ARB). 2012. Appendix B: Emissions Estimation Methodology for Commercial Harbor Craft Operating in California. Available online at http://www.arb.ca.gov/msei/chc-appendix-b-emission-estimates-ver02-27-2012.pdf.

ARB. 2007. Technical Support Document: Initial Statement of Reasons for Proposed Rulemaking. Proposed Regulation for Commercial Harbor Craft. Available online at http://www.arb.ca.gov/regact/2007/chc07/tsd.pdf

Marine Sources Construction CAPs Emissions Estimates (Controlled)

Vessel Characteristics

Vessel Type	Number of Vessels	Main Engine: Individual Engine Power[1]	Main Engine: Number of Engines[1]	Main Engine: Engine Age[2]	Main Engine: Load Factor[3]	Main Engine: Project Operating Hours Per Vessel[4]	Auxiliary Engine: Individual Engine Power[1]	Auxiliary Engine: Number of Engines[1]	Auxiliary Engine: Engine Age[2]	Auxiliary Engine: Load Factor[3]	Auxiliary Engine: Project Operating Hours Per Vessel[4]
	-	[hp]	-	-	-	[hr]	[hp]	-	-	-	[hr]
Barge Tugboat	1	2,000	2	1	0.50	120	100	2	1	0.31	120
Support Tugboat	1	400	2	1	0.50	521	100	2	1	0.31	521
Small Boats[5]	2	250	2	1	0.45	521	100	1	1	0.43	521

CAPs Emission Factors[6]

Vessel Type	Main Engine Zero Hour Emission Factors [g/hp-hr]				Main Engine Fuel Correction Factor				Main Engine Deterioration Factor			
	ROG	CO	NO_x	PM	ROG	CO	NO_x	PM	ROG	CO	NO_x	PM
Barge Tugboat	0.68	3.73	4.37	0.10	1	1	0.948	0.852	0.44	0.25	0.21	0.67
Support Tugboat	0.68	3.73	3.99	0.08	1	1	0.948	0.852	0.44	0.25	0.21	0.67
Small Boats	0.68	3.73	3.99	0.08	1	1	0.948	0.852	0.44	0.25	0.21	0.67

Vessel Type	Auxiliary Engine Zero Hour Emission Factors [g/hp-hr]				Auxiliary Engine Fuel Correction Factor				Auxiliary Engine Deterioration Factor			
	ROG	CO	NO_x	PM	ROG	CO	NO_x	PM	ROG	CO	NO_x	PM
Barge Tugboat	1.18	3.73	5.32	0.22	1	1	0.948	0.852	0.28	0.16	0.14	0.44
Support Tugboat	1.18	3.73	5.32	0.22	1	1	0.948	0.852	0.28	0.16	0.14	0.44
Small Boats	1.18	3.73	5.32	0.22	1	1	0.948	0.852	0.28	0.16	0.14	0.44

CAPs Emission Calculations

Vessel Type	Main Engine Age	Main Engine Useful Life	Main Engine Emissions [ton][7]				Auxiliary Engine Age	Auxiliary Engine Useful Life	Auxiliary Engine Emissions [ton][7]			
	[yr]	[yr]	ROG	CO	NO_x	PM	[yr]	[yr]	ROG	CO	NO_x	PM
Barge Tugboat	1	21	0.18	1.00	1.11	0.02	1	23	0.01	0.03	0.04	0.002
Support Tugboat	1	21	0.16	0.87	0.88	0.02	1	23	0.04	0.13	0.18	0.007
Small Boats	1	21	0.18	0.98	0.99	0.02	1	23	0.06	0.19	0.25	0.009

Vessel Type	Total Engine Emissions [ton]				
	ROG	CO	NO_x	PM_{10}[8]	$PM_{2.5}$[8]
Barge Tugboat	0.19	1.03	1.15	0.02	0.02
Support Tugboat	0.20	1.00	1.06	0.02	0.02
Small Boats	0.24	1.16	1.24	0.03	0.03
Total Emissions:	0.63	3.19	3.45	0.08	0.08

Piers 30-32 and SWL 330 Controlled Marine Equipment Activities, Emission Factors and Emissions

Notes:

1. Main engine numbers and horsepower of the barge tugboat and support tugboat are estimated values based on correspondence with Kurt Ricci, construction project director at Webcor. Other parameters are typical values based on Initial Statement of Reasons (ISOR) for Proposed Regulation for Commercial Harbor Craft (ARB 2007).
2. The engine age was conservatively assumed to be 1 to represent the age at the end of the pile installation phase.
3. Engine load factors based on average values in Emissions Estimation Methodology for Commercial Harbor Craft (ARB 2012).
4. Operating hours of tugboat engines based on correspondence with Kurt Ricci, construction project director at Webcor. Small boats are assumed to operate two hours per construction day.
5. Small boats required for pile repair and strengthening operations under the pier are assumed to be work boats with average vessel characteristics.
6. CAP emission factors, fuel correction factors, and engine deterioration factors based on Emissions Estimation Methodology for Commercial Harbor Craft (ARB 2012).
7. Marine vessel CAP emissions are calculated according to the following equation:

$$Emissions = EF_0 \times F \times (1 + D \times A/UL) \times HP \times LF \times Hr$$

where
EF_0 is the model year, horsepower and engine use (propulsion or auxiliary) specific zero hour emission factor (when engine is new);
F is the fuel correction factor which accounts for emission reduction benefits from burning cleaner fuel;
D is the horsepower and pollutant specific engine deterioration factor, which is the percentage increase of emission factors at the end of the useful life of the engine;
A is the age of the engine when the emissions are estimated;
UL is the vessel type and engine use specific engine useful life;
HP is rated horsepower of the engine;
LF is the vessel type and engine use specific engine load factor; and
Hr is the number of annual operating hours of the engine.

8. It was conservatively assumed that all PM is PM_{10} and $PM_{2.5}$.

References

California Air Resources Board (ARB). 2012. Appendix B: Emissions Estimation Methodology for Commercial Harbor Craft Operating in California. Available online at http://www.arb.ca.gov/msei/chc-appendix-b-emission-estimates-ver02-27-2012.pdf.

ARB. 2007. Technical Support Document: Initial Statement of Reasons for Proposed Rulemaking. Proposed Regulation for Commercial Harbor Craft. Available online at http://www.arb.ca.gov/regact/2007/chc07/tsd.pdf

Construction Area Emissions Estimates for Piers 30-32 + Seawall 330 Project Alternative

Venue	Floor Area	Building Surface Area[1]	Architectural Coatings			
			Reapplication Rate	Indoor Paint VOC EF[2]	Outdoor Paint VOC EF[2]	Architectural Coating VOC emissions[3]
	(ft^2)	(ft^2)		(g/L)	(g/L)	lb/yr
Piers 30- 32 Event Center, including GSW offices	720,890	1,441,780	100%	100	150	7,519
Piers 30-32 Retail Buildings	103,172	206,344				1,076
Piers 30-32 Parking Garage	234,411	468,822				2,445
SWL330 Residences	208,844	563,879				2,941
SWL330 Retail Buildings	29,854	59,708				311
SWL330 Hotel	178,406	356,812				1,861
SWL330 Shared Space	11,447	22,894				119
SWL330 Parking Garage	106,339	212,678				1,109

Notes:
1. Residential building surface area is assumed to be 2.7 times the floor area, and non-residential 2 times the floor area. Assumptions used in CalEEMod, and based on SCAQMD's 1993 CEQA guide.
2. Based on California paint VOC regulations, 100 g/L for flat paints, generally used indoors, and 150 g/L for all other architectural coatings. Building area is assumed to be 75% indoors and 25% outdoors.
3. Assuming 1 gallon of paint covers 180 square feet, consistent with CalEEMod methodology

Area Sources	Total Emissions [ton/yr]				
	ROG	CO	NO_x	PM_{10}	$PM_{2.5}$
Architectural Coatings	8.69	--	--	--	--
Total Project Emissions:	8.69	0.00	0.00	0.00	0.00

Mobile Source CAPs Emissions Estimates

Piers 30-32 + Seawall Lot 330 Project Alternative CAPs Emission Factors

Emission Factor[1]	Units	Pollutant				
		ROG	CO	NO_x	PM_{10}	$PM_{2.5}$
Running Exhaust	[g/mile]	0.072	1.4	0.38	0.0065	0.0060
Idling Exhaust	[g/trip]	0.0047	0.033	0.031	1.1E-04	1.0E-04
Starting Exhaust	[g/trip]	0.24	3.0	0.27	0.0030	0.0028
PM Brake Wear	[g/mile]	-	-	-	0.048	0.021
PM Tire Wear	[g/mile]	-	-	-	0.0082	0.0021
ROG Running Loss	[g/mile]	0.076	-	-	-	-
ROG Diurnal	[g/trip]	0.045	-	-	-	-
ROG Hot-Soak	[g/trip]	0.14	-	-	-	-
ROG Resting Loss	[g/trip]	0.041	-	-	-	-

Notes:
1. From EMFAC2011, calendar year 2018, San Francisco County. Emission factors are weighted by VMT for all vehicle categories.

Piers 30-32 + Seawall Lot 330 Project Alternative CAPs Emission Calculations

Trip Type	Scenario	Daily One-way Vehicle Trips[1]	Days Per Year[2]	Weighted Trip Length	Emissions				
					ROG	CO	NO_x	PM_{10}	$PM_{2.5}$
		Total		[mile][3]	[ton/yr]				
Piers 30-32 + SWL330, Weekend Trips	Basketball Event Days	7,838	30	20.9	0.92	8.55	2.13	0.34	0.16
	Concert Event Days	6,533	55	20.1	1.36	12.58	3.13	0.50	0.23
	No Event Days	2,999	19	8.0	0.10	0.91	0.21	0.03	0.01
Piers 30-32 + SWL330, Weekday Trips	Basketball Event Days	7,215	30	20.9	0.84	7.84	1.95	0.31	0.14
	Concert Event Days	6533	45	20.1	1.11	10.29	2.56	0.41	0.19
	Convention Event Days	4,400	61	18.1	0.93	8.54	2.11	0.34	0.15
	No Event Days	2,705	125	8.1	0.62	5.45	1.26	0.19	0.09
				Total Emissions:	**6**	**54**	**13.3**	**2.1**	**1.0**

Notes:
1. Daily vehicle trips provided by Adavant Consulting.
2. The maximum number of home games (60) in a season was conservatively assumed. Furthermore, it is assumed that half of the games will take place on weekends. Vehicle generation associated with all concert and family show events is approximated by concert trips, while the other 61 events are assumed to be convention events on weekdays.
3. Trip length for Piers 30-32 is an estimation based on season ticket holder addresses. Season ticket holders account for approximately 60% seating at Warrior games. Trip length for SWL330 is assumed to be average commute trip length in the Bay Area (MTC 2008).

References

California Air Resources Board (ARB). 2011. EMission FACtor Model (EMFAC2011).
Available online at www.arb.ca.gov/msei/modeling.htm

Metropolitan Transportation Commission (MTC). 2008. Travel Forsecasts Data Summary: Transportation 2035 Plan for the
Available online at http://www.mtc.ca.gov/planning/2035_plan/Supplementary/T2035-Travel_Forecast_Data_Summary.pdf

Road Dust Calculations

Total Annual VMT

Trip Type	Scenario	VMT [mile/yr]
Piers 30-32 + SWL330, Weekend Trips	Basketball Event Days	4,924,634
	Concert Event Days	7,219,719
	No Event Days	457,694
Piers 30-32 + SWL330, Weekday Trips	Basketball Event Days	4,514,372
	Concert Event Days	5,907,043
	Convention Event Days	4,851,740
	No Event Days	2,741,809
	Total VMT	**30,617,010**

Pollutants	Emissions Factor [lb/VMT]	Emissions [ton/yr]
Fugitive PM_{10}	0.00063	9.676
Fugitive $PM_{2.5}$	0.00016	2.3751

Road Dust Equation[1]

E = k*(sL)^0.91 * (W)^1.02 * (1-P/4N)

where:

E = annual average emission factor in the same units as k

k = particle size multiplier for particle size range and units of interest

PM_{10} (lb/VMT)	0.0022
$PM_{2.5}$ (lb/VMT)	0.00054
sL = road surface silt loading (grams per square meter) (g/m^2)	0.1
W = average weight (tons) of all the vehicles traveling the road	2.4
P = number of "wet" days with at least 0.01 in of precipitation during the averaging period	64
N = number of days in the averaging period	365

Notes:
1. Road dust equation and parameters are based on CalEEMod defaults for the San Francisco Bay Area Air Basin.

References

California Air Resources Board (ARB). 2011. EMission FACtor Model (EMFAC2011).
Available online at www.arb.ca.gov/msei/modeling.htm

Metropolitan Transportation Commission (MTC). 2008.
Available online at http://www.mtc.ca.gov/planning/2035_plan/Supplementary/T2035-Travel_Forecast_Data_Summary.pdf

Marine Sources CAPs Emissions Estimates

Piers 30-32 + Seawall Lot 330 Project Alternative Emission Calculations

Vessel Characteristics

Vessel Type	Number of Vessels	Main Engine					Auxiliary Engine				
		Individual Engine Power[1]	Number of Engines[1]	Engine Model Year[1]	Load Factor[2]	Annual Operating Hours Per Vessel[3]	Individual Engine Power[1]	Number of Engines[1]	Engine Model Year[1]	Load Factor[2]	Annual Operating Hours Per Vessel[3]
	-	[hp]	-	-	-	[hr/yr]	[hp]	-	-	-	[hr/yr]
Water Taxis	2	1,000	2	2007	0.42	120	80	1	2007	0.43	120

CAPs Emission Factors

Vessel Type	Main Engine Zero Hour Emission Factors [g/hp-hr][4]				Main Engine Fuel Correction Factor				Main Engine Deterioration Factor			
	ROG	CO	NO_x	PM	ROG	CO	NO_x	PM	ROG	CO	NO_x	PM
Water Taxis	0.68	3.73	5.53	0.20	1	1	0.948	0.800	0.44	0.25	0.21	0.67

Vessel Type	Auxiliary Engine Zero Hour Emission Factors [g/hp-hr][4]				Auxiliary Engine Fuel Correction Factor				Auxiliary Engine Deterioration Factor			
	ROG	CO	NO_x	PM	ROG	CO	NO_x	PM	ROG	CO	NO_x	PM
Water Taxis	1.18	3.73	5.32	0.30	1	1	0.948	0.800	0.28	0.16	0.14	0.44

CAPs Emission Calculations

Vessel Type	Main Engine Age	Main Engine Useful Life	Main Engine Emissions [ton/yr][6]				Auxiliary Engine Age	Auxiliary Engine Useful Life	Auxiliary Engine Emissions [ton/yr][6]			
	[yr]	[yr]	ROG	CO	NO_x	PM	[yr]	[yr]	ROG	CO	NO_x	PM
Water Taxis	11	20	0.19	0.94	1.30	0.05	11	20	0.01	0.04	0.05	0.003

Vessel Type	Total Engine Emissions [ton/yr]				
	ROG	CO	NO_x	PM_{10}	$PM_{2.5}$[7]
Water Taxis	0.20	0.98	1.3	0.051	0.051
Total Project Emissions:	0.20	1.0	1.3	0.051	0.051

Marine Sources CAPs Emissions Estimates

Notes:

1. Water taxi information based on current and expected future vessel characteristics (communication with Tideline Marine Group).
2. Engine load factors based on average values in Emissions Estimation Methodology for Commerical Harbor Craft (ARB 2012).
3. Based on Project sponsor information.
4. CAP Emission Factors (EFs) for all water taxis based on the California CHC Emissions Estimation Database. BAAQMD (2004) policy and diesel engine conversion factors (USEPA) were used to calculate the NOx and ROG emission factors from the combined emission factors. It is also assumed that VOC and ROG are equivalent (ARB 2009).
5. CAP EFs based on standards from the ARB and USEPA Off-Road Compression-Ignition (Diesel) Engine Standards (ARB 2013).
6. CAPs emissions from marine engines are calculated according to the following equation:

   $Emissions = EF_0 \times F \times (1 + D \times A/UL) \times HP \times LF \times Hr$

   where

   EF_0 is the model year, horsepower and engine use (propulsion or auxiliary) specific zero hour emission factor (when engine is new);

   F is the fuel correction factor which accounts for emission reduction benefits from burning cleaner fuel;

   D is the horsepower and pollutant specific engine deterioration factor, which is the percentage increase of emission factors at the end of the useful life of the engine;

   A is the age of the engine when the emissions are estimated;

   UL is the vessel type and engine use specific engine useful life;

   HP is rated horsepower of the engine;

   LF is the vessel type and engine use specific engine load factor; and

   Hr is the number of annual operating hours of the engine.
7. $PM_{2.5}$ is conservatively assumed to be equal to total PM.

References

Bay Area Air Quality Management District (BAAQMD). 2004. Policy: CARB Emission Factors for CI Diesel Engines – Percent HC in Relation to NMHC + NOx. Available online at http://www.baaqmd.gov/Divisions/Engineering/Authority-to-Construct-Permit-to-Operate/Policy-and-Procedure-Manual/Emission-Factors.aspx

California Air Resources Board (ARB). 2012. Appendix B: Emissions Estimation Methodology for Commercial Harbor Craft Operating in California. Available online at http://www.arb.ca.gov/msei/chc-appendix-b-emission-estimates-ver02-27-2012.pdf.

ARB. 2009. Definitions of VOC and ROG. January. Available online at: http://www.arb.ca.gov/ei/speciate/voc_rog_dfn_1_09.pdf

ARB. 2007. Technical Support Document: Initial Statement of Reasons for Proposed Rulemaking. Proposed Regulation for Commerical Harbor Craft. Available online at http://www.arb.ca.gov/regact/2007/chc07/tsd.pdf

ARB. 2013. ARB and USEPA Off-Road Compression-Ignition (Diesel) Engine Standards. Available online at: http://www.arb.ca.gov/msprog/ordiesel/documents/Off-Road_Diesel_Stds.xls.

U.S. Environmental Protection Agency (USEPA). 1997. Conversion Factors for Hydrocarbon Emission Components. November. Available online at: http://www.epa.gov/oms/models/nonrdmdl/nr-002.pdf.

Generator Emissions Estimates

Piers 30-32 + Seawall Lot 330 Project Alternative Emission Calculations

Location	Size (kW)		Fuel Type	Operation[1] (hrs/yr)	Emission Factors[2,3]					Emissions			
					NMHC	ROG	CO	NOx	PM	ROG	CO	Nox	PM
	[kW]	[hp]			[g/bhp-hr]					[ton/yr]			
Piers 30 - 32													
Standby Emergency	1500	2012	diesel	50	0.14	0.15	2.6	0.5	0.02	0.017	0.29	0.055	0.002
Standby Emergency	1500	2012	diesel	50	0.14	0.15	2.6	0.5	0.02	0.017	0.29	0.055	0.002
Seawall Lot 330													
Residential	600	805	diesel	50	0.14	0.15	2.6	0.5	0.02	0.007	0.12	0.022	0.001
Hotel	500	671	diesel	50	0.14	0.15	2.2	0.3	0.015	0.006	0.08	0.011	0.001
Restaurant	150	201	diesel	50	0.14	0.15	2.2	0.3	0.015	0.002	0.02	0.003	0.000
									Total Emissions:	0.047	0.80	0.15	0.006

Notes:

1. Operation is conservatively assumed to be 50 hours per year, the maximum allowable by the Bay Area Air Quality Management District.
2. Criterial Air Pollutants emission factors based on Tier 4 standards from the ARB and USEPA Off-Road Compression-Ignition (Diesel) Engine Standards (ARB 2013). Emission factors for PM_{10} and $PM_{2.5}$ are conservatively based on the PM emission standard.
3. The emission factors for ROG were calculated from the NMHC emission factors using conversion factors for diesel engines (USEPA 1997) and assuming that VOC and ROG are equivalent (ARB 2009).

References:

U.S. Environmental Protection Agency (USEPA). 1997. *Conversion Factors for Hydrocarbon Emission Components.* November.
Available online at: http://www.epa.gov/oms/models/nonrdmdl/nr-002.pdf.

California Air Resources Board (ARB). 2013. ARB and USEPA Off-Road Compression-Ignition (Diesel) Engine Standards.
Available online at: http://www.arb.ca.gov/msprog/ordiesel/documents/Off-Road_Diesel_Stds.xls.

ARB. 2009. *Definitions of VOC and ROG.* January.
Available online at: http://www.arb.ca.gov/ei/speciate/voc_rog_dfn_1_09.pdf

Boiler Emissions Estimates

Piers 30-32 + Seawall Lot 330 Project Alternative Emission Calculations

Location	Quantity[1]	Fuel Type	Size[1]	Higher Heating Value[2]	Fuel Consumption[3]	Operation[4] (hrs/yr)	Emission Factors[5,6,7]						Emissions			
							CO	NOx	CO	NOx	ROG	PM	CO	NOx	ROG	PM
			Btu/hr	Btu/scf	scf/hr		ppmv (dry at 3% O_2)		lb/MMBtu		lb/10^6 scf		[ton/yr]			
Piers 30-32	4	Natural Gas	4,000,000	1,020	3,922	8,760	400	30	0.30	0.037	5.5	7.6	21	2.6	0.38	0.52
SWL330, Residential	6	Natural Gas	500,000	1,020	490	8,760	400	30	0.30	0.037	5.5	7.6	4	0.5	0.07	0.10
SWL330, Hotel	3	Natural Gas	1,500,000	1,020	1,471	8,760	400	30	0.30	0.037	5.5	7.6	6	0.7	0.11	0.15
SWL330, Retail	1	Natural Gas	2,000,000	1,020	1,961	8,760	400	30	0.30	0.037	5.5	7.6	3	0.3	0.05	0.07
												Total	34	4.1	0.60	0.83

Notes:
1. Quantity and Size based on estimates provided by the Project Sponsor.
2. Higher heating value is the average natural gas heating value in AP-42 Section 1.4.
3. Fuel consumption calculated from size and higher heating value.
4. The boiler is assumed to operate for every hour of the year.
5. CO and NOx emission factors in ppm from BAAQMD Regulation 9 Rule 7.
6. CO and NOx emission factors converted from ppm to lb/MMBtu using the F-Factor method described in USEPA Method 19 for natural gas fuel (USEPA 2001).
7. ROG and PM emission factors from AP-42 Section 1.4 Table 1.4-2.

Abbreviations:
Btu - British Thermal Unit
CO - carbon monoxide
hr - hour
lb - pound
MMBtu - million Btu
NOx - nitrogen oxides
O_2 - oxygen
PM - particulate matter
ppmv - parts per million by volume
ROG - reactive organic gases
scf - standard cubic feet
yr - year

References:

BAAQMD. 2011. Regulation 9 Rule 7. Inorganic Gaseous Pollutants Nitrogen oxides and Carbon Monoxide from Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters.

USEPA. 1995. AP 42, Volume I, Fifth Edition. §1.4. Natural Gas Combustion. Available online at: http://www.epa.gov/ttn/chief/ap42/ch01/final/c01s04.pdf

USEPA. 2001. Prefered and Alternative Methods for Estimating Air Emissions from Boilers. January. Available online at: http://www.epa.gov/ttnchie1/eiip/techreport/volume02/ii02.pdf.

Area Emissions Estimates

Piers 30-32 + Seawall Lot 330 Project Alternative Emission Calculations

Venue	Floor Area	Building Surface Area[1]	Architectural Coatings				Consumer Products	
			Reapplication Rate	Indoor Paint VOC EF[2]	Outdoor Paint VOC EF[2]	Architectural Coating VOC emissions[3]	Consumer Product VOC EF[4]	Consumer Product VOC emissions
	(ft^2)	(ft^2)		[g/L]	[g/L]	[lb/yr]	($lb/ft^2/day$)	[lb/yr]
Piers 30- 32 Event Center, including GSW offices	720890	1441780	10%	100	150	752	1.51E-05	3973
Piers 30-32 Retail Buildings	103172	206344				108		569
Piers 30-32 Parking Garage	234411	468822				245		1292
SWL330 Residences	208844	563879				294		1151
SWL330 Retail Buildings	29854	59708				31		165
SWL330 Hotel	178406	356812				186		983
SWL330 Shared Space	11447	22894				12		63
SWL330 Parking Garage	106339	212678				111		586

Notes:
1. Residential building surface area is assumed to be 2.7 times the floor area, and non-residential 2 times the floor area. Assumptions used in CalEEMod, and based on SCAQMD's 1993 CEQA guide.
2. Based on California paint VOC regulations, 100 g/L for flat paints, generally used indoors, and 150 g/L for all other architectural coatings. Building area is assumed to be 75% indoors and 25% outdoors.
3. Assuming 1 gallon of paint covers 180 square feet, consistent with CalEEMod methodology
4. San Francisco-specific area source emission factor developed by San Francisco Environmental Planning (SFEP) for ROG from consumer products.

Venue	Floor Area	Dwelling Units	Landscaping EFs[1,2]				Landscaping Emissions			
			ROG	CO	NOx	PM_{10}	ROG	CO	NOx	PM_{10}
	[ft^2]		[$lb/ft^2/yr$]	[$lb/ft^2/yr$]	[$lb/ft^2/yr$]	[$lb/ft^2/yr$]	[lb/yr]	[lb/yr]	[lb/yr]	[lb/yr]
Piers 30- 32 Event Center, including GSW offices	720890	-	1.78E-06	1.86E-05	1.74E-07	6.71E-08	1.28	13.43	0.13	0.05
Piers 30-32 Retail Buildings	103172	-					0.18	1.92	0.02	0.01
Piers 30-32 Parking Garage	234411	-					0.42	4.37	0.04	0.02
SWL330 Residences	208844	176	0.461	15.0	0.174	0.082	81.1	2632.1	30.6	14.4
SWL330 Retail Buildings	29854	-	1.78E-06	1.86E-05	1.74E-07	6.71E-08	0.05	0.56	0.01	0.00
SWL330 Hotel	178406	-					0.32	3.32	0.03	0.01
SWL330 Shared Space	11447	-					0.02	0.21	0.00	0.00
SWL330 Parking Garage	106339	-					0.19	1.98	0.02	0.01

Notes:
1. EFs based on CalEEMod defaults, equipment assumed to be during 180 summer days.
2. For residences units are lb/dwelling unit/yr.

Area Emissions Estimates

Venue	Floor Area	Dwelling Units with Hearths[1]	Hearth Emissions[2]			
			ROG	NOx	CO	PM_{10}
	[ft^2]		[lb/yr]	[lb/yr]	[lb/yr]	[lb/yr]
SWL330 Residences	208844	121	1.2	10	4.3	0.82

Notes:

1. Number of hearths used is default percent provided by BAAQMD as per CalEEMod methodology. All hearths assumed to be gas-powered; installation of new wood burning fireplaces banned (San Francisco Building Code, Chapter 31, Section 3102.8).
2. Emissions calculated using emission factors from AP-42, Chapter 1, for residential furnaces, as per CalEEMod methodology. Heating value of natural gas was assumed to be 1,020 MMBtu/MMSCF, and default CalEEMod values were used for average heating rate per hour and average time of use per year for San Francisco.

Area Sources	Total Engine Emissions [ton/yr]				
	ROG	CO	NO_x	PM_{10}	$PM_{2.5}$
Architectural Coatings	0.87	--	--	--	--
Consumer Products	4.39	--	--	--	--
Landscaping	0.04	1.33	0.02	0.01	0.01
Hearths	0.00	0.01	0.00	0.00	0.00
Total Project Emissions:	5.30	1.33	0.02	0.01	0.01

APPENDIX WS

Wind and Shadow

Wind Study
April 23, 2015

TABLES

Table 1a: Wind Hazard Results – Original Plaza Design

References	Existing			Existing + Project				Project + Cumulative			
Location Number	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds
1	41	13	e	42	12	-1	e	23	0	-13	
2	28	0		23	0	0		21	0	0	
3	22	0		17	0	0		33	0	0	
4	14	0		21	0	0		15	0	0	
5	36	0		29	0	0		27	0	0	
6	36	0		44	39	39	e	33	0	0	
7	39	6	e	34	0	-6		28	0	-6	
8	35	0		24	0	0		33	0	0	
9	29	0		28	0	0		39	7	7	e
10	24	0		24	0	0		26	0	0	
11	15	0		28	0	0		27	0	0	
12	24	0		23	0	0		21	0	0	
13	33	0		27	0	0		27	0	0	
14	30	0		28	0	0		33	0	0	
15	32	0		29	0	0		24	0	0	
16	27	0		19	0	0		21	0	0	
17	21	0		20	0	0		24	0	0	
18	18	0		31	0	0		30	0	0	
19	20	0		25	0	0		28	0	0	
20	24	0		24	0	0		22	0	0	
21	30	0		22	0	0		29	0	0	

Table 1a: Wind Hazard Results – Original Plaza Design

References	Existing			Existing + Project				Project + Cumulative			
Location Number	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds
22	26	0		25	0	0		25	0	0	
23	21	0		26	0	0		28	0	0	
24	23	0		19	0	0		20	0	0	
25	26	0		16	0	0		15	0	0	
26	34	0		18	0	0		13	0	0	
27	32	0		23	0	0		21	0	0	
28	28	0		33	0	0		33	0	0	
29	25	0		21	0	0		17	0	0	
30	23	0		25	0	0		25	0	0	
31	24	0		20	0	0		23	0	0	
32	24	0		32	0	0		34	0	0	
33	27	0		30	0	0		28	0	0	
34	Data not available			24	0	-		27	0	-	
35				34	0	-		35	0	-	
36				25	0	-		26	0	-	
37				14	0	-		17	0	-	
38				15	0	-		14	0	-	
39				21	0	-		29	0	-	
40				32	0	-		40	10	-	e
41				34	0	-		37	4	-	e
42				21	0	-		22	0	-	

Table 1a: Wind Hazard Results – Original Plaza Design

References	Existing			Existing + Project				Project + Cumulative			
Location Number	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds
43	Data not available			38	2	-	e	34	0	-	
44				34	0	-		31	0	-	
45				25	0	-		24	0	-	
46				24	0	-		28	0	-	
47				22	0	-		23	0	-	
48				23	0	-		21	0	-	
49	31	0		19	0	0		19	0	0	
50	35	0		40	5	5	e	27	0	0	
51	34	0		33	0	0		22	0	0	
52	31	0		28	0	0		23	0	0	
53	23	0		27	0	0		18	0	0	
54	38	3	e	26	0	-3		19	0	-3	
55	29	0		25	0	0		19	0	0	
56	22	0		28	0	0		22	0	0	
57	30	0		23	0	0		15	0	0	
58	19	0		23	0	0		16	0	0	
59	21	0		19	0	0		15	0	0	
60	Data not available			Data not available				Data not available			
61											
62				37	3	-	e	34	0	-	
63				29	0	-		25	0	-	

Table 1a: Wind Hazard Results – Original Plaza Design

References	Existing			Existing + Project				Project + Cumulative			
Location Number	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds
64				33	0	-		33	0	-	
65				45	25	-	e	44	20	-	e
66				37	3	-	e	36	0	-	
67				33	0	-		31	0	-	
68				30	0	-		28	0	-	
69				11	0	-		10	0	-	
70				11	0	-		10	0	-	
71				19	0	-		20	0	-	
72				29	0	-		21	0	-	
73	Data not available			44	18	-	e	33	0	-	
74				30	0	-		22	0	-	
75				24	0	-		23	0	-	
76				27	0	-		20	0	-	
77				20	0	-		16	0	-	
78				18	0	-		17	0	-	
79				20	0	-		20	0	-	
80				9	0	-		9	0	-	
81				26	0	-		22	0	-	
82	31	0		24	0	0		19	0	0	
83	31	0		28	0	0		23	0	0	
84	34	0		20	0	0		15	0	0	

Table 1a: Wind Hazard Results – Original Plaza Design

References	Existing			Existing + Project				Project + Cumulative			
Location Number	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds
85	31	0		26	0	0		25	0	0	
86	32	0		22	0	0		16	0	0	
87	31	0		19	0	0		14	0	0	
88	32	0		10	0	0		11	0	0	
89	31	0		12	0	0		12	0	0	
90	29	0		24	0	0		16	0	0	
91	34	0		25	0	0		18	0	0	
92	32	0		20	0	0		16	0	0	
93	31	0		30	0	0		21	0	0	
94	29	0		20	0	0		18	0	0	
95	35	0		29	0	0		24	0	0	
96	29	0		32	0	0		30	0	0	
97	34	0		23	0	0		23	0	0	
98	39	6	e	35	0	-6		23	0	-6	
99	40	8	e	41	14	6	e	33	0	-8	
100	22	0		21	0	0		26	0	0	
101	32	0		29	0	0		30	0	0	
102	35	0		33	0	0		30	0	0	
103	37	1	e	35	0	-1		33	0	-1	
104	33	0		35	0	0		33	0	0	
105	45	70	e	43	57	-13	e	42	35	-35	e

Table 1a: Wind Hazard Results – Original Plaza Design

References	Existing			Existing + Project				Project + Cumulative			
Location Number	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds
106	39	5	e	42	12	7	e	40	12	7	e
107	Data not available			Data not available				Data not available			
108											
109	29	0		Data not available				Data not available			
110	28	0									
111	32	0									
112	35	0									
113	31	0									
114	28	0									
115	29	0									
116	34	0									
117	30	0									
118	29	0									
119	26	0									
120	28	0									
121	26	0									
122	31	0									
123	30	0									
124	27	0									
125	33	0									
126	33	0									

Table 1a: Wind Hazard Results – Original Plaza Design

References	Existing			Existing + Project				Project + Cumulative			
Location Number	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds
127	34	0		Data not available				Data not available			
128	32	0									
129	33	0									
130	31	0									
131	33	0									
132	33	0									
133	33	0									
134	34	0									
135	33	0									
136	32	0									
137	28	0									
138	29	0									
139	32	0									
140	32	0									
141	31	0									
142	33	0									
Average Wind Speeds, Total Hours & Exceeds	**30**	**112**	**8/103**	**26**	**190**	**-**	**11/104**	**24**	**88**	**-**	**6/104**
Averages & Totals – Sidewalks & Plaza*	**29**	**112**	**8/69**	**26**	**139**	**27**	**6/69**	**24**	**54**	**-58**	**3/69**

*Sidewalks & Plaza: Locations 1 – 33, 49 – 59, 82 – 106

CONSULTING ENGINEERS & SCIENTISTS

Table 2a: Wind Comfort Results – Original Plaza Design

Reference	Existing			Existing + Project				Project + Cumulative			
Location Number	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Existing (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Existing (mph)	Exceeds
1	20	46	e	19	38	-1	e	11	10	-9	
2	16	30	e	14	22	-2	e	9	5	-7	
3	13	16	e	10	5	-3		16	32	3	e
4	6	0		10	7	4		9	2	3	
5	19	45	e	15	25	-4	e	14	24	-5	e
6	17	32	e	22	52	5	e	16	31	-1	e
7	19	41	e	20	48	1	e	14	21	-5	e
8	17	34	e	13	21	-4	e	16	30	-1	e
9	15	26	e	16	30	1	e	20	42	5	e
10	14	19	e	13	18	-1	e	12	16	-2	e
11	8	1		13	19	5	e	15	25	7	e
12	11	10		11	10	0		12	15	1	e
13	18	37	e	15	25	-3	e	14	22	-4	e
14	17	35	e	16	31	-1	e	16	30	-1	e
15	15	26	e	16	28	1	e	13	16	-2	e
16	12	13	e	10	6	-2		11	10	-1	
17	10	6		9	5	-1		11	10	1	
18	8	3		16	28	8	e	15	27	7	e
19	10	6		10	8	0		15	24	5	e
20	14	20	e	14	19	0	e	11	10	-3	

Table 2a: Wind Comfort Results – Original Plaza Design

Reference	Existing			Existing + Project				Project + Cumulative			
Location Number	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Existing (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Existing (mph)	Exceeds
21	16	28	e	12	16	-4	e	14	22	-2	e
22	14	24	e	10	8	-4		11	10	-3	
23	11	10		14	22	3	e	14	19	3	e
24	11	10		10	7	-1		10	6	-1	
25	13	15	e	8	2	-5		8	1	-5	
26	17	34	e	10	5	-7		7	0	-10	
27	16	31	e	12	12	-4	e	11	10	-5	
28	16	31	e	17	34	1	e	17	32	1	e
29	14	24	e	10	8	-4		9	4	-5	
30	13	20	e	11	10	-2		12	13	-1	e
31	12	16	e	11	10	-1		11	10	-1	
32	11	10		17	38	6	e	17	33	6	e
33	14	24	e	17	34	3	e	15	25	1	e
34				13	18	-	e	13	17	-	e
35				20	44	-	e	16	27	-	e
36				14	22	-	e	13	19	-	e
37	Data not available			7	1	-		7	2	-	
38				8	1	-		7	0	-	
39				11	10	-		14	22	-	e
40				18	39	-	e	19	37	-	e

CONSULTING ENGINEERS & SCIENTISTS

Table 2a: Wind Comfort Results – Original Plaza Design

Reference	Existing			Existing + Project				Project + Cumulative			
Location Number	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Existing (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Existing (mph)	Exceeds
41	Data not available			17	36	-	e	19	37	-	e
42				10	8	-		11	10	-	
43				20	45	-	e	19	42	-	e
44				17	36	-	e	17	34	-	e
45				14	22	-	e	13	20	-	e
46				11	10	-		11	10	-	
47				12	14	-	e	11	10	-	
48				10	6	-		9	4	-	
49	16	33	e	10	7	-6		11	10	-5	
50	16	32	e	22	52	6	e	15	27	-1	e
51	18	39	e	16	30	-2	e	11	10	-7	
52	14	25	e	13	15	-1	e	9	4	-5	
53	12	14	e	13	15	1	e	8	2	-4	
54	18	36	e	12	13	-6	e	10	5	-8	
55	15	24	e	12	13	-3	e	10	6	-5	
56	12	16	e	14	19	2	e	10	6	-2	
57	16	31	e	11	10	-5		8	2	-8	
58	10	6		11	10	1		8	2	-2	
59	12	12	e	11	10	-1		8	1	-4	
60	Data not available			Data not available				Data not available			

Table 2a: Wind Comfort Results – Original Plaza Design

Reference	Existing			Existing + Project				Project + Cumulative			
Location Number	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Existing (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Existing (mph)	Exceeds
61	Data not available			Data not available				Data not available			
62				18	39	-	e	16	32	-	e
63				15	25	-	e	14	24	-	e
64				17	36	-	e	16	32	-	e
65				17	33	-	e	17	27	-	e
66				12	12	-	e	12	14	-	e
67				10	7	-		10	9	-	
68				8	5	-		8	5	-	
69				6	0	-		5	0	-	
70				6	0	-		6	0	-	
71				10	5	-		9	4	-	
72				11	10	-		9	5	-	
73				16	27	-	e	14	21	-	e
74				11	10	-		9	5	-	
75				10	7	-		10	6	-	
76				11	10	-		9	6	-	
77				8	3	-		8	2	-	
78				7	2	-		7	1	-	
79				10	6	-		9	6	-	
80				5	0	-		5	0	-	

CONSULTING ENGINEERS & SCIENTISTS

Table 2a: Wind Comfort Results – Original Plaza Design

Reference	Existing			Existing + Project				Project + Cumulative			
Location Number	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Existing (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Existing (mph)	Exceeds
81	Data not available			7	4	-		7	3	-	
82	17	35	e	9	6	-8		9	5	-8	
83	16	33	e	11	10	-5		11	10	-5	
84	18	38	e	7	2	-11		7	1	-11	
85	17	35	e	14	22	-3	e	14	21	-3	e
86	17	37	e	9	4	-8		7	1	-10	
87	17	35	e	11	10	-6		7	0	-10	
88	18	38	e	5	0	-13		5	0	-13	
89	17	34	e	6	0	-11		6	0	-11	
90	15	25	e	14	19	-1	e	7	1	-8	
91	17	34	e	15	23	-2	e	8	2	-9	
92	16	30	e	12	12	-4	e	8	1	-8	
93	16	28	e	17	33	1	e	9	5	-7	
94	14	23	e	11	10	-3		7	2	-7	
95	17	36	e	16	30	-1	e	10	6	-7	
96	16	31	e	16	30	0	e	15	27	-1	e
97	17	31	e	13	19	-4	e	9	4	-8	
98	20	41	e	21	48	1	e	11	10	-9	
99	21	48	e	23	52	2	e	15	26	-6	e
100	11	10		11	10	0		12	14	1	e

Table 2a: Wind Comfort Results – Original Plaza Design

Reference	Existing			Existing + Project				Project + Cumulative			
Location Number	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Existing (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Existing (mph)	Exceeds
101	15	26	e	14	23	-1	e	15	28	0	e
102	18	40	e	17	33	-1	e	16	31	-2	e
103	19	44	e	18	40	-1	e	17	37	-2	e
104	18	41	e	20	47	2	e	18	44	0	e
105	25	51	e	25	50	1	e	23	48	-1	e
106	18	36	e	19	41	1	e	21	48	3	e
107	Data not available			Data not available				Data not available			
108											
109	16	32	e								
110	16	31	e								
111	16	29	e								
112	17	35	e								
113	16	29	e								
114	13	16	e								
115	15	23	e								
116	19	41	e								
117	16	28	e								
118	16	30	e								
119	14	25	e								
120	16	32	e								

Table 2a: Wind Comfort Results – Original Plaza Design

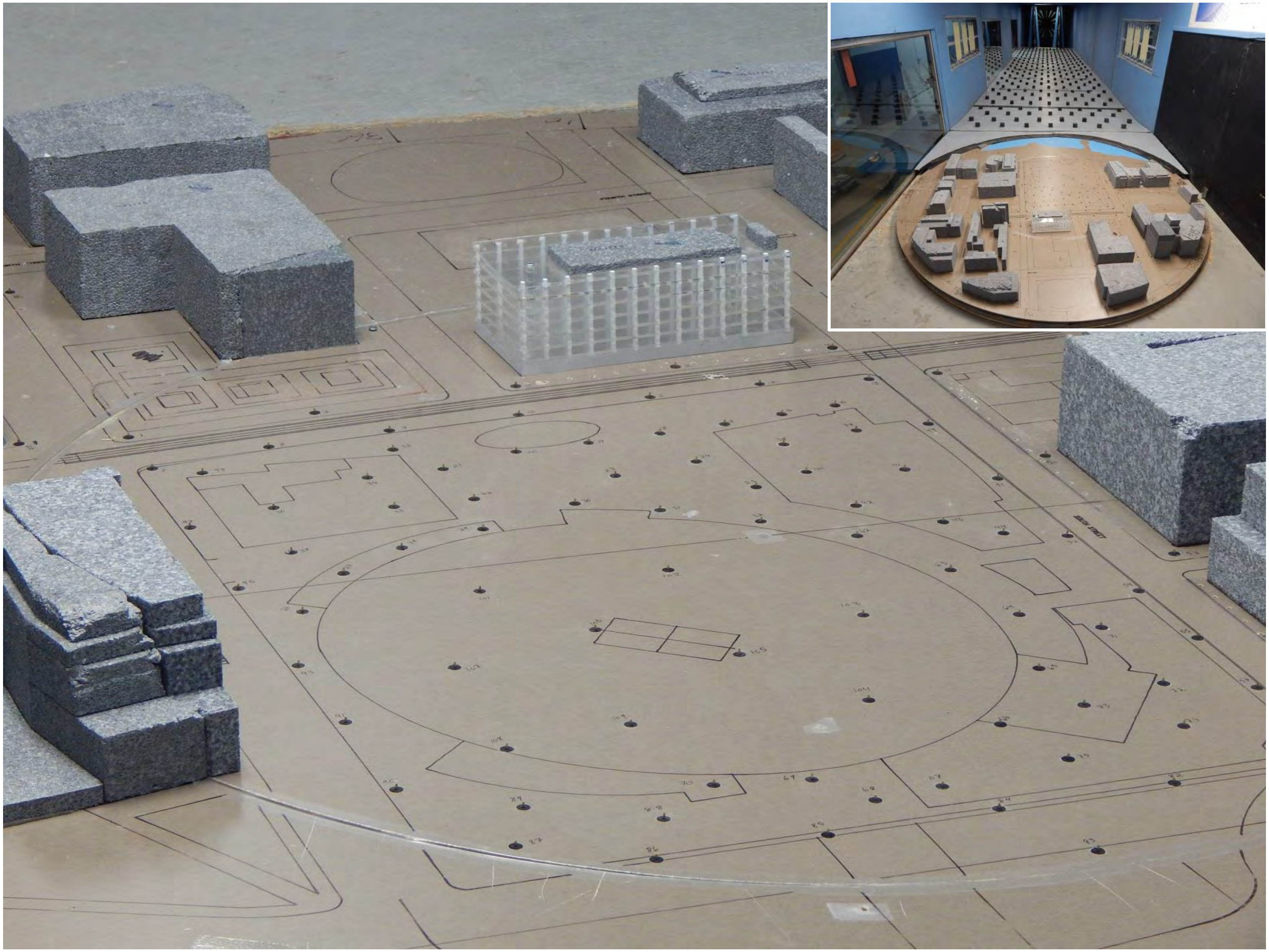
Reference	Existing			Existing + Project				Project + Cumulative			
Location Number	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Existing (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Existing (mph)	Exceeds
121	14	25	e	Data not available				Data not available			
122	16	32	e								
123	16	30	e								
124	15	25	e								
125	16	32	e								
126	17	33	e								
127	17	37	e								
128	17	35	e								
129	17	37	e								
130	16	32	e								
131	18	39	e								
132	16	31	e								
133	17	34	e								
134	17	37	e								
135	17	34	e								
136	17	35	e								
137	15	28	e								
138	15	27	e								
139	18	39	e								
140	18	38	e								

Table 2a: Wind Comfort Results – Original Plaza Design

Reference	Existing			Existing + Project				Project + Cumulative			
Location Number	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Existing (mph)	Exceeds	Wind Speed Exceeded 10% of Time (mph)	Percent of Time Wind Speed Exceeds 11 mph	Speed Change Relative to Existing (mph)	Exceeds
141	17	36	e	Data not available				Data not available			
142	17	37	e								
Average Wind Speeds & Percentages, Total Exceedances	**15**	**28**	**92/103**	**13**	**19**	**-**	**58/104**	**12**	**14**	**-**	**46/104**
Averages & Totals – Sidewalks & Plaza*	**15**	**27**	**58/69**	**14**	**21**	**-2**	**43/69**	**12**	**15**	**-3**	**31/69**

*Sidewalks & Plaza: Locations 1 – 33, 49 – 59, 82 – 106

FIGURES



Wind Tunnel Study Model
Existing

Warrior's Arena – San Francisco, CA

Project #1401775

Figure No. 1a

Date: April 23 , 2015

RWDI

Wind Tunnel Study Model
Existing + Project

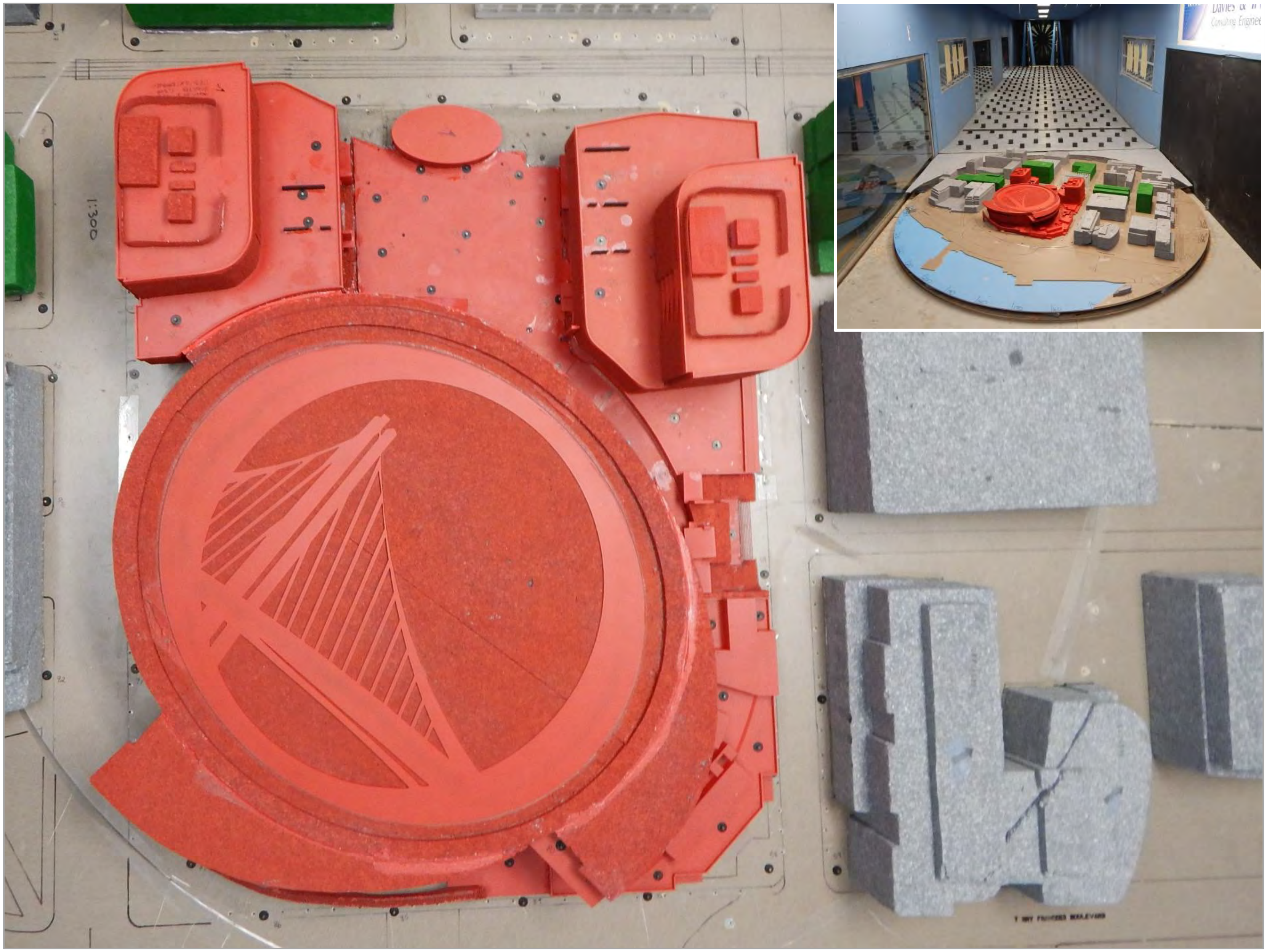
Warrior's Arena – San Francisco, CA

Project #1401775

Figure No. 1b

Date: April 15 , 2015

RWDI



Wind Tunnel Study Model
Project + Cumulative

Warrior's Arena – San Francisco, CA

Project #1401775

Figure No. 1c

Date: April 15, 2015

Pedestrian Wind Hazard Conditions - Existing
Annual (January to December, 6:00am to 8:00pm)

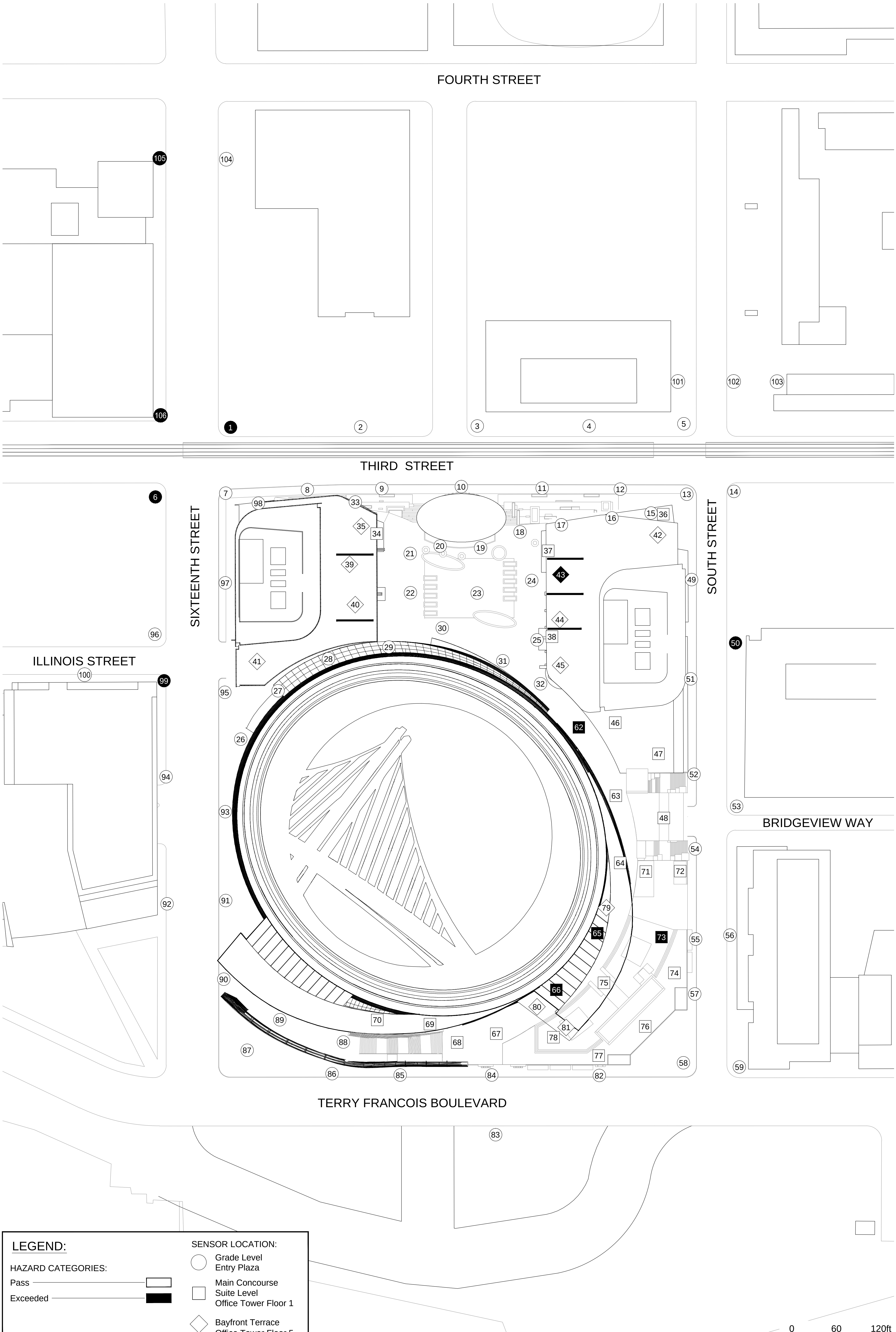
Warriors Arena - San Francisco, CA

True North

Project #1401775

Drawn by: ARM	Figure: 2a
Approx. Scale:	1"=120'
Date Revised:	April 22, 2015

RWDI



Pedestrian Wind Hazard Conditions - Existing + Project
Annual (January to December, 6:00am to 8:00pm)

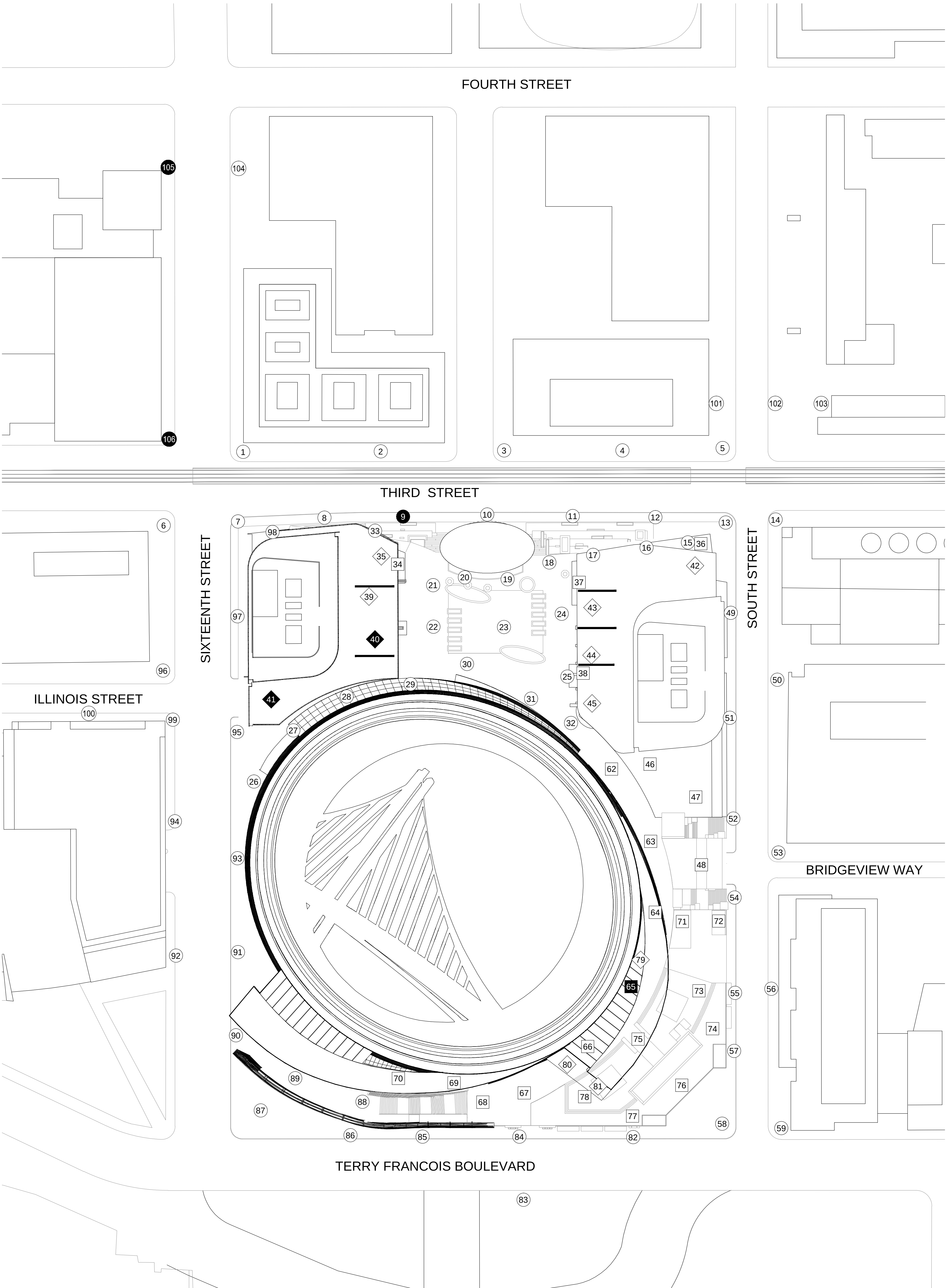
Warrior's Arena - San Francisco, CA

True North

Project #1401775

Drawn by: ARM	Figure: 2b
Approx. Scale:	1"=120'
Date Revised:	Apr. 15, 2015

RWDI



LEGEND:

HAZARD CATEGORIES:

Pass

Exceeded

SENSOR LOCATION:

Grade Level
Entry Plaza

Main Concourse
Suite Level
Office Tower Floor 1

Bayfront Terrace
Office Tower Floor 5

0 60 120ft

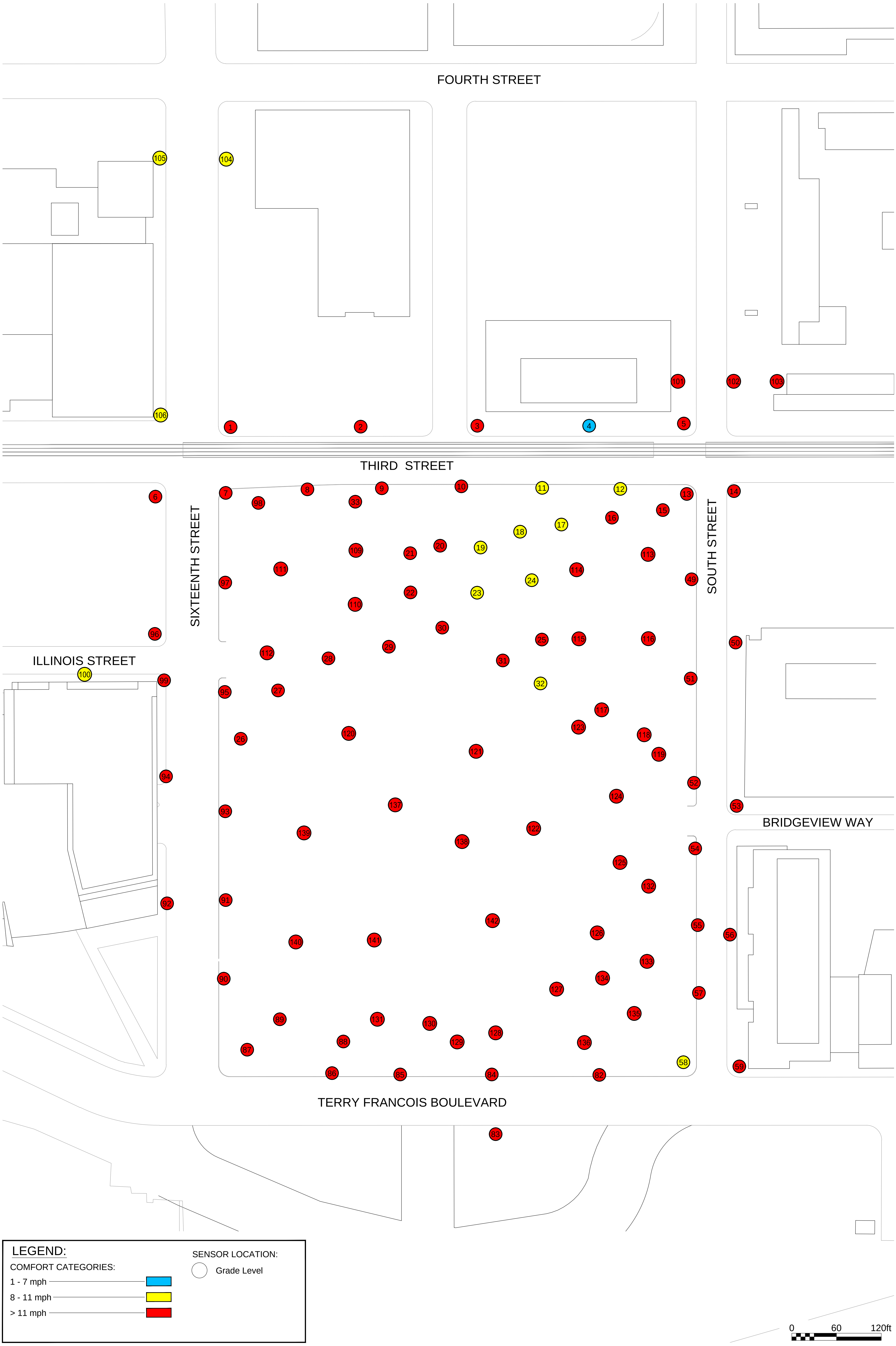
Pedestrian Wind Hazard Conditions - Project + Cumulative
Annual (January to December, 6:00am to 8:00pm)

True North

Drawn by: ARM	Figure: 2c
Approx. Scale:	1"=120'
Date Revised:	Apr. 15, 2015

Warriors Arena - San Francisco, CA

Project #1401775



Pedestrian Wind Comfort Conditions - Existing
Annual (January to December, 6:00am to 8:00pm)

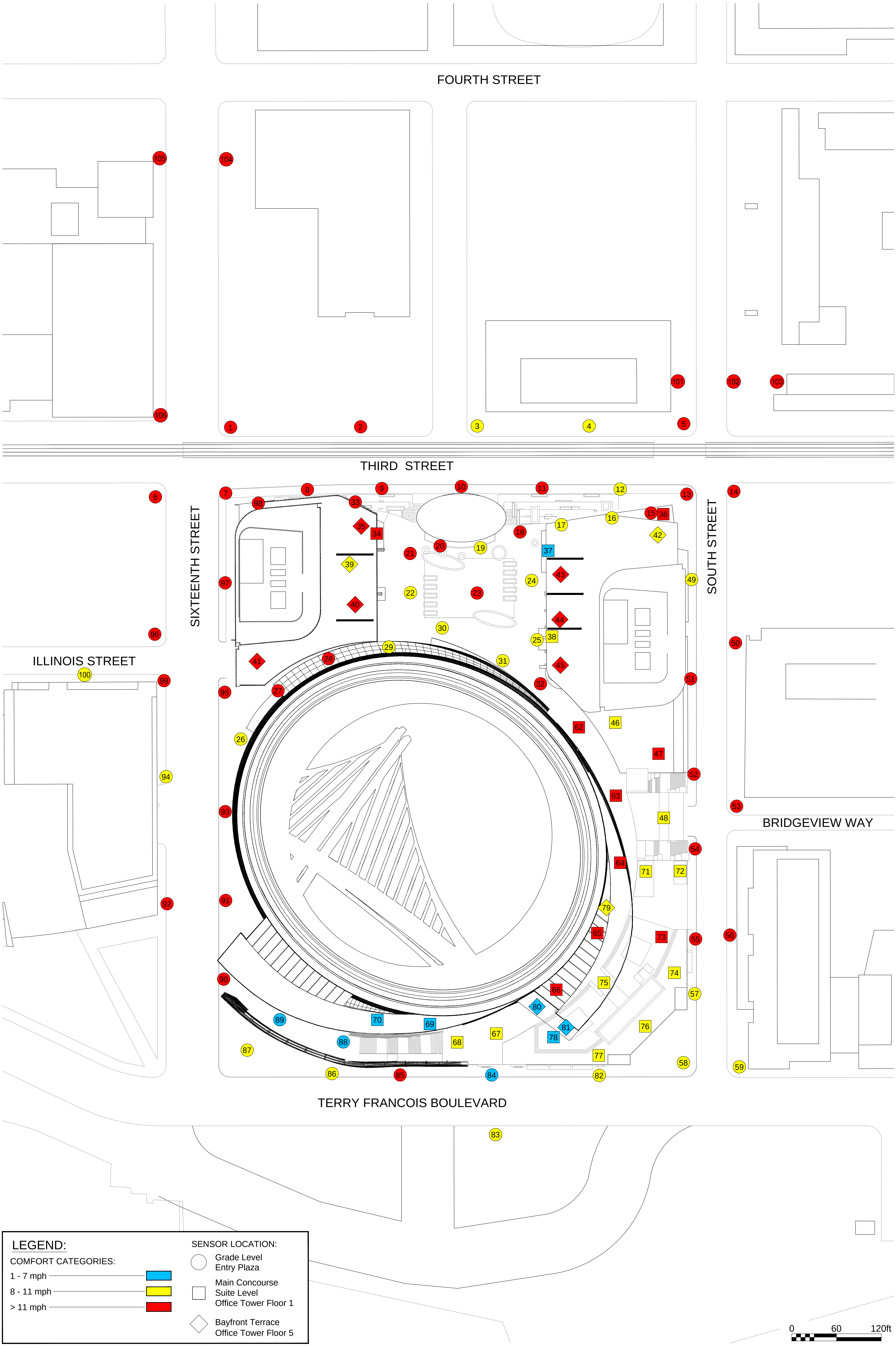
Warriors Arena - San Francisco, CA

True North

Project #1401775

Drawn by:	ARM	Figure:	3a
Approx. Scale:	1"=120'		
Date Revised:	April 22, 2015		

RWDI



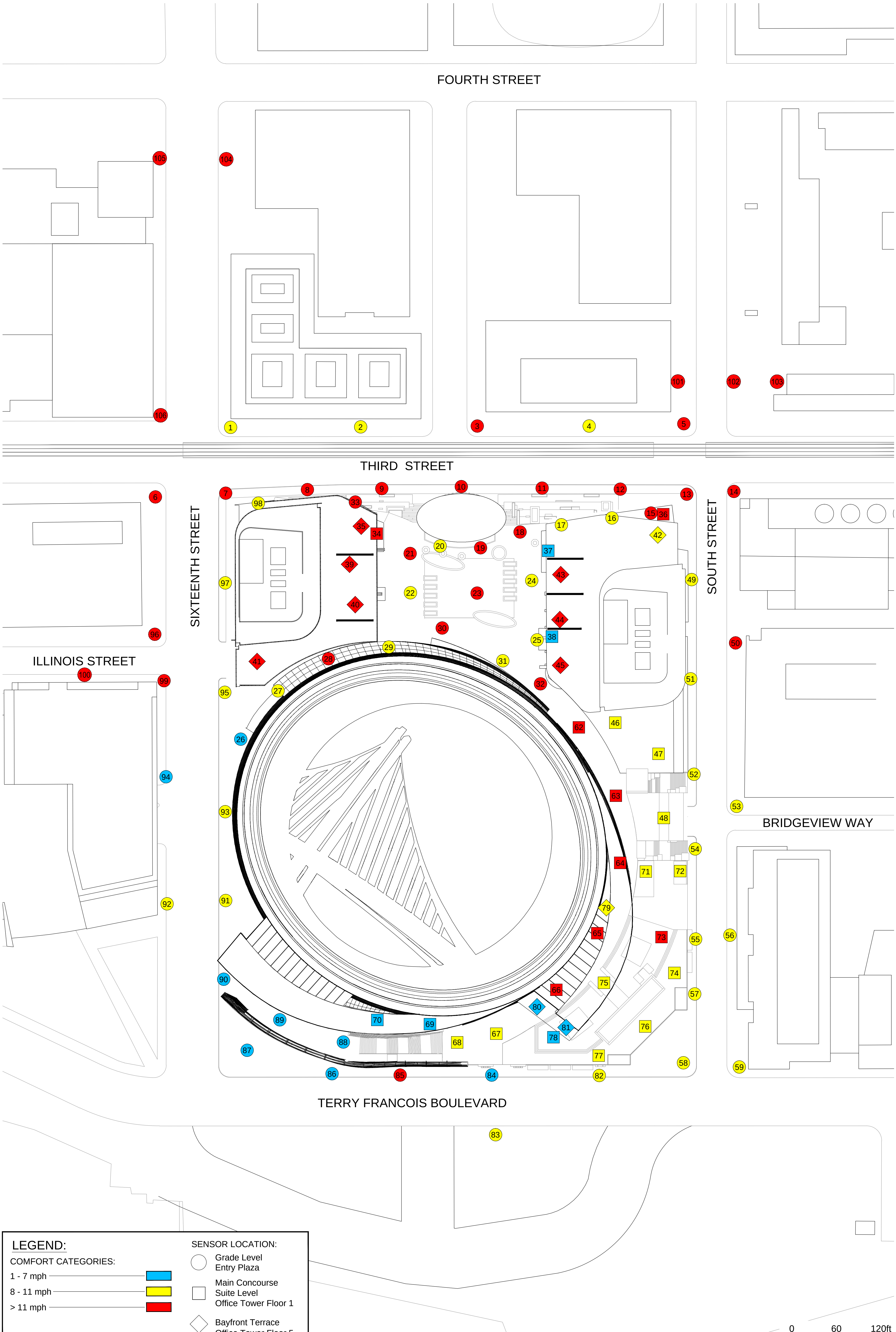
Pedestrian Wind Comfort Conditions - Existing + Project
Annual (January to December, 6:00am to 8:00pm)

Warriors Arena - San Francisco, CA

Project #1401775

Drawn by:	ARM	Figure:	3b
Approx. Scale:	1"=120'		
Date Revised:	Apr. 15, 2015		

RWDI



LEGEND:

COMFORT CATEGORIES:
- 1 - 7 mph (blue)
- 8 - 11 mph (yellow)
- > 11 mph (red)

SENSOR LOCATION:
- ○ Grade Level, Entry Plaza
- □ Main Concourse, Suite Level, Office Tower Floor 1
- ◇ Bayfront Terrace, Office Tower Floor 5

Pedestrian Wind Comfort Conditions - Project + Cumulative Annual (January to December, 6:00am to 8:00pm) Warriors Arena - San Francisco, CA	True North Project #1401775	Drawn by: ARM Approx. Scale: Date Revised:	Figure: 3c 1"=120' Apr. 15, 2015

Wind Study
May 12, 2015

TABLES

Table 1: Wind Hazard Results – VARA Plaza Design

References	Existing			Existing + VARA				VARA + Cumulative			
Location Number	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds
1	41	13	e	28	0	-13		22	0	-13	
2	28	0		22	0	0		26	0	0	
3	22	0		18	0	0		31	0	0	
4	14	0		19	0	0		15	0	0	
5	36	0		28	0	0		26	0	0	
6	36	0		42	22	22	e	30	0	0	
7	39	6	e	34	0	-6		27	0	-6	
8	35	0		24	0	0		32	0	0	
9	29	0		29	0	0		37	3	3	e
10	24	0		26	0	0		35	0	0	
11	15	0		27	0	0		28	0	0	
12	24	0		24	0	0		22	0	0	
13	33	0		27	0	0		25	0	0	
14	30	0		29	0	0		26	0	0	
15	32	0		28	0	0		24	0	0	
16	27	0		20	0	0		20	0	0	
17	21	0		17	0	0		20	0	0	
18	18	0		34	0	0		34	0	0	
19	20	0		20	0	0		26	0	0	
20	24	0		26	0	0		31	0	0	
21	30	0		17	0	0		22	0	0	

Table 1: Wind Hazard Results – VARA Plaza Design

References	Existing			Existing + VARA				VARA + Cumulative			
Location Number	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds
22	26	0		19	0	0		23	0	0	
23	21	0		23	0	0		24	0	0	
24	23	0		21	0	0		17	0	0	
25	26	0		17	0	0		15	0	0	
26	34	0		18	0	0		13	0	0	
27	32	0		26	0	0		24	0	0	
28	28	0		32	0	0		30	0	0	
29	25	0		23	0	0		17	0	0	
30	23	0		24	0	0		23	0	0	
31	24	0		20	0	0		20	0	0	
32	24	0		35	0	0		34	0	0	
33	27	0		26	0	0		29	0	0	
34	Data not available			26	0	-		26	0	-	
35				33	0	-		34	0	-	
36				25	0	-		23	0	-	
37				14	0	-		14	0	-	
38				16	0	-		13	0	-	
39				21	0	-		28	0	-	
40				31	0	-		39	5	-	e
41				33	0	-		35	0	-	
42				21	0	-		21	0	-	

Table 1: Wind Hazard Results – VARA Plaza Design

References	Existing			Existing + VARA				VARA + Cumulative			
Location Number	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds
43	Data not available			37	2	-	e	34	0	-	
44				32	0	-		31	0	-	
45				26	0	-		24	0	-	
46				21	0	-		28	0	-	
47				22	0	-		23	0	-	
48				22	0	-		22	0	-	
49	31	0		20	0	0		20	0	0	
50	35	0		39	3	3	e	33	0	0	
51	34	0		33	0	0		24	0	0	
52	31	0		28	0	0		23	0	0	
53	23	0		27	0	0		16	0	0	
54	38	3	e	26	0	-3		19	0	-3	
55	29	0		23	0	0		20	0	0	
56	22	0		26	0	0		19	0	0	
57	30	0		22	0	0		16	0	0	
58	19	0		23	0	0		16	0	0	
59	21	0		17	0	0		13	0	0	
60	Data not available			Data not available				Data not available			
61											
62				35	0	-		35	0	-	
63				28	0	-		26	0	-	

Table 1: Wind Hazard Results – VARA Plaza Design

References	Existing			Existing + VARA				VARA + Cumulative			
Location Number	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds
64	Data not available			32	0	-		34	0	-	
65				44	21	-	e	42	12	-	e
66				38	3	-	e	34	0	-	
67				33	0	-		30	0	-	
68				30	0	-		26	0	-	
69				11	0	-		10	0	-	
70				11	0	-		9	0	-	
71				19	0	-		20	0	-	
72				27	0	-		19	0	-	
73				43	16	-	e	29	0	-	
74				29	0	-		18	0	-	
75				24	0	-		21	0	-	
76				30	0	-		21	0	-	
77				19	0	-		16	0	-	
78				18	0	-		16	0	-	
79				20	0	-		20	0	-	
80				9	0	-		8	0	-	
81				27	0	-		23	0	-	
82	31	0		23	0	0		19	0	0	
83	31	0		27	0	0		22	0	0	
84	34	0		20	0	0		15	0	0	

Table 1: Wind Hazard Results – VARA Plaza Design

References	Existing			Existing + VARA				VARA + Cumulative			
Location Number	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds
85	31	0		25	0	0		24	0	0	
86	32	0		23	0	0		16	0	0	
87	31	0		17	0	0		14	0	0	
88	32	0		11	0	0		10	0	0	
89	31	0		11	0	0		12	0	0	
90	29	0		20	0	0		14	0	0	
91	34	0		24	0	0		17	0	0	
92	32	0		20	0	0		16	0	0	
93	31	0		27	0	0		18	0	0	
94	29	0		18	0	0		17	0	0	
95	35	0		24	0	0		21	0	0	
96	29	0		30	0	0		29	0	0	
97	34	0		21	0	0		22	0	0	
98	39	6	e	37	9	3	e	19	0	-6	
99	40	8	e	41	17	9	e	33	0	-8	
100	22	0		20	0	0		26	0	0	
101	32	0		27	0	0		28	0	0	
102	35	0		31	0	0		30	0	0	
103	37	1	e	34	0	-1		31	0	-1	
104	33	0		30	0	0		28	0	0	
105	45	70	e	42	43	-27	e	39	13	-57	e

Table 1: Wind Hazard Results – VARA Plaza Design

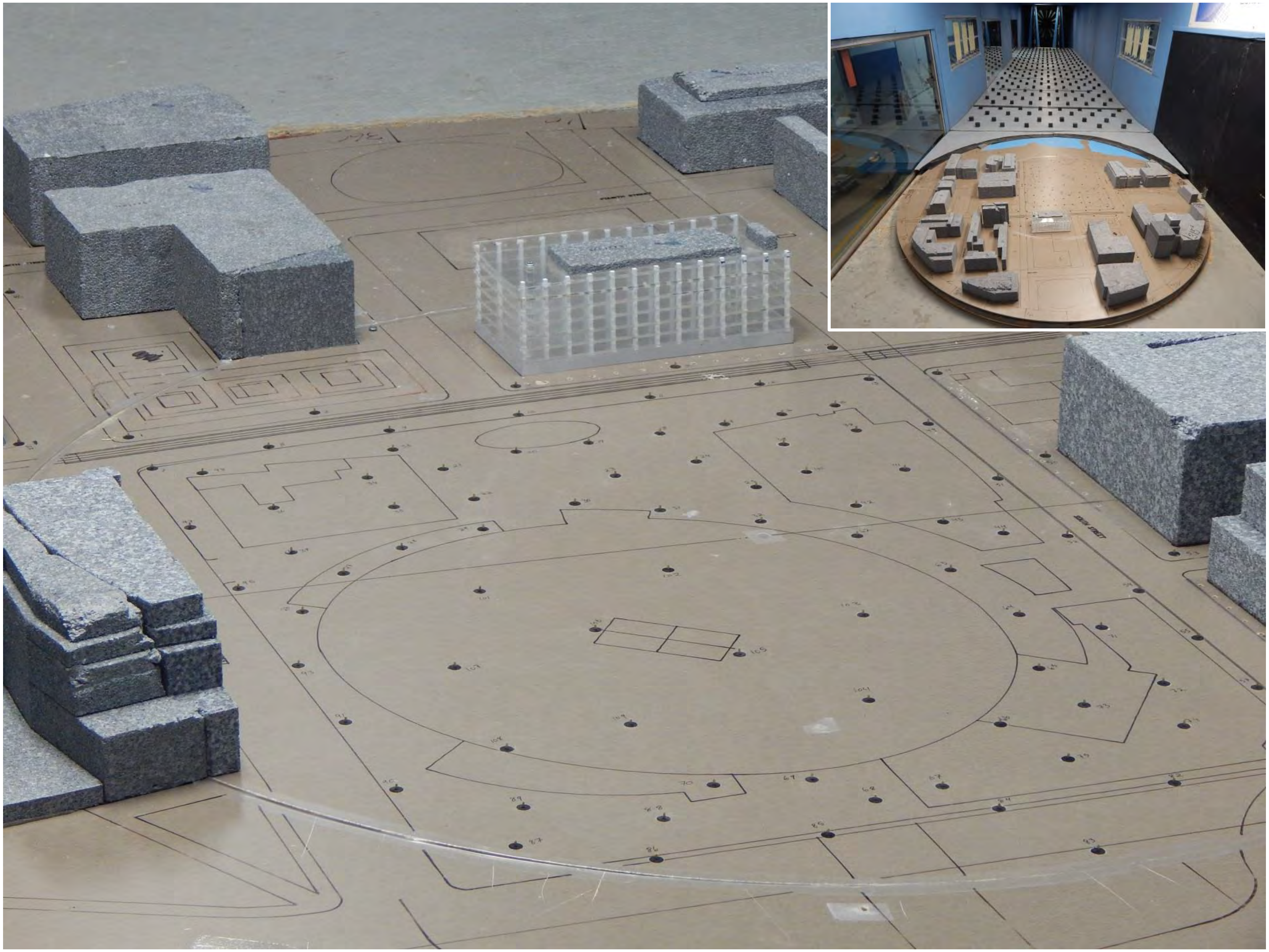
References	Existing			Existing + VARA				VARA + Cumulative			
Location Number	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds
106	39	5	e	40	7	2	e	39	7	2	e
107	Data not available			Data not available				Data not available			
108											
109	29	0		Data not available				Data not available			
110	28	0									
111	32	0									
112	35	0									
113	31	0									
114	28	0									
115	29	0									
116	34	0									
117	30	0									
118	29	0									
119	26	0									
120	28	0									
121	26	0									
122	31	0									
123	30	0									
124	27	0									
125	33	0									
126	33	0									

Table 1: Wind Hazard Results – VARA Plaza Design

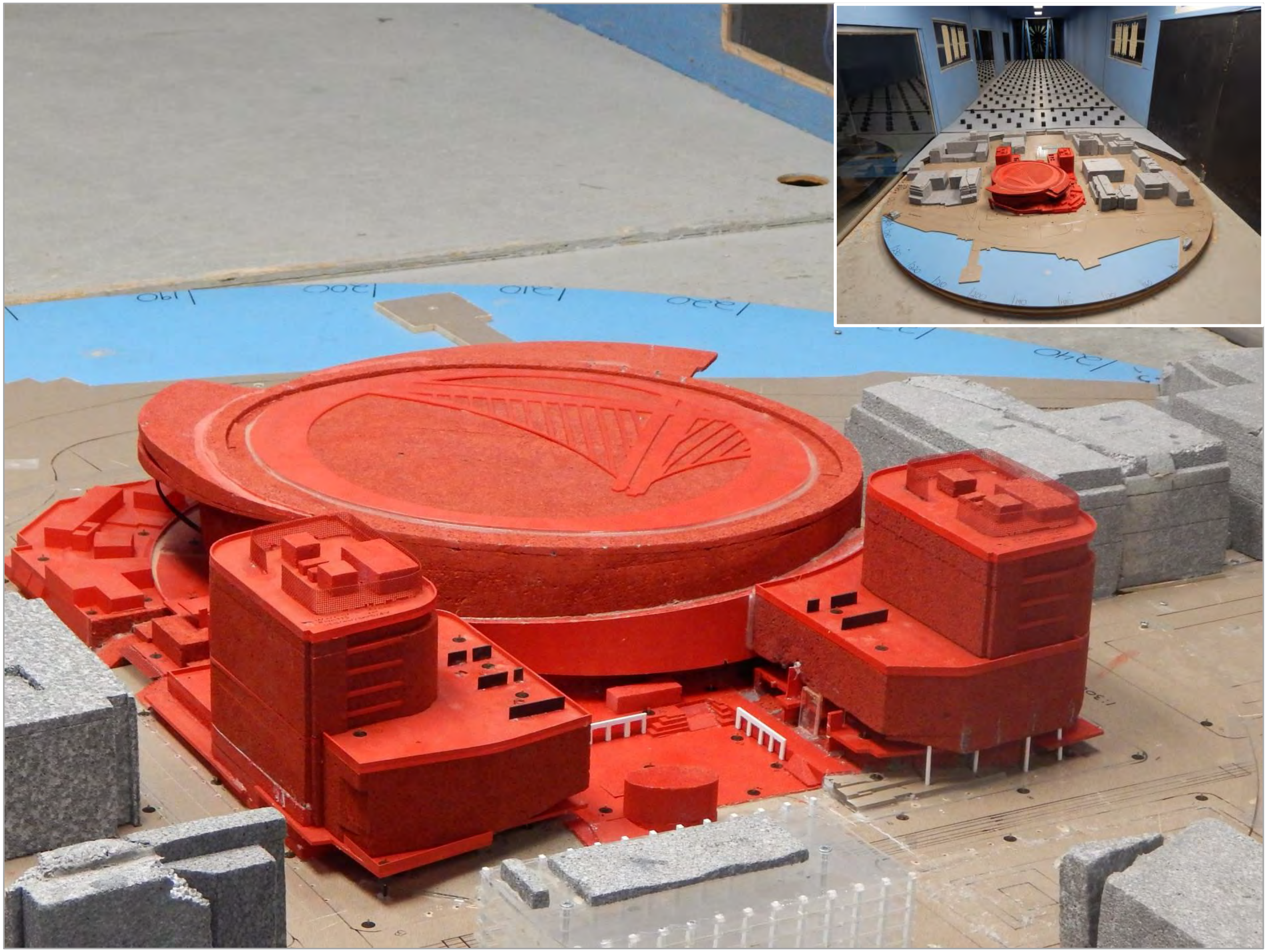
References	Existing			Existing + VARA				VARA + Cumulative			
Location Number	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds	Wind Speed Exceeded 1 hour/year (mph)	Hours per Year Wind Speed Exceeds Hazard Criteria	Hours Change Relative to Existing	Exceeds
127	34	0		Data not available				Data not available			
128	32	0									
129	33	0									
130	31	0									
131	33	0									
132	33	0									
133	33	0									
134	34	0									
135	33	0									
136	32	0									
137	28	0									
138	29	0									
139	32	0									
140	32	0									
141	31	0									
142	33	0									
Average Wind Speeds, Total Hours & Exceeds	**30**	**112**	**8 / 103**	**26**	**143**	**-**	**10 / 104**	**24**	**40**	**-**	**5 / 104**
Averages & Totals – Sidewalks & Plaza*	**29**	**112**	**8 / 69**	**25**	**101**	**-11**	**6 / 69**	**23**	**23**	**-89**	**3 / 69**

*Sidewalks & Plaza: Locations 1 – 33, 49 – 59, 82 – 106

FIGURES



Wind Tunnel Study Model **Existing** Warrior's Arena – San Francisco, CA Project #1401775	Figure No. 1a Date: April 23 , 2015	RWDI



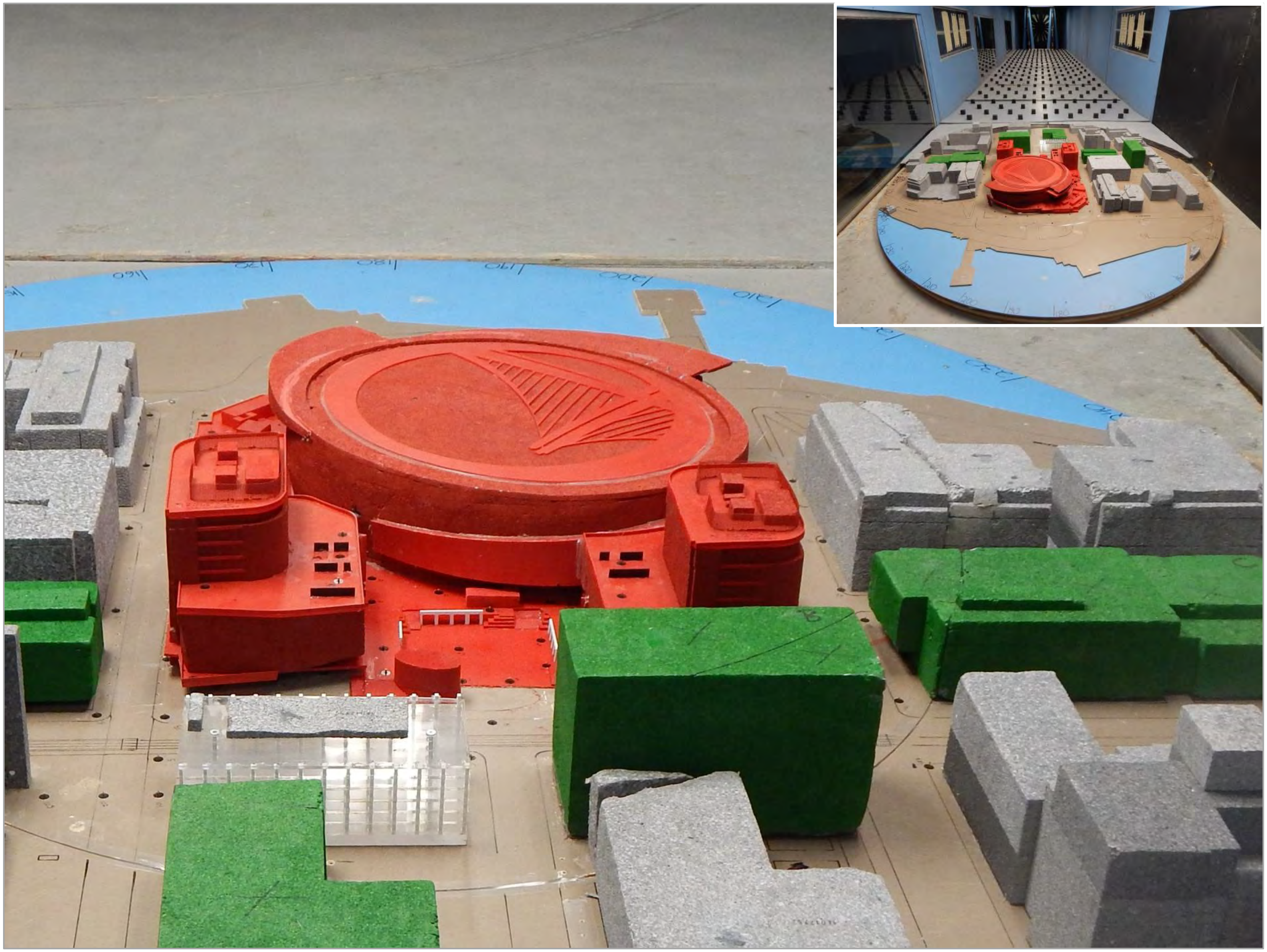
Wind Tunnel Study Model
Existing + VARA Project

Warrior's Arena – San Francisco, CA

Project #1401775

Figure No. 1b

Date: May 12 , 2015



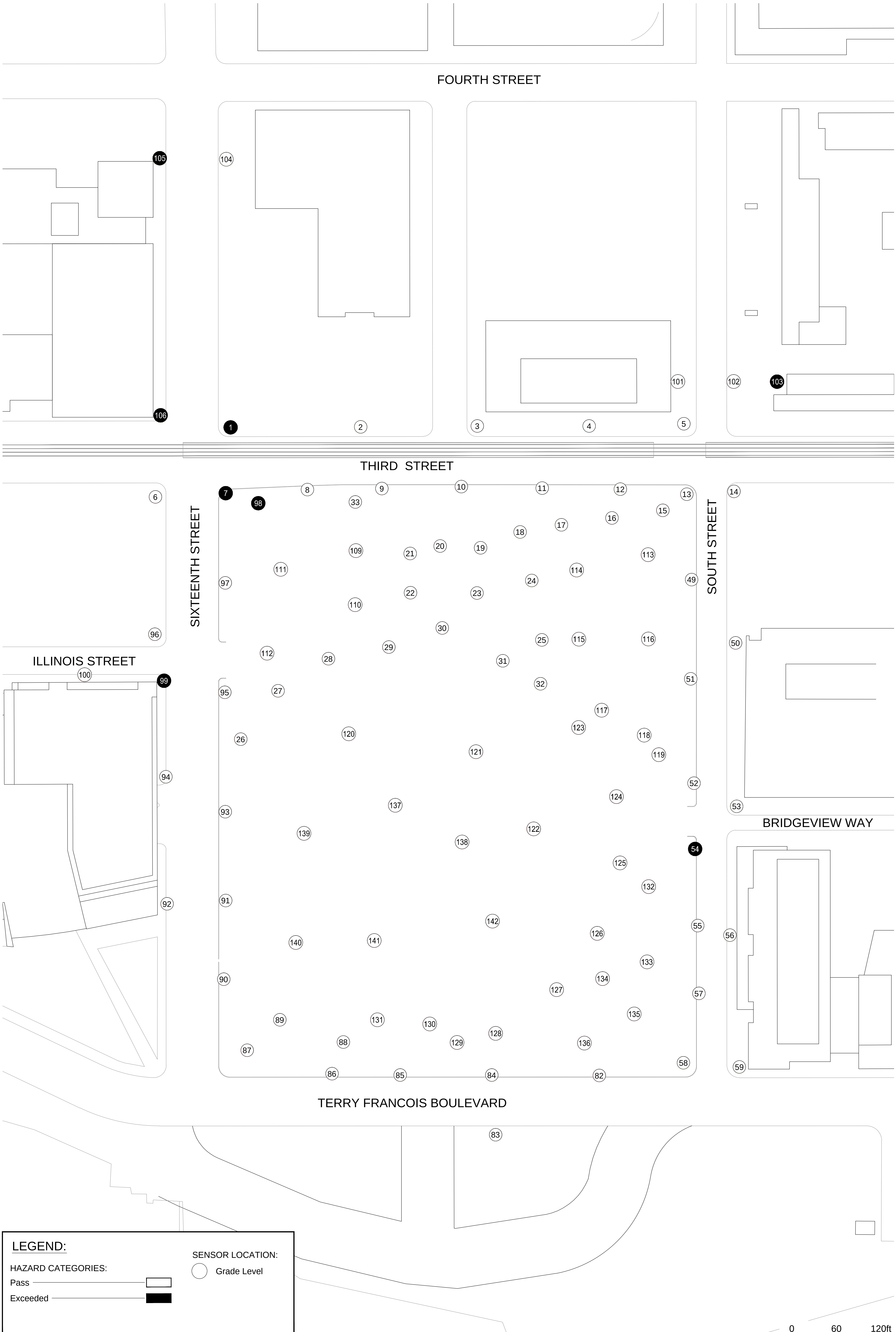
Wind Tunnel Study Model
VARA Project + Cumulative

Warrior's Arena – San Francisco, CA

Project #1401775

Figure No. 1c

Date: May 12 , 2015



Pedestrian Wind Hazard Conditions - Existing
Annual (January to December, 6:00am to 8:00pm)

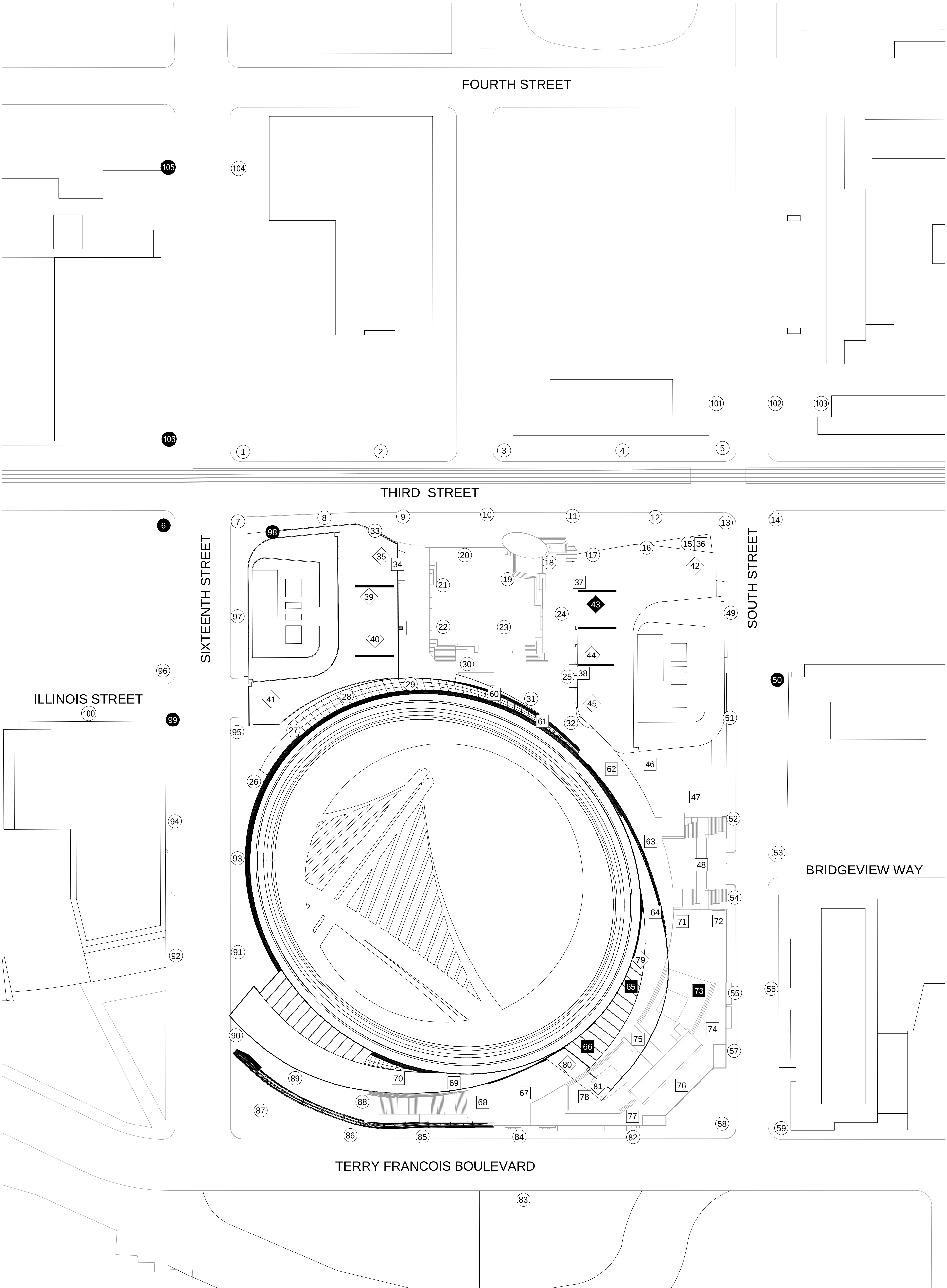
Warriors Arena - San Francisco, CA

True North

Project #1401775

Drawn by:	ARM	Figure:	2a
Approx. Scale:			1"=120'
Date Revised:			April 22, 2015

RWDI



LEGEND:

HAZARD CATEGORIES:

- Pass
- Exceeded

SENSOR LOCATION:

- (Circle) Grade Level, Entry Plaza
- (Square) Main Concourse, Suite Level, Office Tower Floor 1
- (Diamond) Bayfront Terrace, Office Tower Floor 5

Pedestrian Wind Hazard Conditions - Existing + VARA Project
Annual (January to December, 6:00am to 8:00pm)

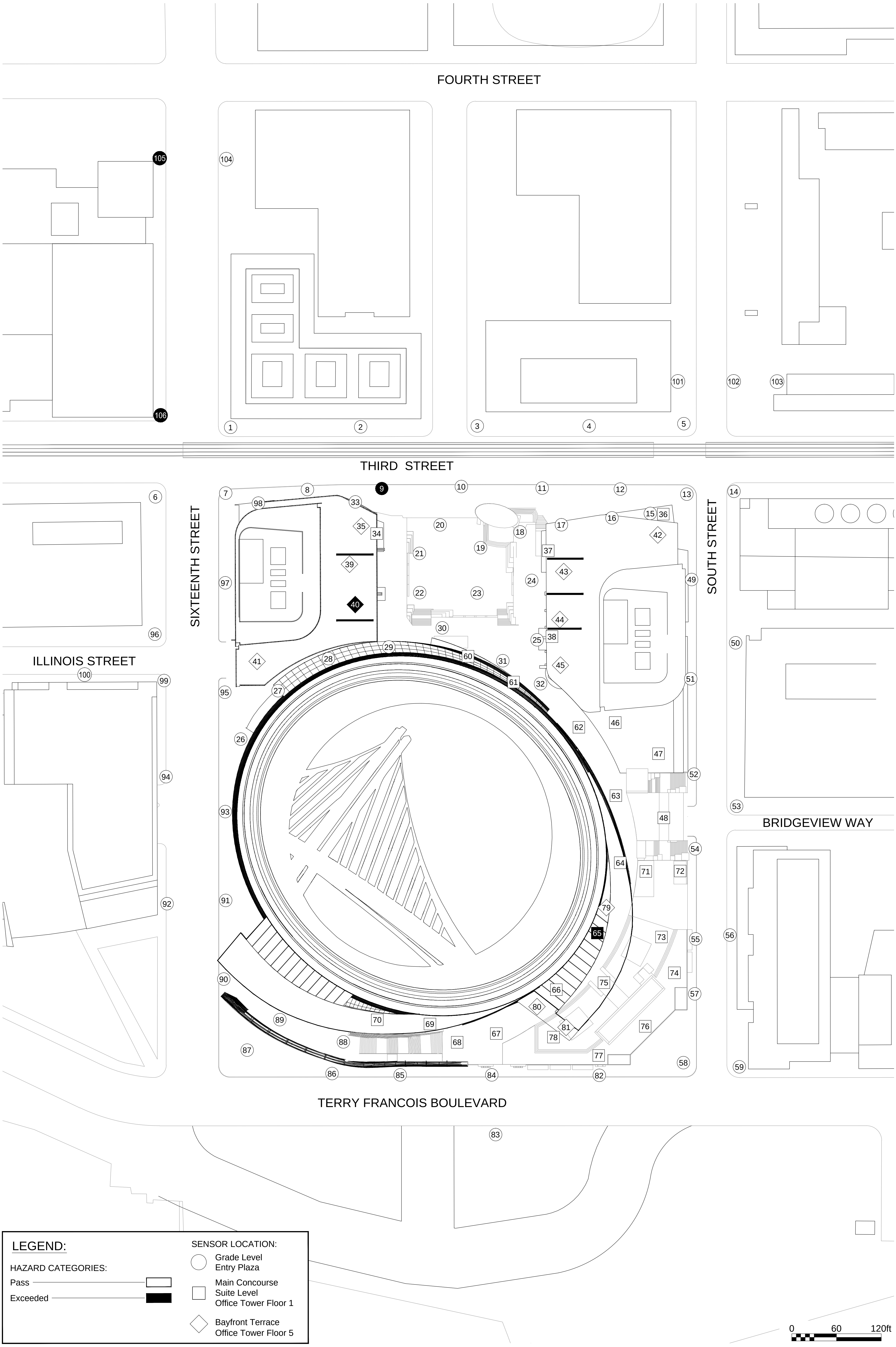
Warriors Arena - San Francisco, CA

True North

Project #1401775

Drawn by:	ARM	Figure:	2b
Approx. Scale:	1"=120'		
Date Revised:	May 12, 2015		

RWDI



Pedestrian Wind Hazard Conditions - VARA Project + Cumulative
Annual (January to December, 6:00am to 8:00pm)

Warriors Arena - San Francisco, CA

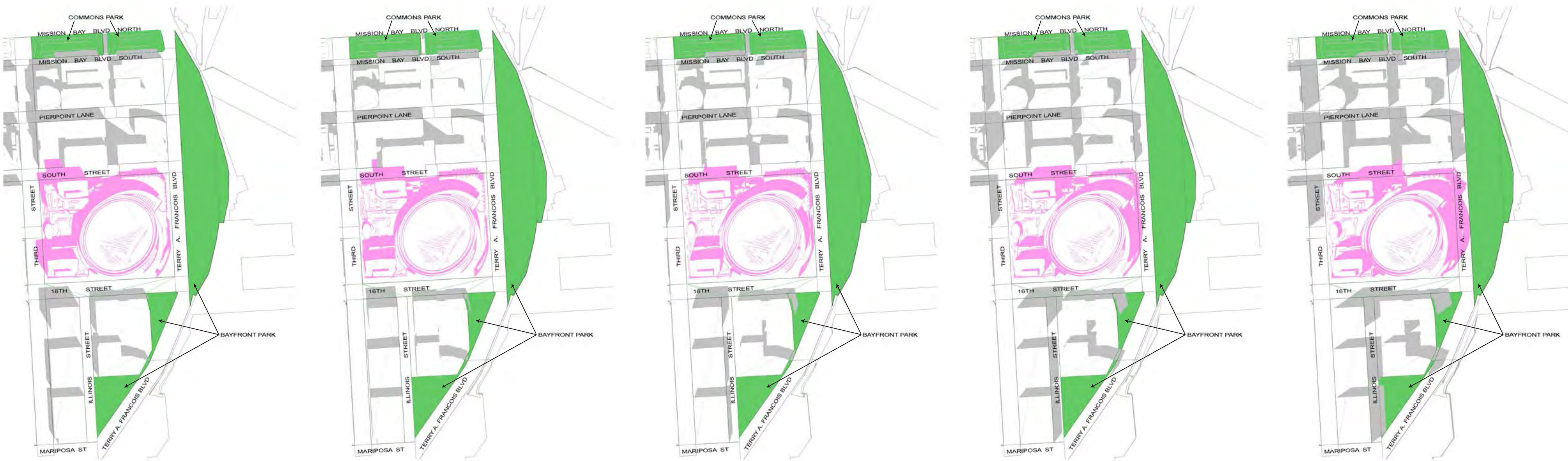
True North

Project #1401775

Drawn by: ARM	Figure: 2c
Approx. Scale:	1"=120'
Date Revised:	May 12, 2015

RWDI

Shadow



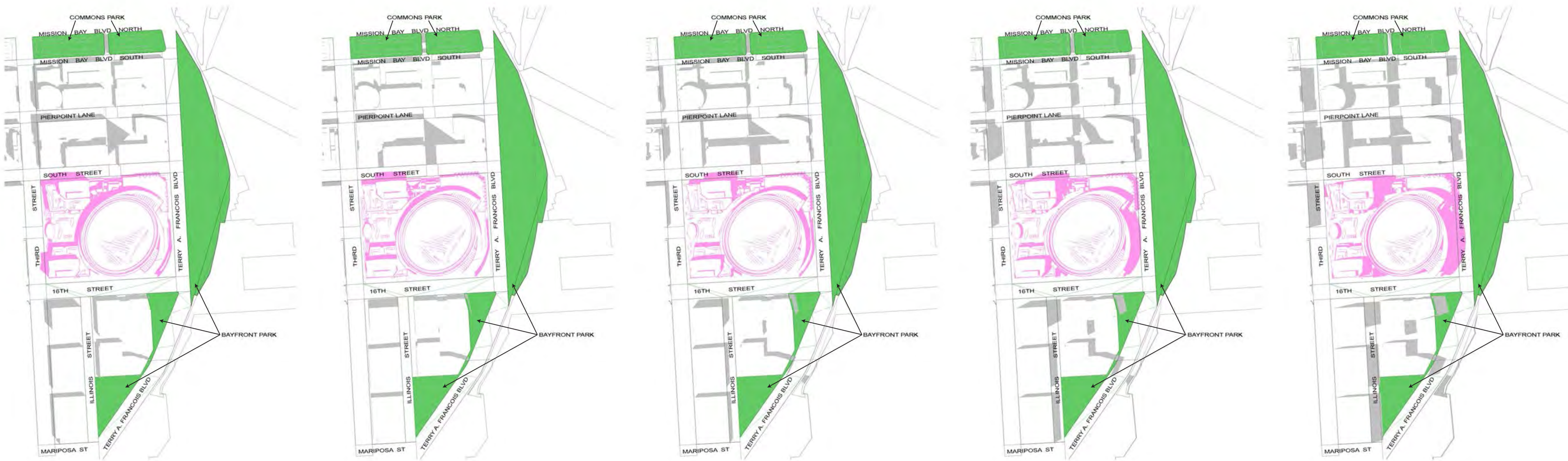
12:00 NOON   1:00 PM   2:00 PM   3:00 PM   4:00 PM

Public open space areas shown in green fill; proposed project shadows are shown in red; and shadows from existing and cumulative development are shown in grey

Figure 1: March 21 Shadows

Public open space areas shown in green fill; proposed project shadows are shown in red; and shadows from existing and cumulative development are shown in grey

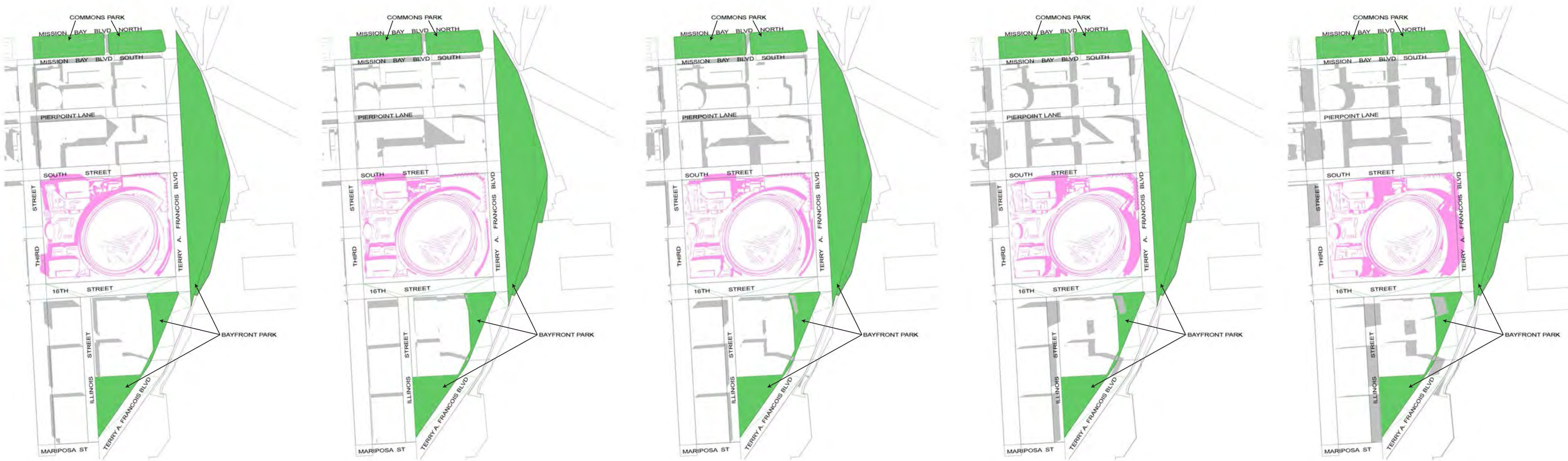
Figure 2: April 21 Shadows



12:00 NOON 1:00 PM 2:00 PM 3:00 PM 4:00 PM

Public open space areas shown in green fill; proposed project shadows are shown in red; and shadows from existing and cumulative development are shown in grey

Figure 3: May 21 Shadows



12:00 NOON　1:00 PM　2:00 PM　3:00 PM　4:00 PM

Public open space areas shown in green fill; proposed project shadows are shown in red; and shadows from existing and cumulative development are shown in grey

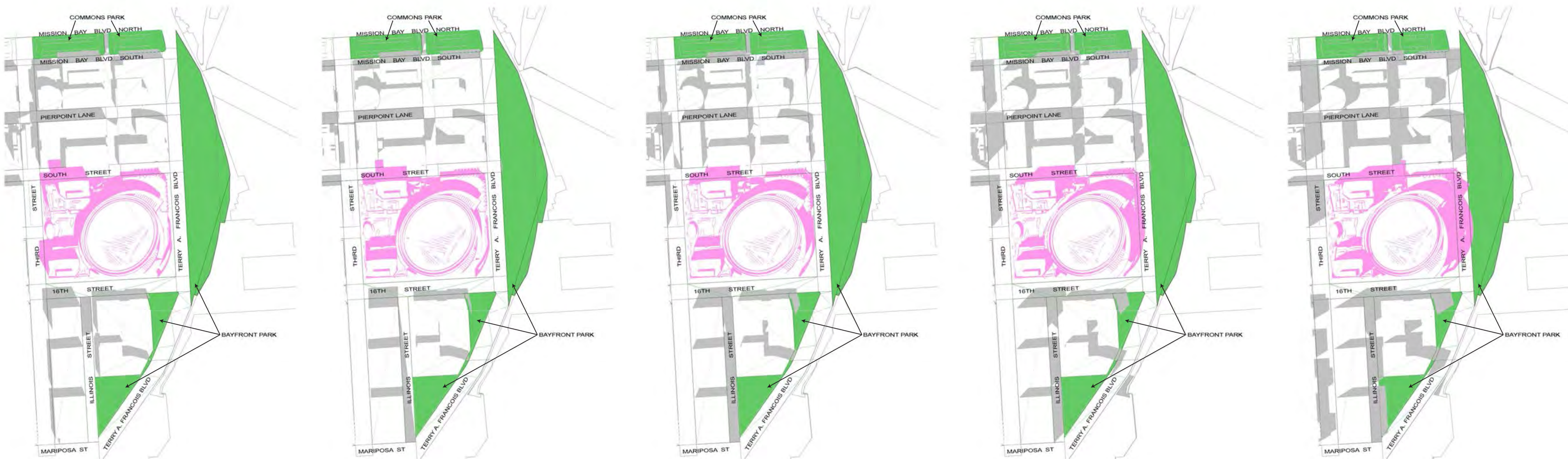
Figure 4: June 21 Shadows

Public open space areas shown in green fill; proposed project shadows are shown in red; and shadows from existing and cumulative development are shown in grey

Figure 5: July 21 Shadows

Public open space areas shown in green fill; proposed project shadows are shown in red; and shadows from existing and cumulative development are shown in grey

Figure 6: August 21 Shadows



12:00 NOON   1:00 PM   2:00 PM   3:00 PM   4:00 PM

Public open space areas shown in green fill; proposed project shadows are shown in red; and shadows from existing and cumulative development are shown in grey

Figure 7: September 21 Shadows

APPENDIX HYD

Combined Sewer Impacts Analysis Technical Memorandum

Subject:	**Combined Sewer Impacts Analysis**
Project:	Golden State Warriors Arena EIR
Prepared By:	Beth Goldstein, PE, LEED AP, QSD/QSP
Date:	February 25, 2015
Reference:	130001

1 Purpose

The purpose of this analysis is to determine the changes, if any, to the frequency, duration or volume of combined sewer discharges (CSDs) from the City's combined sewer system (CSS) due to the contribution of dry weather flow (DWF) from the proposed Golden State Warriors (GSW) arena in the Mission Bay area of San Francisco, CA. This analysis considers only the impact to CSD from changes in DWF only, it does not analyze the impacts on dry weather capacity of the CSS (that analysis is being conducted by SFDPW)[1].

2 Scenarios Analyzed

Three scenarios were analyzed: base case, project, and cumulative. The base case scenario includes existing conditions plus developments and improvements expected to be substantially complete previous to occupancy of the GSW arena. The project scenario adds the DWF from the arena only and the cumulative scenario adds the project DWF plus DWF from reasonably foreseeable projects in the basin. In all three scenarios, the wet weather flow (stormwater runoff) is assumed to not contribute to the CSS; rather is treated and pumped directly to the Bay. All DWF from the proposed GSW arena is assumed to flow to the Mariposa pump station (MPS), therefore Mariposa is the only basin analyzed.

3 Description of Model

The model used for this analysis is a single basin, mass balance hydrologic model developed by SFDPW called "hydrocalc". It takes static hydrologic inputs such as area, C factor, storage volume, pumping rate, and applies a user selected rainfall file as time varying input. The time step is 5 minute.

4 Model Inputs

The following inputs were used in analyzing the three scenarios described in Section 2:

[1] SFDPW, "Mariposa Pump Station (MPS) Dry Weather Flow Hydraulic Analysis", Technical Memorandum from Bassam Aldhafari to Manfred Wong and Bessie Tam, February 3, 2015.

Annual Rain (inch)[1]	Contributing Acres[2]	C Factor[1]	WW Pump[2] (mgd)	DW Pump[2] (mgd)
26	180	0.76	10	1.2

Data Sources:
1. SFDPW ICM model
2. SFDPW TM, 2/3/15

The only input which varies between scenarios is the DWF contribution. The DWF contributions by scenario were derived from the SFDPW MPS TM (2/3/15) and are detailed in the table in Attachment 1. The contributing area outlined in the SFDPW TM is shown in Attachment 2.

5 Model Results

The model predicts the following changes to estimated CSD frequency, volume and duration assuming average DWF to the Mariposa Pump Station:

	DWF (mgd)	Frequency (Count)	Volume (Mgal)	Duration (Hrs)
Baseline	1.21	10	5.34	17.2
Project	1.38	10	5.63	17.3
Cumulative	1.69	10	6.32	18.2

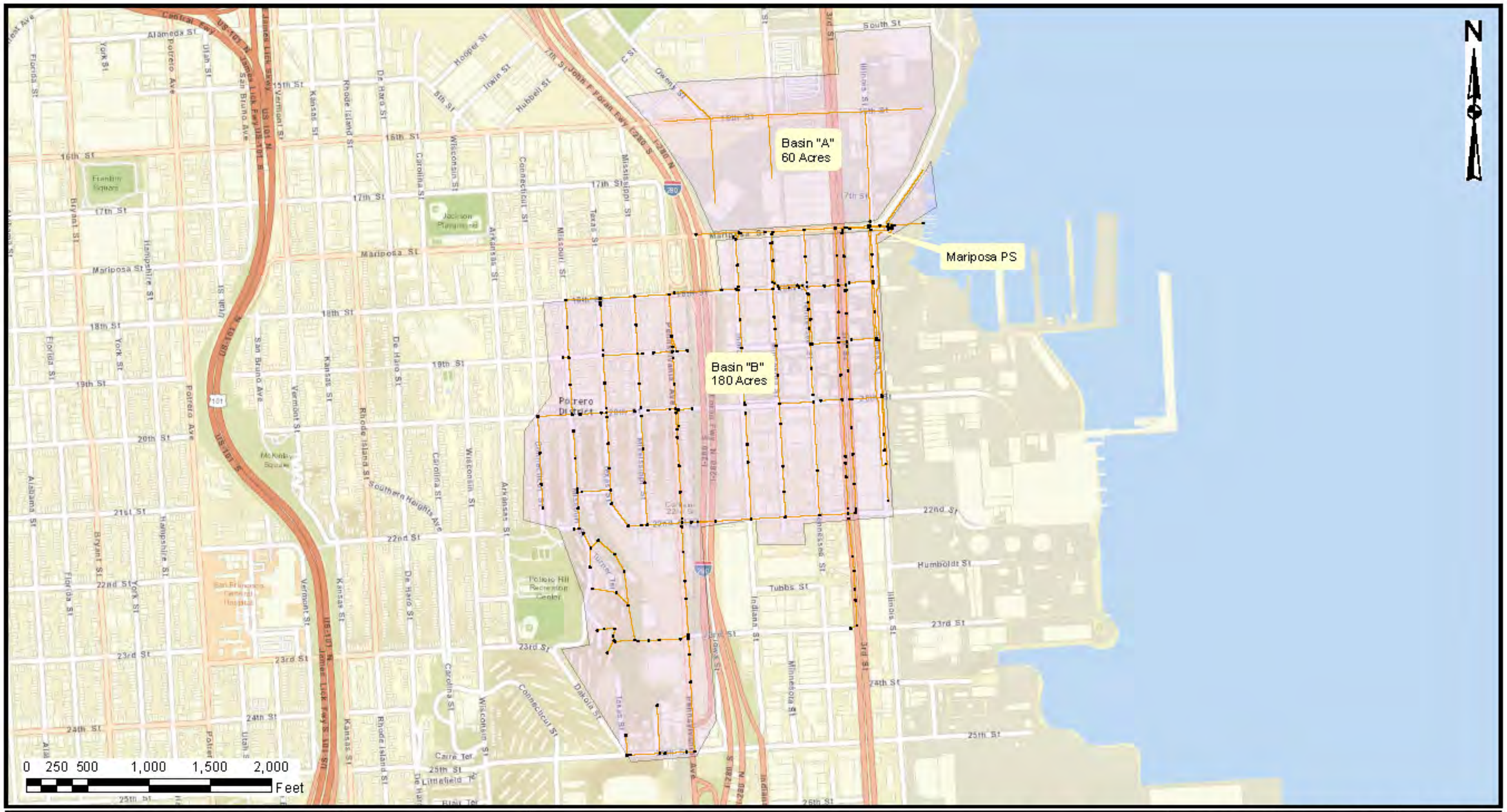
Assuming peak DWF for the arena only (a conservative assumption that every overflow occurs during maximum occupancy), the model predicts the following:

	DWF (mgd)	Frequency (Count)	Volume (Mgal)	Duration (Hrs)
Baseline	1.21	10	5.34	17.2
Project	2.28	10	7.2	19.4
Cumulative	2.60	11	7.98	21.8

ATTACHMENT 1.

Dry Weather Flows (DWFs) from Mission Bay South (Basin "A")

BASELINE			PROJECT			CUMULATIVE		
Parcel	Average DWF (gpm)	Peak DWF (gpm)	Parcel	Average DWF (gpm)	Peak DWF (gpm)	Parcel	Average DWF (gpm)	Peak Flow (gpm)
24a/b	71	213	29-32	114	746	25b	39	117
24c	9	27				33-34	63	190
25a	32	96				hospital phase 2	77	405
hospital phase 1 (X3, 36-39)	90	474				40	40	118
X4, P23-24	16.7	50						
PHASE TOTAL (gpm)	219	860		114	746		219	830
PHASE TOTAL (mgd)	0.31	1.24		0.16	1.07		0.32	1.20
RUNNING TOTAL (gpm)	219	860		333	1606		552	2436
RUNNING TOTAL (mgd)	0.31	1.24		0.479	2.31		0.794	3.51
DWF from Basin "B"	0.6	1.00		0.6	1.00		0.6	1.00
I&I	0.3	0.3		0.3	0.3		0.3	0.3
TOTAL (mgd)	1.21	2.54		1.38	3.61		1.69	4.81



Legend		HYDRAULIC STUDY: MISSION BAY/MARIPOSA PS SANITARY FLOW ANALYSIS	STUDY BY:	APPROVED BY:	HYD JO:
Manhole			BA	WL	2508J
Existing Network		TRIBUTARY AREA (SANITARY) AND EXISTING NETWORK MAP	ATTACHMENT 2		
Catchment					

APPENDIX MIT

Mission Bay FSEIR Mitigation Measures: Applicability to Proposed Project

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MISSION BAY FSEIR MITIGATION MEASURES: APPLICABILITY TO PROPOSED PROJECT

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
D. VISUAL QUALITY AND URBAN DESIGN			
North/ South	D.1 **Lighting and Glare** Design parking structure lighting to minimize off-site glare. The design could include 45-degree cutoff angles on light fixtures to focus light within the site, and specifications that spill lighting from parking areas would be 0.25 foot-candle or less at 5 feet from the property line of the parking areas. Applies to individual sites within the Project Area.	No	Pursuant to Public Resources Code 21099(d), aesthetics impacts of the proposed GSW project are not considered significant. Consequently, Mission Bay FSEIR Mitigation Measure D.1 is not required.
South	D.2 **Architectural Resources - Evaluation of Fire Station No. 30** D.2a. Retain an architectural historian to prepare an evaluation of the architectural integrity and historical importance of Fire Station No. 30 prior to development on this site. If the building is determined to be eligible for the National Register, preserve, rehabilitate, and reuse the building in a manner that is consistent with the Secretary of the Interior's guidelines for historic preservation. D.2b. If Fire Station No. 30 is found to be eligible for the National Register, require the following mitigation measures to reduce (though not eliminate) the significant impact prior to demolition of the structure: Prepare a Historical American Building Survey, including the precise recording of the structure through measurements, drawings, and photographs Provide sufficient detail in the survey documentation so that after demolition the historical structure could be reconstructed from the survey data File copies of the records and documents with the appropriate federal, state, and city agencies Include salvage and selective re-use of building materials in the mitigation program once the survey has been completed Upon completion, provide a copy of the report to the San Francisco Planning Department, the President of the San Francisco Landmarks Preservation Advisory Board, and the San Francisco Redevelopment Agency.	No	Mission Bay FSEIR Mitigation Measure D.2a-b is only applicable to development within the Fire Station 30 site, and not the project site, and consequently, it is not applicable to the proposed project.
North / South	D.3 **Archaeological Resources** Retain the services of an archaeologist, because of the strong possibility of encountering the remains of cultural or historic artifacts or features in the six historic resources areas. The Environmental Review Officer (ERO) in consultation with the President of the Landmarks Preservation Advisory Board (LPAB) and the archaeologist would determine: 1) whether the archaeologist should instruct all excavation and foundation crews on the project site of the potential for discovery of historic archaeological deposits and artifacts, and the procedures to be followed if such materials are uncovered; and 2) prior to the commencement of foundation excavation, a program of archaeological testing.	No	Mission Bay FSEIR Mitigation Measure D.3 is only applicable to development within the Mission Bay FSEIR-identified historic resource areas in the Mission Bay plan area, and not the project site. Consequently, Mission Bay FSEIR Mitigation Measure D.3 is not applicable to the proposed project.

		MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
D. VISUAL QUALITY AND URBAN DESIGN (cont.)				
North / South (cont.)		Retain a qualified historic archaeologist to supervise a pre-foundation excavation testing program for each phase of Project Area development or each construction site, as appropriate, using a series of mechanical, exploratory borings or other testing methods determined by the archaeologist to be appropriate. A qualified historical archaeologist would supervise the testing in the six historic resource areas to determine the probability of finding cultural and historical remains. At the completion of the archaeological testing program, the archaeologist would submit a written report first and directly to the ERO and the President of the LPAB, with a copy to the project sponsor, which describes the findings, assesses their significance and proposes appropriate recommendations for any additional procedures necessary for the mitigation of adverse impacts to cultural resources determined to be significant. Retain a certified archaeologist to supervise a program of on-site monitoring during site excavation in the six historic resource areas, following site clearance and pre-excavation testing. The certified archaeologist would record observations in a permanent log. Should cultural or historic artifacts be found following commencement of excavation activities, the archaeologist would assess the significance of the find, and immediately report to the ERO and the President of LPAB. Upon receiving the advice of the consultant and the LPAB, the ERO would recommend specific mitigation measures, if necessary. The monitoring program, whether or not there are finds of significance, would result in a written report to be submitted first and directly to the ERO and the President of the LPAB, with a copy to the project sponsor. Suspend excavation or construction activities which might damage discovered cultural resources for a total maximum of four weeks over the course of construction at each site to permit inspection, recommendation and retrieval, if appropriate. Implement an appropriate security program to prevent looting or destruction, if cultural resources of potential significance are discovered. Any discovered cultural artifact assessed as significant by the archaeologist upon concurrence by the ERO and the President of the LPAB would be placed in a repository designated for such materials or possibly exhibited in a public display. Following approval of the archaeological testing and monitoring program reports by the ERO and the President of LPAB, a final report would be sent to the California Archaeological Site Survey Office at Sonoma State University, the Foundation for San Francisco's Architectural Heritage and the State Office of Historic Preservation. The Office of Environmental Review would receive three final copies of the final archaeological findings report. Archaeological testing could be coordinated with other site investigations for geotechnical and toxic waste purposes.		However the Initial Study for the proposed project identifies Mitigation Measure M-CP-2a (Archaeological Testing, Monitoring and/or Data Recovery Program) which would in effect implement the requirements of Mission Bay FSEIR Mitigation Measure D.3 at the project site.
North / South	D.4 D.4a.	**<u>Archaeological Exploration Program</u>** Develop archaeological exploration programs, consistent with Measure D.3, above, for pre-identified sensitive historic archaeological areas that should include the following: Define specific research parameters and prepare a written study plan in consultation with the ERO and LPAB prior to subsurface exploration, with emphasis on National Register determination of historical significance and the maximum retrieval of archaeological data	No	Mission Bay FSEIR Mitigation Measure D.4 is only applicable to development within the Mission Bay FSEIR-identified historic resource areas in the Mission Bay plan area, and not the project site. Consequently, Mitigation Measure D.3 is not applicable to the proposed project.

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
D. VISUAL QUALITY AND URBAN DESIGN (cont.)			
North / South (cont.)	D.4b. Examine large-scale exposure of soil profiles D.4c. Complete detailed field records, including photographs and drawings, to document subsurface soil profiles, archaeological deposits and integrity of such deposits D.4d. Complete a detailed report of findings to describe research and exploration methodologies, testing results, all archaeological findings and recommendations for resource management		However, the Initial Study for the proposed project identifies Mitigation Measure M-CP-2a (Archaeological Testing, Monitoring and/or Data Recovery Program) which would in effect implement the requirements of Mission Bay FSEIR Mitigation Measure D.4 at the project site.
North / South	D.5 **Archaeological Monitoring at 19th Century City Dump** Archival review suggests that depositional integrity of the late 19th-century city dump has been lost because of scavenging while the dump was in operation; however, important historical artifacts may still be present. Pre-construction archaeological testing is therefore not recommended. Archaeological monitoring during construction would be the appropriate mitigation measure for that area. Therefore, retain the services of a qualified archaeologist. The ERO in consultation with the President of the LPAB and the archaeologist would determine whether the archaeologist should instruct all excavation and foundation crews in the area of the 19th-century city dump of the potential for discovery of cultural and historic artifacts or features. If such artifacts or features were uncovered, follow procedures described in Measure D.3 for suspension of construction activities, notification of the ERO and President of the LPAB, and development recovery measures, as appropriate.	No	Mission Bay FSEIR Mitigation Measure D.5 is only applicable to development within the 19th Century City Dump site, and not the project site. Consequently, Mission Bay FSEIR Mitigation Measure D.5 is not applicable to the proposed project.
North / South	D.6 **Unknown Archaeological Remains** The entire Mission Bay Project Area has at least some sensitivity for the presence of unknown archaeological remains. Prehistoric cultural deposits could be encountered in three identified areas and unknown historical features, artifact caches and debris areas could be located anywhere in the Project Area. Follow procedures for instructing excavation crews, notifying the ERO and President of the LPAB, and developing recovery measures, as described in Measure D.3, above. In addition, in the event that prehistoric archaeological deposits are discovered, consult local Native American organizations. Dialogue with the ERO, LPAB and the archaeological consultant would take place in developing acceptable archaeological testing and excavation procedures, particularly in regard to the disposition of cultural materials and Native American burials.	No	The City has updated its standard mitigation measures for accidental discovery of archeological resources. Consequently, MB FSEIR Mitigation Measure D.6 replaced with Mitigation Measure M-CP-2b (Accidental Discovery of Archaeological Resources)
North / South	D.7 **Pedestrian-Level Winds** Require a qualified wind consultant to review specific designs for buildings 100 feet or more in height for potential wind effects. The Redevelopment Agency would conduct wind review of high-rise structures above 100 ft. Wind tunnel testing would also be required unless, upon review by a qualified wind consultant, and with concurrence by the Agency, it is determined that the exposure, massing and orientation of the buildings are such that impacts, based on a 26-mile-per-hour hazard for a single hour of the year criterion, will not occur. The purpose of the wind tunnel studies is to determine design-specific impacts and to provide a basis for design modifications to mitigate these impacts. Projects within Mission Bay, including UCSF, would be required to meet this standard or to mitigate exceedances through building design.	Yes	Pursuant to Mission Bay FSEIR Mitigation Measure D.7, wind tunnel testing was conducted for the proposed development at Blocks 29-32, the results of which are included in the SEIR.

			MB FSEIR Mitigation Measure Applicability to Project	Notes
		MISSION BAY FSEIR SECTION / MITIGATION MEASURE		
D. VISUAL QUALITY AND URBAN DESIGN (cont.)				
North / South	D.8	**Shadows** The Redevelopment Plan documents would require analysis of potential shadows on existing and proposed open spaces during the building design and review process when exceptions to certain standards governing the shape or locations of buildings are requested that would cause over 13% of Mission Creek Park (either North or South), 20% of Bayfront Park, 17% of Triangle Square or 11% of Mission Bay Commons to be in continuous shadow for a period of one hour from March to September between 10:00 a.m. and 4:00 p.m.	Yes	Pursuant to Mission Bay FSEIR Mitigation Measure D.8, a shadow analysis was conducted for the proposed development at Blocks 29-32, the results of which are included in the SEIR.
E. TRANSPORTATION				
North	E.1 E.1a. E.1b. E.1c.	**Third Street/King Street** Widen the northbound approach to provide an additional through lane on the west side of Third Street. Reconfigure the existing traffic signal. Install "Don't Block the Box" signs.	No	Mission Bay FSEIR Mitigation Measure E.1 has already been implemented, and consequently, is not applicable to the proposed project.
North	E.2 E.2a. E.2b. E.2c.	**Third Street/Berry Street** Restripe the northbound approach to provide an additional through lane. Reconfigure the existing traffic signal. Install "Don't Block the Box" signs.	No	Mission Bay FSEIR Mitigation Measure E.2 has already implemented, and consequently, is not applicable to the proposed project.
South	E.3 E.3a.	**Third Street/Owens Street** Install a new traffic signal.	No	Mission Bay FSEIR Mitigation Measure E.3 has already implemented, and consequently, is not applicable to the proposed project.
South	E.4 E.4a.	**Third Street/The Common** Install new traffic signals.	No	Mission Bay FSEIR Mitigation Measure E.4 has already implemented, and consequently, is not applicable to the proposed project.
South	E.5 E.5a.	**Third Street/South Street** Install a new traffic signal.	No	Mission Bay FSEIR Mitigation Measure E.5 has already been implemented, and consequently, is not applicable to the proposed project.

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
E. TRANSPORTATION (cont.)			
South	E.6 **<u>Third Street/16th Street</u>** E.6a. Widen the northbound approach to provide two exclusive left-turn lanes. E.b. Reconfigure the existing traffic signal.	No	Mission Bay FSEIR Mitigation Measure E.6 has already been implemented, and consequently, is not applicable to the proposed project.
South	E.7 **<u>Third Street/Mariposa Street</u>** E.7a. Widen the eastbound approach to provide an additional through lane. E.7b. Widen and restripe the westbound approach to provide an exclusive left-turn lane and an additional through lane. E.7c. Reconfigure the existing traffic signal.	No	Mission Bay FSEIR Mitigation Measure E.7 has already been implemented, and consequently, is not applicable to the proposed project.
North	E.8 **<u>Fourth Street/King Street</u>** E.8a. Widen the eastbound approach to provide an exclusive right-turn lane. E.8b. Reconfigure the existing traffic signal. E.8c. Install "Don't Block the Box" signs.	No	Mission Bay FSEIR Mitigation Measure E.8 has already been implemented, and consequently, is not applicable to the proposed project.
North	E.9 **<u>Fourth Street/Berry Street</u>** E.9a. Restripe the westbound approach to provide an additional lane. E.9b. Restripe the northbound approach to provide an additional lane. E.9c. Reconfigure the existing traffic signal. E.9d. Install "Don't Block the Box" signs.	No	Mission Bay FSEIR Mitigation Measure E.9 has already been implemented, and consequently, is not applicable to the proposed project.
South	E.10 **<u>Fourth Street/Owens Street</u>** E.10a. Install a new traffic signal.	No	Mission Bay FSEIR Mitigation Measure E.10 has already been implemented, and consequently, is not applicable to the proposed project.
South	E.11 **<u>Fourth Street/UCSF private street</u>** E.11a. Install a new traffic signal.	No	Mission Bay FSEIR Mitigation Measure E.11 has already been implemented, and consequently, is not applicable to the proposed project.
South	E.12 **<u>Fourth Street/16th Street</u>** E.12a. Install a new traffic signal.	No	Mission Bay FSEIR Mitigation Measure E.12 has already been implemented, and consequently, is not applicable to the proposed project.

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
E. TRANSPORTATION (cont.)			
South	E.13 **Fourth Street/Mariposa Street** E.13a. Widen the eastbound and westbound approaches to provide exclusive left-turn lanes. E.13b. Install a new traffic signal.	No	Mission Bay FSEIR Mitigation Measure E.13 has already been implemented, and consequently, is not applicable to the proposed project.
South	E.14 **Seventh Street/16th Street** E.14a. Remove on-street parking on all approaches. E.14b. Restripe the northbound and eastbound approaches to provide an additional through lane. E.14c. Restripe the southbound approach to provide an additional through lane and an exclusive left-turn lane. E.14d. Restripe the westbound approach to provide an additional through lane and a right-turn pocket. E.14e. Install a new traffic signal. E.14f. Provide the appropriate traffic warning devices for the Caltrain track crossing.	No	Mission Bay FSEIR Mitigation Measure E.14 has already been implemented, and consequently, is not applicable to the proposed project.
South	E.15 **Owens Street/16th Street** E.15a. Install a new traffic signal.	No	Mission Bay FSEIR Mitigation Measure E.15 has already been implemented, and consequently, is not applicable to the proposed project.
South	E.16 **Owens Street/Mariposa Street/I-280 Off-ramp** E.16a. Widen the eastbound approach to provide an exclusive left-turn lane. E.16b. Reconfigure the existing traffic signal.	No	Mission Bay FSEIR Mitigation Measure E.16 has already been implemented, and consequently, is not applicable to the proposed project.
South	E.17 **I-280 On-ramp/Mariposa Street** E.17a. Widen the westbound approach to provide an exclusive left-turn lane. E.17b. Install a new traffic signal.	No	Mission Bay FSEIR Mitigation Measure E.17 has already been implemented, and consequently, is not applicable to the proposed project.
South	E.18 **Seventh Street/The Common** E.18a. Install a new traffic signal. E.18b. Provide the appropriate traffic warning devices for the Caltrain railroad track at-grade crossing.	No	Mission Bay FSEIR Mitigation Measure E.18 has already been implemented, and consequently, is not applicable to the proposed project.

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
E. TRANSPORTATION (cont.)			
North	E.19 **Fifth Street/King Street** E.19a. Narrow approximately 250 feet of the median on the westbound approach to provide an exclusive left-turn lane. E.19b. Restripe the I-280 off-ramp touchdown and narrow the median on the south side of King Street for a distance of about 300 feet beginning at the intersection with Fifth Street, to increase the number of eastbound lanes from the existing two to three. E.19c. Reconfigure the existing traffic signal.	No	Mission Bay FSEIR Mitigation Measure E.19 is a mitigation measure applicable to development within Mission Bay North, and is therefore not applicable to the proposed project. Mission Bay FSEIR Mitigation Measure E.19 is assumed to be implemented by 2040, and is included in the Cumulative scenario
North/ South	E.21 **Third Street** E.21a. Widen the west side of Third Street between Berry Street and King Street to accommodate the additional lanes described in Measure E.01. E.21b. Widen Third Street for approximately one-third the distance between Mariposa Street and 16th Street to accommodate the lane configuration described in Measure E.6. E.21c. In cooperation with the Public Transportation Commission and the Department of Public Works, reconfigure Third Street in the Project Area to accommodate the Third Street light rail transit median while maintaining two travel lanes in each direction and exclusive left-turn lanes at specific locations, as listed in Measures E.06 and E.07.	No	Mission Bay FSEIR Mitigation Measure E.21 has already been implemented, and consequently, is not applicable to the proposed project.
South	E.22 **Mariposa Street** E.22a. Widen Mariposa Street between Terry A. François Boulevard and Pennsylvania Street, including the bridge over the Caltrain tracks.	No	Mission Bay FSEIR Mitigation Measure E.22 has already been implemented, and consequently, is not applicable to the proposed project.
North / South	E.23 **Fourth Street** E.23a. Widen Fourth Street between China Basin Channel and King Street to accommodate the Third Street light rail tracks and a MUNI station platform between Berry and King Streets. E.23b. Extend Fourth Street southward, parallel to Third Street, to intersect with Mariposa Street at the existing intersection with Minnesota Street.	No	Mission Bay FSEIR Mitigation Measure E.23 has already been implemented, and consequently, is not applicable to the proposed project.
North	E.24 **King Street** E.24a. Widen eastbound King Street between Fifth and Fourth Streets to accommodate the lane configurations for the Fourth Street/King Street intersection in Measure E.08. E.24b. Construct westbound King Street frontage road between Fifth Street and Berry Street.	No	Mission Bay FSEIR Mitigation Measure E.24 has already been implemented, and consequently, is not applicable to the proposed project.

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
E. TRANSPORTATION (cont.)			
South	E.25 **Owens Street** E.25a. Construct Owens Street between Third and Fourth Streets, providing a median approximately 24 feet wide to accommodate the MUNI Third Street light rail line, with no on-street parking. E.25b. Construct Owens Street between Fourth Street and The Common, providing on-street parking on the north side of the street only. E.25c. Extend Owens Street northward from 16th Street to The Common, providing no on-street parking. E.25d. Construct Owens Street between 16th Street and Mariposa Street, providing no on-street parking.	No	Mission Bay FSEIR Mitigation Measure E.25 has been partially implemented. Owens Street between Third Street and the traffic circle at Mission Bay Drive has been renamed Channel Street. Mission Bay FSEIR Mitigation Measures E.25a and E.25c have already been implemented, and consequently, are not applicable to the proposed project. The section of Owens Street between Fourth Street and the traffic circle at Mission Bay Drive (FSEIR Mitigation Measures E.25b) has been partially implemented and will be completed as planned development adjacent to Owens Street is completed. Therefore FSEIR Mitigation Measure E.25b is not applicable to the proposed project. The section of Owens Street between 16th and Mariposa Streets is under construction as part of the UCSF Medical Center project (FSEIR Mitigation Measures E.25d), and therefore is not applicable to the proposed project.
South	E.26 **North Common and South Common Streets connection to Seventh Street** E.26a. Construct an "at-grade" connection to Seventh Street across Caltrain tracks, in conjunction with Measure E.18 for the new intersection. E.26b. Prohibit parking at trolleybus stops for the 22-Fillmore line east of Third Street where bus line is extended.	No	Mission Bay FSEIR Mitigation Measure E.26 has already been implemented (i.e., Mission Bay Drive), and consequently, is not applicable to the proposed project.
South	E.27 **Muni Line 22-Fillmore** Reroute the MUNI 22-Fillmore trolleybus line to travel on 16th Street to Third Street, and then north on Third Street to The Common. If not already accomplished, install trolleybus wire support poles and/or eyebolts on buildings along the new route, and complete North Common Street and South Common Street east of Third Street. Prohibit parking on North Common and South Common Streets at trolleybus stops.	No	As part of Mission Bay FSEIR Mitigation Measure E.27, the temporary 55 16th Street motor coach route between Mission Street and Third Street was initiated in February 2015. The

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
E. TRANSPORTATION (cont.)			
South (cont.)			extension of the 22 Fillmore into Mission Bay will be implemented as part of the Muni Forward project Mission Bay FSEIR Mitigation Measure E.27 has already been implemented, and consequently, is not applicable to the proposed project.
South	E.28 **<u>Muni Line 30-Stockton or 45-Union/Stockton</u>** Extend about half of the 30-Stockton or the 45-Union/Stockton trolley buses south and east of the current terminus at the Caltrain terminal to the current terminus of the 22-Fillmore line, at the same time that the 22-Fillmore is rerouted as called for in Measure E.27. Route trolley buses to Connecticut Street via Townsend or Mission Bay Street, and then east to a new terminus near Third and 20th Streets. The coordination of Measure E.27 with E.28, to provide extended MUNI trolleybus service to Mission Bay by rerouting the 22-Fillmore and 30-Stockton or 30/45-Union/Stockton lines, shall be accomplished in phases, if necessary, to provide service as early in project development as MUNI service may be needed. The phases may include: E.28.a. Construct Mission Bay Street, the Seventh Street Connector to North and South Common Streets and the Caltrain at-grade rail crossing, and the portion of North and South Common Streets east of Third Street, early enough in project development to accommodate MUNI trolleybus travel, including poles and eyebolts supporting trolley wires, and provide poles and/or eyebolts supporting trolley wires along 16th Street and a portion of Common Streets in the Project Area, as described in Measure E.27 and above in this Measure; or E.28.b. If item E.28a is not feasible sufficiently early in project development, for an interim period until the necessary streets and trolley wires have been constructed as part of adjacent development, construct the portion of North and South Common Streets east of Third Street and install poles and/or eyebolts supporting trolley wires along the new route for the 22-Fillmore, and extend some but not all of the trolleybuses, so that both Mission Bay and Lower Potrero areas continue to be served. This measure involves only limited service to Mission Bay; or E.28.c. If item E.28a is not feasible sufficiently early in project development, for an interim period until the necessary streets and trolley wires have been constructed as part of adjacent development, provide service to Mission Bay temporarily using diesel buses on 16th Street; or E.28.d. Use a combination of items E.28b and E.28c to provide MUNI trolley bus service to both the Mission Bay and Lower Potrero areas until necessary streets and trolley wires have been constructed as part of adjacent development in the Project Area.	No	As part of the TEP/Muni Forward project, the planned 10 Townsend service improvements will replace the extension of the 30 Stockton or 45 Union-Stockton into Mission Bay. Mission Bay FSEIR Mitigation Measure E.28 will be implemented as part of the TEP/Muni Forward project.

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
E. TRANSPORTATION (cont.)			
North	E.29 **Seventh Street/Brannan Street** E.29a. Restripe the northbound approach to provide three lanes.	No	Mission Bay FSEIR Mitigation Measure E.29 is a mitigation measure applicable to development within Mission Bay North, and is therefore not applicable to the proposed project. This improvement will be implemented as part of buildout of the UCSF LRDP in Mission Bay.
North	E.30 **Seventh Street/Townsend Street** E.30.a. Restripe the southbound, eastbound, and westbound approaches to provide a left-turn lane, a through lane, and a right-turn lane. E.30.b. Restripe the northbound approach to provide a left turn lane, a through lane, and a shared right-through lane.	No	Mission Bay FSEIR Mitigation Measure E.30 has already been implemented, and consequently, it is not applicable to the proposed project
North	E.31 **Seventh Street/Berry Street** E.31.a. Restripe the eastbound approach to provide two lanes. E.31.b. Restripe the northbound approach to provide a shared left-through lane and a through lane and restripe the southbound approach to provide a through lane and a shared right-through lane.	No	The Mission Bay street network has since been revised, and Mission Bay FSEIR Measure E.31 is no longer applicable.
South	E.32 **Seventh Street/North and South Common Streets** E.32a. Restripe the northbound approach to provide two through lanes, and a right-turn lane. E.32.b. Restripe the southbound approach to provide two through lanes, and a left-turn lane.	No	Mission Bay FSEIR Mitigation Measure E.32 has already been implemented, and consequently, is not applicable to the proposed project.
South	E.33 **16th Street/Potrero Street** Restripe the eastbound and westbound approaches to provide a left-turn lane, a through lane and a shared right-through lane.	No	Mission Bay FSEIR Mitigation Measure E.33 has been superseded by improvements planned for 16th Street as part of Muni Forward, and is not applicable to the proposed project.
South	E.34 **16th Street/Vermont Street** Install a new traffic signal.	No	Mission Bay FSEIR Mitigation Measure E.34 has already been implemented, and consequently, is not applicable to the proposed project

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
E. TRANSPORTATION (cont.)			
North	E.35 **Eighth Street/Townsend Street** E.35.a. Eliminate traffic circle and reconfigure intersection. E.35.b. Install a new traffic signal.	No	Mission Bay FSEIR Mitigation Measure E.35 is a mitigation measure applicable to development within Mission Bay North, and consequently, is not applicable to the proposed project. The SFMTA has determined that signalization would create more problems for pedestrians and congestion for vehicular traffic, and application of modern roundabout techniques to improve operation of the intersection would be more appropriate.
North	E.36 **Third Street/Townsend Street** E.36.a. Remove the on-street parking on the westbound approach during the p.m. peak commute period. E.36.b. Provide an additional westbound through lane during the p.m. peak commute period.	No	Mission Bay FSEIR Mitigation Measure E.36 has already been implemented, and consequently, is not applicable to the proposed project.
North	E.38 **Fourth Street/King Street** Widen the southbound approach to provide an additional lane, and restripe the intersection to provide one exclusive left-turn lane, one exclusive through lane, one shared right-through lane, and an exclusive right-turn lane for the southbound Fourth Street approach.	No	Mission Bay FSEIR Mitigation Measure E.38 has already been implemented, and consequently, is not applicable to the proposed project.
North	E.41 **Fourth Street** Widen the west side of Fourth Street for approximately half the distance between Townsend Street and King Street to provide the additional southbound lane noted in Mitigation Measure E.38, including providing additional right-of-way.	No	Mission Bay FSEIR Mitigation Measure E.41 has already been implemented, and consequently, is not applicable to the proposed project.
North / South	E.42 **Seventh Street** Eliminate on-street parking on both sides of Seventh Street between Townsend and 16th Streets during the morning and afternoon peak commute periods to accommodate the lane configuration changes described in Mitigation Measures E.29, E.30, E.31, and E.32.	No	Mission Bay FSEIR Mitigation Measure E.42 has already been implemented, and consequently, is not applicable to the proposed project.
North / South	E.43 **Increase Bay Bridge Tolls** Increase Bay Bridge tolls for single-occupant vehicle (SOV) trips during commute hours to discourage non-carpool traffic.	No	Mission Bay FSEIR Mitigation Measure E.43 has been implemented, and consequently, is not applicable to the proposed project.

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
E. TRANSPORTATION (cont.)			
North / South	E.44 **AC Transit District** Encourage the Alameda-Contra Costa Transit District to expand transbay service to accommodate cumulative demand; encourage the Metropolitan Transportation Commission to provide funding for AC Transit District service expansion, and support AC Transit District in its requests for funding for other sources.	No	Future cumulative AC Transit service is projected to accommodate cumulative ridership, and therefore additional AC Transit service is not required. Mission Bay FSEIR Mitigation Measure E.44 consequently, is not applicable to the proposed project.
North/ South	E.45 **Extend N-Judah MUNI Metro Line** Extend and operate the route of the N-Judah MUNI Metro line from the Embarcadero station to Mariposa Street, using the MMX and Third Street light rail tracks.	No	Mission Bay FSEIR Mitigation Measure E.45 to be implemented with the Central Subway, and consequently, is not applicable to the proposed project.
North/ South	E.46 **Transportation Management Organizations** E.46.a Form a Mission Bay Transportation Management Association (TMA) to implement a Transportation System Management (TSM) Plan. E.46.b Form a Transportation Coordinating Committee (TCC) including representatives of Project Area property owners, UCSF, SFRA and appropriate City staff, including DPT, MUNI, and DPW, to address area-wide transportation planning issues and coordinate with other uses and neighborhoods in nearby areas.	No	Mission Bay FSEIR Mitigation Measure E.46 has been implemented, and consequently, is not applicable to the proposed project.
North/ South	E.47 **Transportation System Management (TSM) Plan** Prepare a TSM Plan, which could include the following elements:		
North/ South	E.47.a. ***Shuttle Bus System*** Operate shuttle bus service between Mission Bay and regional transit stops in San Francisco (e.g., BART, Caltrain, Ferry Terminal, Transbay Transit Terminal), and specific gathering points in major San Francisco residential neighborhoods (e.g., Richmond and Mission Districts).	Yes	This measure was adopted to encourage use of alternate modes and reduce auto mode. A Mission Bay South Transportation Management Plan has been developed which incorporates this mitigation measure, and it is part of the Mission Bay South Owner Participation Agreement for development within Mission Bay. Because the project sponsor would be subject to the Owner Participation Agreement, this mitigation measure is assumed to be part of the proposed project.

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
E. TRANSPORTATION (cont.)			
North/ South	E.47.b. ***Transit Pass Sales*** Sell transit passes in neighborhood retail stores and commercial buildings in the Project Area.	Yes	This measure was adopted to encourage use of alternate modes and reduce auto mode. A Mission Bay South Transportation Management Plan has been developed which incorporates this mitigation measure, and it is part of the Mission Bay South Owner Participation Agreement for development within Mission Bay. Because the project sponsor would be subject to the Owner Participation Agreement, this mitigation measure is assumed to be part of the proposed project.
North/ South	E.47.c. ***Employee Transportation Subsidies*** Provide a system of employee transportation subsidies for major employers.	Yes	This measure was adopted to encourage use of alternate modes and reduce auto mode. A Mission Bay South Transportation Management Plan has been developed which incorporates this mitigation measure, and it is part of the Mission Bay South Owner Participation Agreement for development within Mission Bay. Because the project sponsor would be subject to the Owner Participation Agreement, this mitigation measure is assumed to be part of the proposed project.
South	E.47.d. ***Pedestrian Signals at Owens Street Near the Pedestrian Bridge.*** Pedestrian signals at this location will provide continuity between the pedestrian bridge near Fifth Street and the pedestrian path adjacent to Owens Street, and the residential units in the central subarea of Mission Bay South.	No	Mission Bay FSEIR Mitigation Measure E.47d is not adjacent to the project site, and consequently, is not applicable to the proposed project.

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
E. TRANSPORTATION (cont.)			
North/ South	E.47.e. ***Secure Bicycle Parking*** Provide secure bicycle parking areas in parking garages of residential buildings, office buildings, and research and development facilities. Provide secure bicycle parking areas by 1) constructing secure bicycle parking at a ratio of 1 bicycle parking space for every 20 automobile parking spaces, and 2) carrying out an annual survey program during project development to establish trends in bicycle use and to estimate demand for secure bicycle parking and for sidewalk bicycle racks, increasing the number of secure bicycle parking spaces or racks either in new buildings or in existing automobile parking facilities to meet the estimated demand. Provide secure bicycle racks throughout Mission Bay for the use of visitors.	Yes	This measure was adopted to encourage use of alternate modes and reduce auto mode. A Mission Bay South Transportation Management Plan has been developed which incorporates this mitigation measure, and it is part of the Mission Bay South Owner Participation Agreement for development within Mission Bay. Because the project sponsor would be subject to the Owner Participation Agreement, this mitigation measure is assumed to be part of the proposed project.
North/ South	E.47.f. ***Appropriate Street Lighting*** Ensure that sidewalks in Mission Bay are sufficiently lit to provide pedestrians and bicyclists with a greater sense of safety, and thereby encourage Mission Bay employees, visitors, and residents to walk and bicycle to and from Mission Bay.	Yes	This measure was adopted to encourage use of alternate modes and reduce auto mode. A Mission Bay South Transportation Management Plan has been developed which incorporates this mitigation measure, and it is part of the Mission Bay South Owner Participation Agreement for development within Mission Bay. Because the project sponsor would be subject to the Owner Participation Agreement, this mitigation measure is assumed to be part of the proposed project.
North/ South	E.47.g. ***Transit, Pedestrian and Bicycle Route Information*** Provide maps of the local and citywide pedestrian and bicycle routes with transit maps and information on kiosks throughout the Project Area to promote multi-modal travel.	Yes	This measure was adopted to encourage use of alternate modes and reduce auto mode. A Mission Bay South Transportation Management Plan has been developed which incorporates this mitigation measure, and it is part of the Mission Bay South Owner Participation Agreement for development within Mission Bay. Because the project sponsor would be subject to the Owner Participation Agreement, this mitigation measure is assumed to be part of the proposed project.

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
E. TRANSPORTATION (cont.)			
North/ South	E.47.h. ***Parking Management Guidelines*** Establish parking management guidelines for the private operators of parking facilities in the Project Area.	Yes	This measure was adopted to encourage use of alternate modes and reduce auto mode. A Mission Bay South Transportation Management Plan has been developed which incorporates this mitigation measure, and it is part of the Mission Bay South Owner Participation Agreement for development within Mission Bay. Because the project sponsor would be subject to the Owner Participation Agreement, this mitigation measure is assumed to be part of the proposed project.
South	E.47.i ***Flexible Work Time/Telecommuting*** Where feasible, offer employees in the Project Area the opportunity to work on flexible schedules and/or telecommute so they could avoid peak hour traffic conditions.	Yes	This measure was adopted to encourage use of alternate modes and reduce auto mode. A Mission Bay South Transportation Management Plan has been developed which incorporates this mitigation measure, and it is part of the Mission Bay South Owner Participation Agreement for development within Mission Bay. Because the project sponsor would be subject to the Owner Participation Agreement, this mitigation measure is assumed to be part of the proposed project.
North/ South	E.49 **Ferry Service** Make a good faith effort to assist the Port of San Francisco and others in ongoing studies of the feasibility of expanding regional ferry service. Make good faith efforts to assist in implementing feasible study recommendations.	No	This measure is currently being implemented by the Water Emergency Transportation Authority.

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
F. AIR QUALITY			
North/ South	F.1 **TSM Measures** Implement measures to decrease vehicle trips, as described in Mitigation Measures E.46 through E.50 in Section VI.E, Mitigation Measures: Transportation	Yes	
North/ South	F.2 **Construction PM_{10}** As conditions of construction contracts, require contractors to implement the following mitigation program, based on the instructions in the BAAQMD CEQA Guidelines, at all construction sites within the Project Area: F.2.a. Water all active construction areas at least twice a day, or as needed to prevent visible dust plumes from blowing off-site F.2.b. Use tarpaulins or other effective covers for on-site storage piles and for haul trucks that travel on streets F.2.c. Pave, apply water three times daily, or apply (non-toxic) soil stabilizers on all *unpaved* parking areas and staging areas at construction sites F.2.d. Sweep all paved access routes, parking areas, and staging areas daily (preferably with water sweepers) F.2.e. Sweep streets daily (preferably with water sweepers) if visible amounts of soil material are carried onto public streets F.2.f. Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more) F.2.g. Enclose, cover, water twice daily or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.) F.2.h. Limit traffic speeds on unpaved roads to 15 mph F.2.i. Install sandbags or other erosion control measures to prevent silt runoff to public roadways F.2.j. Replant vegetation in disturbed areas as quickly as possible F.2.k. Install wheel washers for all exiting trucks, or wash off the tires or tracks of all trucks and equipment leaving the site F.2.l. Install wind breaks, or plant trees / vegetative wind breaks at windward side(s) of construction areas F.2.m. Suspend excavation and grading on large construction sites when winds (instantaneous gusts) exceed 25 mph F.2.n. Limit the area subject to excavation, grading and other construction activity at any one time	No	Mission Bay FSEIR Mitigation Measure F.2.a-n would effectively be implemented through compliance with the requirements of the Construction Dust Control Ordinance that was adopted in 2008. Therefore, Mission Bay FSEIR Mitigation Measure F.2 is not applicable to the proposed project.

		MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
F. AIR QUALITY (cont.)				
North/ South	F.3	**Toxic Air Contaminants (TACs)** Prior to issuing a certificate of occupancy for a facility containing potential toxic air contamination sources, obtain written verification from BAAQMD either that the facility has been issued a permit from BAAQMD, if required by law, or that permit requirements do not apply to the facility	No	Mission Bay FSEIR Mitigation Measure F.3 has been superseded by current BAAQMD permit requirements for diesel generators, and consequently, is not applicable to the proposed project.
South	F.4	**Meteorology Station** As soon as possible, to provide reliable wind data for informational purposes, and where applicable, to facilitate the preparation of risk assessment studies, locate and maintain a meteorology station at an appropriate location within the Project Area.	No	Mission Bay FSEIR Mitigation Measure F.4.a-g has already been implemented, and consequently, is not applicable to the proposed project.
	F.4.a.	Hire a contractor to select appropriate sites for location of the meteorology station to ensure accuracy of data. Preferably the site would be located at a first phase building at the UCSF site, which is centrally located in the Project Area		
	F.4.b.	Once site selections are recommended, contact the BAAQMD for consultation and comment on the sites		
	F.4.c.	Hire a contractor to select certified equipment and software		
	F.4.d.	Consult the BAAQMD on the equipment and software that is selected prior to purchase		
	F.4.e.	Construct and site the station according to BAAQMD standards (written guidelines may be obtained from the District)		
	F.4.f.	Provide data from the station to the BAAQMD on a real-time basis		
	F.4.g.	At a minimum, take continuous wind speed and direction measurements for a period of at least two years		
North/ South	F.5	**Dry Cleaning Facilities** Prohibit dry cleaning facilities that conduct on-site dry cleaning operations in residential areas within the Project Area. For any dry cleaning operations with the Project Area, require vapor barriers in their design and construct so as to reduce exposure to perchloroethylene and any other toxic air contaminants handled at the facility.	No	Mission Bay FSEIR Mitigation Measure F.5 is no longer applicable due to the regulatory phase out of perchloroethylene.
North/ South	F.6	**Child-Care Buffer Zones** Require preschool and childcare centers to notify BAAQMD and the San Francisco Department of Public Health regarding the locations of their operations, and require these centers to consult with these agencies regarding existing and possible future stationary and mobile sources of toxic air contaminants. The purpose of these consultations is to obtain information so that preschool and childcare centers can be located to minimize potential impacts from toxic air contaminants emissions sources.	No	Mission Bay FSEIR Mitigation Measure F.6 does not apply to the proposed project because the only TAC sources (diesel generators and motor vehicles) would be located in the garage where there would be no office uses or associated child care facilities.

		MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
G. NOISE AND VIBRATION				
North/ South	G.1	**<u>Noise Reduction in Pile Driving</u>** Use noise-reducing pile driving techniques such as pre-drilling pile holes (if feasible, based on soils) to the maximum feasible depth, installing intake and exhaust mufflers on piledriving equipment, vibrating piles into place when feasible, installing shrouds around the piledriving hammer where feasible, and restricting the hours of operation.	No	The project proposes to install piles using drilling and cast-in-place techniques, and as a result, would implement Mission Bay FSEIR Mitigation Measure G.1 as part of the project. Consequently, Mission Bay FSEIR Mitigation Measure G.1 is not warranted for, nor applicable to, the proposed project.
North	G.2	**<u>Analyze Potential Vibrations from Caltrain</u>** Analyze potential vibration from Caltrain on the western-most block of Mission Bay North at Berry and King Streets, adjacent to Caltrain tracks, based on information about localized soils, and, if the analysis shows vibration could be significant without mitigation, design and construct foundations of buildings proposed to be on that block with vibration-reducing features to reduce potential impacts from adjacent passenger trains.	No	Mission Bay FSEIR Mitigation Measure G.2 is only applicable to development on the western-most block of Mission Bay North at Berry and King Streets, adjacent to Caltrain tracks. The project site is not in this location, and consequently, Mitigation Measure G.2 is not applicable to the proposed project.
H. SEISMICITY				
North/ South	H.1	**<u>Heavy Equipment Storage</u>** During the build-out period, store heavy construction equipment in the Project Area during the buildout period that is capable of traveling on damaged roads, clearing debris, and opening access to, and within, the Project Area after a major earthquake.	No	Implementation of the San Francisco Emergency Response Plan, the site-specific emergency response plan required under the Fire Code, and life safety requirements of the Building and Fire Codes fulfill the intent of Mission Bay FSEIR Mitigation Measure H.1.
North/ South	H.2	**<u>Emergency Preparedness and Emergency Response</u>** Following build-out, coordinate emergency response plans with the City regarding use of heavy equipment from the City storage yard in the vicinity of the Project Area	No	Implementation of the San Francisco Emergency Response Plan, prepared in 2008; implementation of the site-specific emergency response plan required under the Fire Code, and life safety requirements of the Building and Fire Codes fulfill the intent of Mission Bay FSEIR Mitigation Measure H.2.

		MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
H. SEISMICITY (cont.)				
	H.3	**Comprehensive Preparedness and Response Plan**		
North/ South	H.3.a.	Require the formulation of a comprehensive preparedness and response plan for the entire Project Area (as opposed to the typical building-by-building plan), integrated with the City's emergency response plans and in coordination with the Mayor's Office of Emergency Services. An emergency response plan should include: Community coordination and response Coordination with government services Outreach and training (not only for employees but also residents) Food and water Shelter Sanitation Consideration of need and potential locations for special facilities (operations, medical, etc.) in the context of the citywide Emergency Response Plan and the Project Area's location in Emergency Response District 3 Organization of employees into response teams Employee training in response procedures, including setting up a command post, communications, first aid, evacuation, security and clean-up	No	Mission Bay FSEIR Mitigation Measure H.3a is applicable to the entire plan area, and not for individual developments in the plan area, including the proposed project, and consequently, is not applicable to the proposed project.
North/ South	H.3.b.	In addition to the Project Area-wide plan, require each building or complex in the Project Area to prepare an emergency response plan. Each plan would be the responsibility of the owner(s) of each building or complex, and would be reviewed by the City periodically to ensure it is kept up to date.	No	Section 12.202(e)(1) of the San Francisco Fire Code, and the provisions of the Building Code fulfill the intent of Mission Bay FSEIR Mitigation Measure H.3b.
South	H.4	**Fire Station No. 30** Provide seismic rehabilitation of Fire Station No. 30 in the Project Area, if the building is to be reused for human occupancy.	No	Mission Bay FSEIR Mitigation Measure H.4 is only applicable to Fire Station 30, not the project site, and consequently, is not applicable to the proposed project.
South	H.5	**New Fire Station** At the time the San Francisco Fire Department determines the population or building density is high enough to warrant it, provide a new fire station in Mission Bay South to reduce the effects of limited emergency access to and from the site following a major earthquake.	No	The new Public Safety Building at Third Street and Mission Rock became operational in April 2015, and satisfies the requirements of Mission Bay FSEIR Mitigation Measure H.5.

		MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
H. SEISMICITY (cont.)				
North/ South	H.6	**Facilitate Emergency Access Routes** As part of the comprehensive preparedness plan identified in Mission Bay FSEIR Measure H.3, identify and implement feasible measures to facilitate and improve emergency access routes to the site, especially in the vicinity of Seventh and Owens Streets. Such measures could include design of open spaces to allow vehicle access following in a catastrophic event; designing underground utilities at the Owens and Seventh Streets connector to minimize severe damage or disconnection caused by earthquakes; constructing heavier pavement sections along critical routes if indicated through a geotechnical study; and siting buildings within the area bounded by Seventh Street, the Seventh Street connector, Owens Street, and 16th Street in a manner that would allow emergency vehicle access between these buildings in a catastrophic event.	No	Mission Bay FSEIR Mitigation Measure H.6 is applicable to the entire plan area, and not for individual developments in the plan area, including the proposed project, and consequently, is not applicable to the proposed project.
North/ South	H.7	**Corrosivity** Test soils for sulfate and chloride content. If necessary, use admixtures in concrete so it would not be susceptible to attack by sulfates, and/or use coated metal pipes so that pipes would be more resistant to corrosion by chlorides.	No	The site-specific geotechnical investigation required by, and conducted in accordance with, the California and San Francisco Building Codes would address the potential for corrosion of the project's concrete piles, and would include specifications for the concrete to ensure that the piles would not be adversely affected by corrosion. Consequently, Mission Bay FSEIR Mitigation Measure H.7 no longer necessary.
I. HEALTH AND SAFETY				
South	I.1	**Biohazardous Materials Handling Guidelines** Require businesses that handle biohazardous materials and do not receive federal funding to certify that they follow the guidelines published by the National Research Council and the United States Department of Health and Human Services Public Health Service, National Institutes of Health, and Centers for Disease Control, as set forth in *Biosafety in Microbiological and Biomedical Laboratories, Guidelines for Research Involving Recombinant DNA Molecules (NIH Guidelines)*, and *Guide for the Care and Use of Laboratory Animals,* or their successors, as applicable.	Yes	Mission Bay FSEIR Mitigation Measure I.1 is included under SEIR Initial Study Mitigation Measure M-HZ-1a. Guidelines for Handling Biohazardous Materials.
South	I.2	**Use of HEPA Filters.** Require businesses handling biohazardous materials to certify that they use high efficiency particulate air (HEPA) filters or substantially equivalent devices on all exhaust from Biosafety Level 3 laboratories unless they demonstrate that exhaust from their Biosafety Level 3 laboratories would not pose substantial health or safety hazards to the public or the environment. Require such businesses to certify that they inspect or monitor the filters regularly to ensure proper functioning.	Yes	Mission Bay FSEIR Mitigation Measure I.2 is included under SEIR Initial Study Mitigation Measure M-HZ-1a. Guidelines for Handling Biohazardous Materials.

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
I. HEALTH AND SAFETY (cont.)			
South	I.3 **Handling of Biohazardous Materials** Require businesses handling biohazardous materials to certify that they do not handle or use biohazardous materials requiring Biosafety Level 4 containment (i.e., dangerous or exotic materials that pose high risks of life-threatening diseases or aerosol-transmitted infections, or unknown risks of transmission) in the Project Area.	Yes	Mission Bay FSEIR Mitigation Measure I.3 is included under SEIR Initial Study Mitigation Measure M-HZ-1a. Guidelines for Handling Biohazardous Materials.
J. CONTAMINATED SOILS AND GROUNDWATER			
North/ South	J.1 **Risk Management Plan(s)** Prior to any site development activities in the Project Area, develop and implement an RWQCB-approved Risk Management Plan or Plans (RMP). The RMP shall address all site development activities and post-development activities and shall include specific measures that would be protective of human health and the aquatic environment. The human health standards to be applied in the RMP are a cumulative cancer risk of 1×10^{-5} and Hazard Index of 1, or more stringent standards as may be required by the RWQCB. Amend the RMPs as required by the RWQCB to reflect new information regarding contamination, land use decisions, or as a result of Article 20 compliance. ***RMP Enforcement*** J.1a Provide an enforcement structure for RMPs, to be in place and effective during construction and after project development, including: i. Develop and record a restrictive covenant as an Environmental Restriction and Covenant under California Civil Code Section 1471 that: a. Places limits on future uses in the Project Area consistent with the provisions in the RMP; b. Provides notice to current and future property owners that the RMP contains use restrictions and other requirements and obligates property owners to provide like notice to occupants; and c. Provides notice to current and future property owners that the RWQCB maintains residual regulatory enforcement authority over all portions of the Project Area sufficient to compel enforcement of the entire RMP. ii. As part of any future transfer of property title of any portion of the Project Area, require current property owners to provide a copy of the RMP to each of their future transferees. ***Pre-Development*** Include, at a minimum, the following elements in the RMP: J.1b Limit direct access to areas with exposed native soils (defined as soils that exist at the site prior to project approval) and perform inspections to verify that measures taken to limit direct access are maintained.	No	The Mission Bay RMP was completed for the Mission Bay Plan Area in 1999, in accordance with Mission Bay FSEIR Mitigation Measure J.1. In addition, a Revised RMP was completed for Pier 64 vicinity, including Blocks 29-32, in 2006. Consequently, Mission Bay FSEIR Mitigation Measure J.1 has been fulfilled by the preparation of these plans.

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
J. CONTAMINATED SOILS AND GROUNDWATER (cont.)			
North/ South (cont.)	Alternatively, for each location with exposed native soils, provide risk management procedures for those areas. If this alternative is chosen, for each exposed soil location that would remain vacant and undeveloped at the initiation of development, and for each site that becomes vacant and includes exposed native soil, evaluate and document potential health risks to the general public that could occur before site development using the following process: Evaluate sampling results to determine constituents that could pose a risk to the general public. Identify populations who could be exposed to the constituents in soils based on land uses within and adjacent to the Project Area. Exposed populations that would be considered would include adult and child visitors/trespassers, nearby residents (adults and children), and workers not involved in project construction within and adjacent to the Project Area. Using specific EPA- and DTSC-recommended exposure assumptions, identify the appropriate exposure pathways and assumptions in consultation with the RWQCB. Using the specific exposure assumptions identified above, adopt contaminant-specific interim target levels (ITLs) following regulatory risk assessment guidelines established by DTSC and EPA. Compare ITLs to the range of concentrations detected in exposed native soils to identify areas where ITLs are exceeded. No further action prior to development (other than that required under Article 20 or other applicable regulations) would be required in areas in which ITLs are not exceeded. J.1c For areas where ITLs are exceeded, identify specific Interim Risk Management (IRM) measures that would reduce potential contamination-related risks to Project Area occupants and visitors during site build-out. Based on the results of the ITL evaluation and need for site controls, general IRM measures could include measures such as: i. Limit Direct Access to Uncovered Native Soil on Undeveloped Portions of the Project Area. To effectively limit access, install fencing or other physical barriers around the identified areas, and post Ano trespassing@ signs. ii. Hydroseed or Apply Other Vegetative or Other Cover to Uncovered Areas. Hydroseed or apply other vegetative or other cover to the uncovered areas to reduce the potential for windblown dusts to be generated, and to reduce the potential for individuals to have direct contact with the native soils. iii. Include Safety Notices in Leases. Notify tenants of occupied portions of the Project Areas of the potential risks involved with the disturbance of existing cover (asphalt, concrete, vegetation) or exposed native soil. iv. Conduct Periodic Inspections of Open Spaces. Conduct periodic inspections of the Project Area to reduce the illegal occupancy of open areas by transient populations, and to reduce the illegal dumping by unauthorized occupants or off-site populations. Implement additional security measures such as fencing and/or the use of security guards, if inspections show a need.		

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
J. CONTAMINATED SOILS AND GROUNDWATER (cont.)			
North/ South (cont.)	v. Periodic Monitoring. Perform inspections verifying that risk management measures remain effective by identifying disturbances to cover materials that could result in the exposure of underlying native soil and by identifying areas where temporary fencing or other physical barriers might need to be reinstalled. If the inspections identify areas where measures have been rendered ineffective, implement corrective action. ***Development*** J.1d Include in the RMP, health and safety training and health protection objectives for workers who may directly contact contaminated soil during construction and/or maintenance, including Cal/OSHA worker safety regulations appropriate to the type of construction activity, location, and risk relative to the potential types of hazards associated with contaminated soil or groundwater, and where appropriate, compliance with Title 8, Group 16, requirements. J.1e Identify site access controls to be implemented during construction, such as: i. Secure construction site to prevent unauthorized pedestrian/vehicular entry with fencing or other barrier of sufficient height and structural integrity to prevent entry and based upon the degree of control required. ii. Post Ano trespassing@ signs. iii. Provide on-site meetings with construction workers to inform them about security measures and reporting/contingency procedures. J.1f Identify protocols for managing soil during construction, which will include at a minimum: i. The dust controls found in Measure F.02 in Section VI.F, Mitigation Measures: Air Quality. ii. Standards for imported fill (defined as fill brought onto the site from outside the Project Area) that are protective of human health and the aquatic environment and an identified minimum depth of fill to be required for landscaped areas. iii. A requirement that prior to placement, if native soil in the Project Area is to be used on site in any manner that could result in direct human exposure, characterization of the soil be conducted to confirm that it meets appropriate standards approved by the RWQCB and would be appropriate for the intended use. iv. Protocols for managing stockpiled and excavated soils. v. A program for off-site dust monitoring, consisting of real-time monitoring for PM10 concentrations to demonstrate that the health and safety of all individuals not engaged in construction activities would not be adversely affected by chemicals that could be contained in dust generated by soil-disturbing activities. If monitoring shows dust levels exceeding 250 g/m3, implement additional dust control measures, such as continuous misting of exposed areas with water, until concentrations are reduced below the action level.		

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
J. CONTAMINATED SOILS AND GROUNDWATER (cont.)			
North/ South (cont.)	J.1g Identify protocols for managing groundwater, which will include at a minimum: i. Procedures to prevent unacceptable migration of contamination from defined plumes during dewatering, such as monitoring, counter-pumping, or installing sheetpiles down to Bay Mud before dewatering. ii. Procedures for the installation of subsurface pipelines and other utilities, where necessary, to prevent lateral transmission of chemicals in groundwater. Such procedures could include, but would not be limited to, selection of proper backfill materials and thickness and installation of clay plugs or barrier collars. J.1h Include SWPPP requirements and BMPs as described in Mitigation Measure K.01 in Section VI.K, Mitigation Measures: Hydrology and Water Quality. J.1i Include a requirement that construction personnel be trained to recognize potential hazards associated with underground features that could contain hazardous materials, previously unidentified contamination, or buried hazardous debris. J.1j Develop and describe procedures for implementing a contingency plan, including appropriate notification and control procedures, in the event unanticipated subsurface hazards are discovered during construction. Control procedures could include, but would not be limited to, further investigation and removal of USTs or other hazards. J.1k Establish procedures, as necessary, so that construction activities avoid interfering with any RWQCB-required site investigation and remediation in the free product area. ***<u>Post-Development</u>*** J.1l Except where testing demonstrates that native soils meet standards established by the RWQCB as being protective of human health and the aquatic environment, require that upon project completion, all native soils shall be capped, so as to preclude human contact by using buildings, paved surfaces (such as parking lots, sidewalks, or roadways), or fill of a kind and depth approved by the RWQCB. J.1m Prohibit residences with unrestricted access to soils in front yards or backyards anywhere in the Project Area. J.1n Prohibit access to native soils for private use. If disturbance of native subsurface soils or groundwater dewatering is planned, carry out these activities in accordance with the elements of the RMP called for in Measures J.01d through J.01k. Following construction or excavation or soil disturbance, restore the cap in accordance with the provisions of the RMP as called for in Measure J.01l. J.1o Prohibit the use of shallow groundwater within the Project Area for domestic, industrial, or irrigation purposes. Permit installation of groundwater wells within the Project Area only for environmental monitoring purposes. Secure and lock environmental wells installed within the Project Area to prevent unauthorized access to the groundwater. In the event the use of shallow groundwater is proposed, perform an assessment of the risks from direct exposure to the groundwater prior to use and obtain RWQCB or other appropriate regulatory agency approval of the results of the assessment and proposed uses		

		MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
J. CONTAMINATED SOILS AND GROUNDWATER (cont.)				
North/ South	J.2	**Site Specific Risk Evaluation** Carry out a site-specific risk evaluation for each site in a non-residential area proposed to be used for a public school or child care facility; submit to RWQCB for review and approval. If cancer risks exceed 1×10^{-5} and/or non-cancer risk exceeds a Hazard Index of 1, carry out remediation designed to reduce risks to meet these standards or select another site that is shown to meet these standards.	Yes	Included under SEIR Initial Study Mitigation Measure M-HZ-2: RMP Provisions for Child Care Facilities.
K. HYDROLOGY AND WATER QUALITY				
North/ South	K.1	**Stormwater Pollution Prevention Program (SWPPP)** Develop and implement a comprehensive Stormwater Pollution Prevention Plan (SWPPP) for all construction activities within the Project Area to avoid and minimize erosion and sedimentation in China Basin Channel and San Francisco Bay and to manage other aspects of the construction site. Include at least the following Best Management Practices, or substantially equivalent measures.	No	Compliance with the current General Construction NPDES Permit would ensure a SWPPP with appropriate BMPs would be developed and implemented. Consequently Mitigation Measures K.1a through K.1i are not needed.
	K.1.a.	Minimize dust during demolition, grading, and construction by lightly spraying exposed soil on a regular basis.		
	K.1.b.	Minimize wind and water erosion on temporary soil stockpiles by spraying with water during dry weather and covering with plastic sheeting or other similar material during the rainy season (November to April).		
	K.1.c.	Minimize the area and length of time during which the site is cleared and graded.		
	K.1.d.	Prevent the release of construction pollutants such as cement, mortar, paints and solvents, fuel and lubricating oils, pesticides, and herbicides by storing such materials in a bermed, or otherwise secured, area.		
	K.1.e.	As needed, install filter fences around the perimeter of the construction site to prevent off-site sediment discharge. Prior to grading the bank slopes of China Basin Channel for the proposed channel-edge treatments, install silt or filter fences to slow water and remove sediment. As needed, properly trench and anchor in the silt or filter fences so that they stand up to the forces of tidal fluctuation and wave action, and do not allow sediment-laden water to escape underneath them.		
	K.1.f.	Follow design and construction standards found in the *Manual of Standards for Erosion and Sediment Control Measures* for placement of riprap and stone size.		
	K.1.g.	Install and maintain sediment and oil and grease traps in local stormwater intakes during the construction period, or otherwise properly control oil and grease discharges.		
	K.1.h.	Clean wheels and cover loads of trucks carrying excavated soils before they leave the construction site.		
	K.1.i.	Implement a hazardous material spill prevention, control, and clean-up program for the construction period. As needed, the program would include measures such as constructing swales and barriers that would direct any potential spills away from the Channel and the Bay and into containment basins to prevent the movement of any materials from the construction site into water.		

		MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
K. HYDROLOGY AND WATER QUALITY (cont.)				
North/ South	K.2	**Changes in Sanitary Sewage Quality** In addition to developing and implementing a Stormwater Management Program for the Central/Bay Basin (see Mitigation Measure K.05), participate in the City's existing Water Pollution Prevention Program. Facilitate implementation of the City's Water Pollution Prevention Program by providing and installing wastewater sampling ports in any building anticipated to have a potentially significant discharge of pollutants to the sanitary sewer, as determined by the Water Pollution Prevention Program of the San Francisco Public Utilities Commission's Bureau of Environmental Regulation and Management, and in locations as determined by the Water Pollution Prevention Program.	Yes	Mission Bay FSEIR Mitigation Measure K.2 is included under SEIR Mitigation Measure M-H-6. Wastewater Sampling Ports.
North/ South	K.3	**Sewer Improvement Design** Design and construct sewer improvements such that potential flows to the City's combined sewer system from the project do not contribute to an increase in the annual overflow volume as projected by the Bayside Planning Model by providing increased storage in oversized pipes, centralized storage facilities, smaller dispersed storage facilities, or detention basins, or through other means to reduce or delay stormwater discharges to the City system.	Yes	Mission Bay FSEIR Mitigation Measure K.3 applies to the entire project area and Mission Bay FSEIR Mitigation Measure K.4 applies only to the planned separate stormwater system that would discharge stormwater flows directly to China Basin Channel (Mission Creek) and the Bay.
South	K.4	**Alternative Technologies to Improve Stormwater Discharge Quality** Implement alternative technologies or use other means to reduce settleable solids and floatable materials in stormwater discharges to China Basin Channel to levels equivalent to, or better than City-treated combined sewer overflows. Such alternative technologies could include one or more of the following: biofilter system, vortex sediment system, catch basin filters, and/or additional source control measures to remove particulates from streets and parking lots.		Implementation of Mitigation Scenario B (identified in Mission Bay FSEIR Summary of Comments and Responses in Volume III, beginning on p. XII.253) included separating the stormwater collection system and sanitary sewer in the reconfigured Mariposa sub-basin as well as in the reconfigured Central sub-basin. The master developer ultimately adopted and is currently implementing Mitigation Scenario B, as described in the Mission Bay South Infrastructure Plan. Implementation of this mitigation approach satisfies the requirements of Mission Bay FSEIR Mitigation Measures K.3 and K.4

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
K. HYDROLOGY AND WATER QUALITY (cont.)			
South	K.5 **Central/Bay Basin Stormwater Management Program** Develop and implement a Stormwater Management Program for the Central/Bay Basin applicable to new and interim development under the Redevelopment Plan if any are contributing to direct discharges of stormwater to near-shore waters. Develop the plan in coordination with City and County of San Francisco agencies such as the Water Pollution Prevention Program of the City and County of San Francisco Public Utilities Commission's (SFPUC) Bureau of Environmental Regulation and Management, and the Clean Water Program. Develop the Stormwater Management Program according to guidelines contained in California Municipal Storm Water Best Management Practice Handbook and in California Industrial/Commercial Storm Water Best Management Practice Handbook. In addition, design the program with Best Management Practices consistent with the minimum control measures pursuant to the proposed Phase II stormwater regulations. Implement the Stormwater Management Program until a city-wide stormwater management program is developed that includes any area contributing to direct discharges of stormwater to near-shore waters. If the City and County of San Francisco develops a city-wide stormwater management program, such a program would supersede the stormwater management program for the Project Area. Periodically prepare and submit a monitoring report to the City detailing progress on implementation of Best Management Practices. Modify the Stormwater Management Program, as necessary, to respond to changes in conditions, and record any changes made (additions or deletions) in the monitoring report.	No	Mission Bay FSEIR Mitigation Measure K.5 requires implementation of an individual stormwater management program that utilizes BMPs for Mission Bay until the Phase II regulations become final and Mission Bay is included in the City's stormwater management program. However, subsequent to publication of the Mission Bay FSEIR, the SWRCB adopted the General Permit for the Discharge of Storm Water from Small Municipal Separate Storm Sewer Systems. The CCSF also adopted Section 147 of Article 4.2 of the San Francisco Public Works Code in 2010 and published the associated Stormwater Design Guidelines. Discharges of stormwater from the project site to the separate storm sewer would be required to comply with these regulatory requirements as further described above. Therefore, Mission Bay FSEIR Mitigation Measure K.5 is not applicable to the proposed project.
North/ South	K.6 **Structure Placement and Design to Minimize Dangers of Flooding** Structures in the Project Area should be designed and located in such a way to assure the reasonable safety of structures and shoreline protective devices built in the Bay or in low-lying shoreline areas from the dangers of tidal flooding, including consideration of a rise in relative sea level. Detailed construction specifications to mitigate against impacts of a sea-level rise, however, would require specific flood protection engineering and building analysis by a licensed engineer where structures are proposed below a 99-foot elevation (Mission Bay Datum). Measures include: K.6.a. Setback from the water's edge K.6.b. Install seawalls, dikes, and/or berms during construction of infrastructure K.6.c. Provide for dewatering basements	No	Mission Bay FSEIR Mitigation Measure K.6 is no longer warranted for the proposed project. FSEIR Mitigation Measures K.6a through K.6f apply to structures proposed below an elevation of -1 foot SFD (10 feet NAVD88). Elevations at the project site range from approximately -1 foot SFD (10 feet NAVD88) to +3 feet SFD (14 feet NAVD88); however some of the project components would extend below grade. The SFPUC inundation maps completed in 2014 have provided a

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
K. HYDROLOGY AND WATER QUALITY (cont.)			
North/ South (cont.)	K.6.d. Construct streets and sidewalks above existing grades by reducing the amount of excavation for utilities or basements K.6.e. Use topsoil to raise the level of public open spaces K.6.f. Use half-basements and partially depressed garage levels to minimize excavation		more detailed assessment of areas of the project site that could be inundated due to sea level rise and indicate an area greater than previously anticipated in the Mission Bay FSEIR. However, the project incorporates into the project design measures that fulfill the requirements of FSEIR Mitigation Measure K.6. This includes designing the proposed project with flood-resistant building standards or, in some cases, to be capable of adapting to meet these standards when needed in the future in recognition of future flood hazards due to sea level rise.
L. CHINA BASIN CHANNEL VEGETATION AND WILDLIFE			
North/ South	L.1 **Salt Marsh Wetland Habitat Mitigation Plan** Prepare and implement a salt marsh wetland habitat mitigation plan in accordance with the San Francisco District, U.S. Army Corps of Engineers Habitat Mitigation Planning Guidelines. Determine the details of the plan through the Section 404 permit process. Nothing in this mitigation measure is intended to constrain the flexibility needed to meet permitting agency requirements, or adjust to variability in field conditions, new information or technology, or other factors. Similarly, this condition is not intended to conflict with or constrain use of more natural alternative Channel edge treatments that are determined feasible and consistent with adopted Redevelopment Agency standards and guidelines applicable to Mission Bay as contained in Design for Development documents.	No	Mission Bay FSEIR Mitigation Measure L.1 is only applicable to construction activities within the Mission Creek Channel, and not the project site. Consequently, Mission Bay FSEIR Mitigation Measure L.1 is not applicable to the proposed project.
North/ South	L.2 **Wetland Habitat Avoidance** Avoid salt marsh wetland habitat along the China Basin Channel shoreline during installation of suction inlets (and associated piping) used for fire-fighting water supply. Design the storm drain outfalls to minimize scouring and erosion of mudflats in coordination with relevant permitting agencies during the permitting process.	No	Mission Bay FSEIR Mitigation Measure L.2 is only applicable to construction activities within the Mission Creek Channel, and not the project site. Consequently, Mission Bay FSEIR Mitigation Measure L.2 is not applicable to the proposed project.

		MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
L. CHINA BASIN CHANNEL VEGETATION AND WILDLIFE (cont.)				
North/ South	L.3	**Construction During Pacific Herring Spawning Season** Do not conduct any construction activities (including movement of heavy equipment or structures by barge or tugboat) with the potential to cause turbidity in Channel or Bay waters during the spawning season of Pacific herring (December 1-March 1).	No	Mission Bay FSEIR Mitigation Measure L.3 is only applicable to construction activities (including movement of construction barges and tugboats) within the Mission Creek Channel. Consequently, Mission Bay FSEIR Mitigation Measure L.3 is not applicable to the proposed project.
North / South	L.4	**Turbidity Prevention** Require the construction contractor to use shallow-draft tugboats, to prevent turbidity and sediment resuspension caused by tugboat activity in the Channel. Shallow-draft tugboats float higher in the water than deep-draft tugboats. Because they float higher, the tugboat propellers are not as deep under the water surface, and therefore are farther away from the bottom of the Channel. This arrangement has less potential to disturb bottom sediments because the local currents created by the propellers would not extend as deeply into the water column. Require the construction contractor to operate the tugboats at the minimum speed necessary to maintain maneuverability of the barges. Slower speeds would reduce the spin of tugboat propellers, thus minimizing turbidity and sediment resuspension.	No	Mission Bay FSEIR Mitigation Measure L.4 is only applicable to use of construction tugboats within the Mission Creek Channel. Consequently, Mission Bay FSEIR Mitigation Measure L.4 is not applicable to the proposed project.
North / South	L.5	**Construction In Channel** Confine resuspended sediments from construction activities in the Channel or Bay waters to the work site using submarine silt curtains around pile-driving or outfall construction sites, or silt fences properly anchored and trenched in place at the toe of slope below any grading or rubble-removing activities.	No	Mission Bay FSEIR Mitigation Measure L.5 is only applicable to construction activities within the Mission Creek Channel, and not the project site. Consequently, Mission Bay FSEIR Mitigation Measure L.5 is not applicable to the proposed project.
North / South	L.6	**Removal and Disposal Plan** Prepare a written plan for removal and disposal, including a description of any methods incorporated to avoid or minimize potential surface water contamination shall be prepared prior to removing existing support piles from China Basin Channel for the proposed Channel-edge treatments. Submit the plan to the San Francisco Bay Regional Water Quality Control Board for approval before implementation. Implement the plan during construction and have a qualified specialist monitored the plan to ensure adequate performance. Implement this plan during removal of pilings under the direction of a qualified specialist.	No	Mission Bay FSEIR Mitigation Measure L.6 is only applicable to construction activities within the Mission Creek Channel, and not the project site. Consequently, Mission Bay FSEIR Mitigation Measure L.2 is not applicable to the proposed project.

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
M. COMMUNITY SERVICES AND UTILITIES			
South	M.1 **Transfer School Site** Transfer the 2.2 acre school site to the San Francisco Unified School District in a developable condition prior to issuance of building permits for residential units that will make the total combined number of dwelling units in Mission Bay North and Mission Bay South equal to or greater than 3,200 dwelling units.	No	Mission Bay FSEIR Mitigation Measure M.1 is only applicable to the 2.2-acre school site in the plan area, not the project site. Consequently, Mission Bay FSEIR Mitigation Measure M.1 is not applicable to the proposed project.
North / South	M.2 **Include Water Conservation in Buildings and Landscaping** Include methods of water conservation in Mission Bay buildings and landscaping. Water conservation methods include the following: M.2.a. Install water conserving dishwashers and washing machines in rental apartments and condominiums M.2.b. Install water conserving dishwashers and water efficient centralized cooling systems in office buildings M.2.c. Incorporate water efficient laboratory techniques in research facilities where feasible M.2.d. Provide information to residences and businesses advising methods to conserve water M.2.e. Install water conserving irrigation systems (e.g., drip irrigation) M.2.f. Design landscaping using drought resistant and other low-water use plants	No	Compliance with the 2013 California Green Building Code, 2013 San Francisco Green Building Code, San Francisco Water Efficient Irrigation Ordinance and the San Francisco Green Landscaping Ordinance would in effect implement FSEIR Mitigation Measures M.2a through M.2f. Therefore, Mission Bay FSEIR Mitigation Measures M.2a through M.2f are no longer required.
North / South	M.3 **Extend Auxiliary Water Supply System** Extend the Auxiliary Water Supply System (High-Pressure System) through the interior of the Project Area. The routing, design and implementation of the AWSS extensions shall be determined by the Fire Department and the Department of Public Works.	No	The AWSS has been extended through the interior of the plan area, and satisfies the requirements of Mitigation Measure M.3. Mission Bay FSEIR Mitigation Measure M.3 is not applicable to the proposed project.
South	M.4 **Sewers and Wastewater Treatment** Construct a fence around any interim surface detention basins.	No	There would be no interim stormwater detention ponds constructed on the site under the proposed project. Therefore Mission Bay FSEIR Mitigation Measure M.4 does not apply to the project.
South	M.5 **Stormwater Runoff Control and Drainage** Drain stormwater runoff (up to a 5-year event) from newly constructed buildings and permanently covered surfaces in the Bay Basin into the City’s combined sewer system until installation of a permanent sewer system.	No	Mission Bay FSEIR Mitigation Measure M.5 is not applicable to the proposed project because the Bay basin has been incorporated into the reconfigured Central sub-basin and the project would discharge to the Mission Bay separate stormwater system that has already been constructed.

	MISSION BAY FSEIR SECTION / MITIGATION MEASURE	MB FSEIR Mitigation Measure Applicability to Project	Notes
M. COMMUNITY SERVICES AND UTILITIES (cont.)			
South	M.6 **<u>Construct New Fire Station and Provide New Engine Company</u>** M.6.a. ***<u>Construct New Fire Station</u>*** Construct or pay for the construction of a new fire station in the Mission Bay South Redevelopment Area to house equipment and personnel serving the Project Area south of China Basin Channel, either in a new building or in the vacant Fire Station No. 30 after rehabilitation and expansion of that building. The San Francisco Fire Department shall review each proposed development phase to determine when land for the new fire station shall be transferred and when planning and design for the fire station shall be initiated.	No	The new Public Safety Building at Third Street and Mission Rock Street in Mission Bay South became operational in April 2015, and satisfies the requirements of Mission Bay FSEIR Mitigation Measure M.6a.
South	M.6.b. ***<u>Provide New Engine Company</u>*** Provide or pay for the provision of an engine company and associated Fire Department personnel and equipment, and a truck company and associated personnel and equipment, to serve the Project Area south of China Basin Channel. The San Francisco Fire Department shall review each proposed development phase to determine when the engine company and truck company and related personnel and equipment shall be provided.	No	SFFD Station 4 company currently operates in the Public Safety Building in Mission Bay South in April 2015, and satisfies the requirements of Mission Bay FSEIR Mitigation Measure M.6b.